THE IMPLEMENTATION OF AN ONLINE EDUCATIONAL PROGRAM FOR NURSES: INCREASING KNOWLEDGE ABOUT DYSPHAGIA AND DYSPHAGIA DIETARY RECOMMENDATIONS

by

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DISSERTATION ABSTRACT

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Title: The Implementation of an Online Educational Program for Nurses: Increasing Knowledge about Dysphagia and Dysphagia Dietary Recommendations

Diet modification has become a fundamental clinical tool for speech-language pathologists (SLPs) within dysphagia management, particularly for acutely ill patients. However, for dietary modifications to meet intervention goals of increased intake and prevention of negative health consequences, adherence is needed across healthcare professionals, including nurses. Previous literature has highlighted education as a key contributor to increased adherence. Further, the increased flexibility of online education may help mitigate barriers experienced by healthcare professionals to completing these trainings. The purpose of this study was to develop and pilot an online educational program about dysphagia and diet modification for inpatient nurses caring for patients experiencing dysphagia. The study also aimed to examine the feasibility of program implementation and participants' overall perceptions of program impact. A total of four participants completed the program and subsequent surveys with three also participating in semi-structured interviews about their experience. Results showed a large effect in knowledge level change between baseline and directly after completing the program and between baseline and one month after completion. Additionally, most of the participants rated the educational program as "good" using the System Usability Scale. Four themes were generated based on the semi-structured interviews. First, participants described the positive benefits of the educational program

on their knowledge and clinical practices. The second and third themes encompassed dysphagia-related training received in educational and work settings and what barriers exist to additional training. The fourth theme included insight into the relationships between nurses and SLPs and the positive effects of a strong relationship. Taken together, the quantitative and qualitative analyses supported improvement in participants' knowledge levels, preliminarily supporting the program's effectiveness. Results also showed good levels of acceptability and feasibility of the online program as a mode for training. By increasing knowledge about dysphagia management, implementing such a program in nursing training or continuing education may increase adherence to dietary recommendations. In doing so, such a program can lead to earlier identification and appropriate management of dysphagia, resulting in better treatment outcomes, including a reduction in the negative consequence of dysphagia, increased patient satisfaction, and improved quality of life.

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CHAPTER I

INTRODUCTION

Swallowing is a normal physiological process that involves transferring solids, liquids and saliva from the mouth to the stomach (Dodds et al., 1990; Groer & Crary, 2021). Various muscles, organs, and nerves work together in order for swallowing to occur. The sequential action of swallowing occurs in seconds and requires minimal effort and awareness (Groher & Crary, 2021). Normal swallowing consists of four phases: the preparatory phase, the oral phase, the pharyngeal phase, and the esophageal phase. Each phase has its own specific function that contributes to the normal swallowing process. The preparatory phase starts as soon as food and liquids enter the mouth, as taste, temperature, and texture trigger different receptors in the tongue, soft and hard palate, and pharynx. Mastication occurs, as needed, and saliva formation is triggered to help in forming a cohesive bolus (e.g., of food or drink). The oral phase includes the movement of the bolus to the pharynx through the movement of the tongue. The pharyngeal phase involves moving the bolus from the pharynx to the esophagus while simultaneously protecting the airway from food or liquids entering through actions such as the elevation of the larynx. More specifically, it starts approximately when the bolus reaches the valleculae or back of the tongue and ends when the food passes the upper esophageal sphincter. Lastly, the esophageal phase consists of peristaltic movement of the esophagus that propels the bolus to the stomach. Any changes or abnormality in any of these four phases or related structures can lead to dysphagia (Dodds et al., 1990).

Dysphagia is a swallowing disorder that can occur in any of the four phases of swallowing. It is a prevalent and debilitating health condition, estimated to occur in approximately 8% of the population worldwide (Cichero et al., 2013) and up to 91% of the

population aged 70 years of age or older (Ortega et al., 2017). Dysphagia is associated with or caused by different conditions, including neurological, progressive, and structural disorders (Groher & Crary, 2021; Roden & Altman, 2013). Neurological disorders associated with dysphagia include traumatic brain injury, cerebral palsy, and stroke. Progressive disorders that frequently lead to dysphagia include Parkinson's disease and Alzheimer's disease and other related dementias. Finally, structural disorders that can contribute to dysphagia include the consequences of surgery, intubations, cancer and chemotherapy. A main concern related to dysphagia across all of these populations is that dysphagia can lead to the occurrence of penetration or aspiration, or decreased airway protection. Penetration is when food and liquid enter the respiratory tract above the vocal cords whereas aspiration is when food and liquid enter the respiratory tract below the vocal cords. The signs and symptoms associated with dysphagia and aspiration/penetration vary across patients and patient populations, due to multiple variables such as age and underlying diagnosis, and include coughing, throat clearing, wet vocal quality, residual food/drink, pain when swallowing, drooling, fatigue, weight loss, nutritional deficiency, and difficulty breathing (Groher & Crary, 2021; Weir et al., 2009). These signs and symptoms can help identify those individuals at risk for dysphagia, allowing for earlier identification, assessment, and treatment. However, aspiration and penetration can also occur silently, without any signs and symptoms, making it difficult to detect without further assessment.

The significant physical and emotional consequences of dysphagia can markedly reduce quality of life and increase mortality (Ekberg et al., 2002; Guyomard et al., 2009; Leow et al., 2010; Printza et al., 2020; Vesey, 2013; Yifru et al., 2021). Dysphagia can lead to dehydration, malnutrition, failure to thrive, and aspiration pneumonia, all of which can lead to death (Chadwick et al., 2002; Namasivayam-MacDonald et al., 2017; Palmer & Padilla, 2022, Van den

Berg et al., 2014). Aspiration pneumonia is a medical condition where an inflammation of the lungs occurs due to food, liquids, or secretions entering into the airway. Healthy individuals do minimally aspirate occasionally, but the body's cellular immune system has the capability to clear it without additional complications (Marik, 2001; Palmer & Padilla, 2022). However, when the immune system is impaired due to health status, the amount aspirated is large and continuous, and/or the aspirated material contains bacteria, aspiration pneumonia can then develop. The occurrence of aspiration pneumonia can increase hospital length of stay and thus, increase the cost of treatment (Attrill et al., 2018; Schwarz et al., 2017). Dehydration and malnutrition occur in about 55% of individuals diagnosed with dysphagia (Howard et al., 2018). Dehydration can lead to confusion, fatigue, and system failure, and it can also exacerbate the dysphagia further by causing mouth dryness (xerostomia), all increasing the chances of poorer oral hygiene and aspiration pneumonia (Rofes et al., 2011; Wirth et al., 2016). Malnutrition has an adverse effect on an individual's health (Carrion et al., 2015; Wirth et al., 2016). It affects the immune system and increases the risk of mortality. Further, all of these consequences and conditions can negatively affect the healing processes of the underlying medical cause of the dysphagia.

Eating and drinking during mealtimes are also important components of daily social interaction and relationships (e.g., Mintz & Du Bois, 2002; Groher & Crary, 2021). Cultural rituals and celebrations, such as birthdays and holidays, and other social gatherings often involve food and drink. Individuals diagnosed with dysphagia may have difficulty participating in such social interactions or they might avoid, or be excluded from, being part of these events completely (Ekberg et al., 2002; McQuestion et al., 2011; Wilson et al., 2013). Not surprisingly, dysphagia has been associated with decreased health-related quality of life (Jones et al., 2018).

Depression and anxiety can also commonly occur in individuals diagnosed with dysphagia, which can be related to their increased social isolation and reduced quality of life (Eastburn et al., 2022; Lin et al., 2012; Sadeghi et al., 2021). For example, among 96 patients diagnosed with dysphagia in the hospital setting, anxiety was present in 37% of participants, depression symptoms were observed in 32.6%, and both anxiety and depression were present in 21.3% (Verdonschot et al., 2013). In addition, dysphagia can strip away the pleasure associated with mealtimes, resulting in individuals eating as a matter of necessity and hunger only (Ullrich & Crichton, 2015). The psychosocial effects of dysphagia are not only seen in the individual diagnosed with dysphagia but can also be seen in the caregivers caring for individuals with dysphagia (Choi-Kwon et al., 2005; Rangira et al., 2021). The high demands needed to care for individual with dysphagia (e.g., preparing regular or modified meals; constant supervision to ensure safe swallowing and sufficient consumptions), along with their regular daily life demands can significantly increase caregiver burden (Namasivayam-MacDonald & Shune, 2018; Rangira et al., 2021). Moreover, caregivers may experience guilt over their own ability to eat and may limit their food choices and social interactions as a result. This increase in caregiver burden, guilt, and social isolation can lead to increased feelings of depression and loneliness (Shune & Namasivayam-MacDonald, 2020).

In light of these negative consequences, speech-language pathologists (SLPs) are challenged to provide the most effective interventions possible in order to reduce the impact of dysphagia on the individual and their family. A variety of treatments are used in dysphagia management, including rehabilitative exercises and compensatory strategies (e.g., dietary modifications, postural adjustments) (Groher & Crary, 2021; Johnson et al., 2014). Rehabilitative exercises focus on rehabilitating the underlying impairment for the purposes of long-term

improvements, such as increasing muscle strength and range of motion through repetition and optimal muscle movement (Huckabee & Macrae, 2014; Steele, 2012). For example, the McNeill Dysphagia Therapy Program, consists of a systematic set of exercises that aims to improve the strength, speed, and coordination of the swallow and has been shown to improve the physiological function of swallowing (Carnaby et al., 2020; Crary et al., 2012). Another rehabilitative intervention technique that has shown benefit is lingual resistance and strength training exercises. These exercises can help increase the strength of the tongue muscles and therefore improve swallowing (Steele et al., 2016; Robbins et al., 2005). However, these rehabilitative techniques have been criticized because while they are based on targeting muscle weakness, current SLP tools generally cannot assess muscle strength (Huckabee & Macrae, 2014). In addition, there is a lack of strong evidence and inconsistent findings available to support the use and benefits of rehabilitative exercises (Namasivayam-MacDonald et al., 2022).

Unlike rehabilitative exercises that are expected to yield long-term underlying changes in the swallowing mechanism, compensatory strategies introduce temporary changes in the swallow environment that will have an instant effect on improving swallowing function while the strategy is being implemented (Sura et al., 2012). Compensatory strategies include postural adjustments, swallowing maneuvers, and diet modification (Garcia, & Chambers, 2010; Sura et al., 2012). Postural adjustments are used to help change the bolus speed and direction in order to prevent aspiration and improve swallow function (Sura et al., 2012). The chin tuck is a head posture change commonly used where the chin is tucked toward the chest during swallowing (Logemann et al., 2008). This postural change can improve airway protection and prevent aspiration. Diet modification refers to the processes of changing food texture and liquid thickness consistency (Cichero et al., 2013; Garcia & Chambers, 2010). Often the goal in using diet modification is to

prevent the occurrence of adverse events, such as aspiration pneumonia, choking, and asphyxiation, and to ensure adequate nutrition (Cichero et al., 2013; Sura et al., 2012). Consequently, in preventing these adverse events, the risk of mortality can be reduced (Cichero et al., 2013). Diet modification can also be used to compensate for anatomical and physiological changes, such as a delayed swallow onset, missing teeth, and impaired oral sensory input (Howard et al., 2018). As a result, diet modification has become a fundamental aspect of treatment in both acute and chronic dysphagia for many SLPs (Bath et al., 2000; Garcia & Chambers, 2010, Carnaby & Harenberg, 2013; Ney et al., 2009; Sura et al., 2012). For example, it has been reported that approximately 28 – 47% of residents living in nursing homes receive modified diets (Castellanos, 2004; Streicher et al., 2018; Vucea, 2019).

However, for such a compensatory dysphagia intervention to be effective, patient adherence is needed (Low et al., 2001). A concept similar to compliance, adherence specifically acknowledges and incorporates the effect of personal knowledge, motivation, and social context on the extent to which a patient follows agreed upon recommendations (McKay & Verhagen, 2015). In other words, adherence is thought to be patient-centered as the healthcare plan is built upon a mutual agreement between the clinician and patient. Ultimately, in order for dietary modifications to meet the intervention goals of increased oral intake and the prevention of negative consequences, adherence is needed and patients must actually be consuming the recommended modified textured food and drinks. Yet, not all patients follow these recommendations. Nonadherence to modified diets has been reported to be between 21% and 43.5% with higher nonadherence to modified liquid consistencies (40.6%) as compared to modified food textures (11.7%) (Espinosa-Val et al., 2020; Low et al, 2001; Shim et al., 2013).

In order to improve adherence to dietary recommendations in dysphagia, and therefore mitigate the risks associated with dysphagia, it is necessary to understand what positively or negatively influences adherence. Across the limited existing literature, contributing factors that have been identified include patient mental health status; dissatisfaction with the modified diet; patient, caregiver, and health employee degree of knowledge and education; pre-thickened liquids; and setting policies and procedures (Chadwick et al., 2003; Colodny, 2005; Low, et al., 2001; Nagshabandi et al., 2023; Rosenvinge & Starke, 2005; Seshadri et al., 2018; Smith-Tamaray et al., 2011). Importantly, education and knowledge have consistently been reported to be an influencing factor on adherence across multiple studies, suggesting their importance. Increased education and increased knowledge of the individual with dysphagia and their formal/paid (e.g., healthcare staff) and informal/unpaid caregivers (e.g., family members) regarding the benefits of and rationale behind the recommended diet have been shown to increase the likelihood that they would adhere to the recommendations (Chadwick et al., 2002; Chadwick et al., 2003; Colodny, 2001; Low et al., 2001; McCurtin et al., 2018; Rosenvinge & Starke, 2005; Robbertse & Beer, 2020; Seshadri et al., 2018; Smith-Tamaray et al., 2011). Understanding why they were placed on a modified diet, what modified diet they were on, how to use thickeners and prepare their modified diet, and what the consequences were of not following the recommended diet all led to better adherence. For example, post-stroke patients reported that their nonadherence to the recommended modified diet was related to their lack of knowledge regarding the reason they were placed on the modified diet (McCurtin et al., 2018). Given this lack of knowledge, they reported that they felt that they did not need to be on a modified diet. As another example, when educational programs about dysphagia were provided to nurses, the number of patients who were identified as having or being at risk for dysphagia

increased, highlighting the nurses' increased awareness of dysphagia and its consequences (Hansell & Heinemann, 1996).

Collaborating with and educating caregivers and other professionals who work with individuals with dysphagia is necessary for the success of dysphagia management, especially in more acute hospital settings where the risks associated with dysphagia may be increased given the baseline medical vulnerability or instability of the patients (Dondorf et al., 2015). Such interdisciplinary collaboration is strongly encouraged by the World Health Organization (WHO) because of its benefits in achieving therapy goals (WHO, n.d.). Nurses, in particular, are important for SLPs to collaborate with in hospital settings because they spend the most time with the patients and are therefore best able to monitor and report on patient progress (Dondorf et al., 2015; Heritage, 2010). Nurses are able to administer dysphagia screening tools (Mateos-Nozal et al., 2022), which help identify individuals who might have dysphagia and lead to more timely referrals to the SLP. Better education on how to use the screeners can lead to more frequent administration and thus, more accurate identification (Hansel & Heinemann, 1996). Nurses can also provide SLPs with needed support in managing dysphagia by implementing the SLPs recommendations (e.g., modified diets and postural changes) and monitoring dysphagia signs and symptoms during meals and medication administration. Since SLPs are typically only present during the assessment and treatment sessions, nurses are often better-suited to help implement the techniques as they are more present with the patient. For example, if the SLP recommends small sips, the nurses are able to monitor and ensure that the patient is taking small sips throughout the day (Dondorf et al., 2015). The nurses are also able to report any nonadherence to the SLPs or any continuing concerns, such as if they note, for example, continued coughing even with the recommended diet and safety precautions. Nurses are crucial

for both monitoring patient adherence and also ensuring the environment is set up to support patient adherence. For example, it is equally as important for the nurses themselves to be adherent, only offering patients the appropriate diet textures and with the appropriate postural modifications. Therefore, providing educational opportunities to nurses is essential.

Thus, the goal of this study was to pilot an online educational training program aimed at improving nurses' knowledge about dysphagia and diet modification. Given the important role nurses play in adherence and in light of the positive effects increased knowledge and education can have on adherence, improving nurses' knowledge may ultimately improve dysphagia management outcomes—and overall patient wellbeing.

CHAPTER II

LITERATURE REVIEW

The literature review section will provide the empirical support and framework for the development of the targeted educational program explored in the current study. First, a discussion on the use of diet modification in dysphagia management and the benefits of this strategy will be provided. The following section will describe the factors influencing adherence to dysphagia dietary modification as identified in the current dysphagia literature. Then, a more specific discussion on education as a primary influencer on adherence is offered. Finally, information regarding the use of online educational platforms and their advantages will be presented.

Diet Modification in Dysphagia

Diet modification has become a fundamental clinical tool for SLPs within dysphagia management (Carnaby & Harenberg, 2013; Garcia & Chambers, 2010; Howard et al., 2018; Ney et al., 2009; Sura et al., 2012). Diet modification refers to changing food textures and liquid viscosity, often as a result of swallow safety needs (Cichero et al., 2013; Garcia & Chambers, 2010). It has been reported that up to 67% of residents living in long-term homes or nursing facilities are on texture modified diets (e.g., Painter et al., 2017; Streicher et al., 2018; Vucea et al., 2019) and modified diets are prescribed to 15 - 30% of patients in long term acute (Keller et al., 2012). Diet modification can also be recommended as more of a short-term management strategy to ensure safe oral intake given an acute condition. For example, the prevalence of dysphagia among stroke patients is high (50 to 80%) (Kim et al., 2020). However, most stroke patients show significant improvement in the first few weeks (Sura et al., 2012; Takizawa et al., 2016). Dysphagia in this situation may be temporary and can resolve when the patient is more

medically stable and alert and on less medication. Thus, diet modification is often recommended during this early stage of recovery, particularly when they may not be able to participate in active dysphagia exercises or swallowing maneuvers (Clark, 2003).

Supporting its use, diet modification has the potential to lead to immediate improvements, when implemented correctly. Swallowing physiology and outcomes can be improved by changing the food texture and liquid thickness, including increased nutritional intake and decreased risk of aspiration and asphyxiation (Cichero et al., 2013; Steele et al., 2015; Sura et al., 2012). Some of the potential benefits of modified food and liquids, including in the prevention of aspiration, have been documented in the literature. For example, one study explored the occurrence of penetration and aspiration based on videofluoroscopic examination among 55 participants diagnosed with unilateral vocal cord paralysis (Bhattacharyya et al., 2003). When thin liquids were presented, penetration was noted in 19 of the participants and aspiration in 11. But when thickened liquids were provided, penetration was only noted in 12 of the participants and no signs of aspiration were noted in any of the participants. These findings support that the use of thickened liquids may increase safety during the consumption of liquids by reducing the occurrence of aspiration.

More recently, a systematic review of the literature was conducted to explore the potential positive benefits of modified liquids and solid consistencies (Steele et al., 2015). Out of the 10,147 non-duplicate articles, a total of 36 articles met the inclusion criteria regarding the reporting of swallowing modified liquids and food. Participants varied across the 36 articles and included healthy individuals in 26 articles and individuals with dysphagia in 10 articles (primarily adults across both groups). All 36 articles provided information regarding thickened liquids, but only 18 articles looked into modified food diets. In terms of thickening liquids, the

studies reviewed did support that increasing the thickness level of liquids reduces the risk of penetration and aspiration. Unfortunately, in terms of food consistency, there was a clear paucity of research related to the therapeutic use of food texture modification. The articles supported that optimal food consistency requires an individualized evaluation of tolerance for different foods, generally part of the comprehensive swallowing assessment. It did appear that some relevant food properties of food texture to consider include cohesiveness, hardness, and slipperiness. Recommendations for modified food textures may also further be related to reducing risk for choking, as foods that require chewing present a choking risk and therefore foods that require less chewing (e.g., a pureed consistency) would decrease risk of choking. Of note, choking and its related terms (e.g., airway obstruction, asphyxiation) were not included in the search of the systematic review. The systematic review also shed light on additional gaps found in the literature. The available literature on the use of thickened liquids, similar to solids, is also limited and does not yet provide a full picture of its benefits and limitations at this time. Support for benefits was also, at times, mixed. For example, the systematic review revealed that although thickened liquids decreased the occurrence of penetration/aspiration (increased safety), increased thickness can also lead to increased residue (decreased efficiency). This indicates the need for research to determine the most appropriate thickness level that provides the best therapeutic benefits.

Despite the identified gaps and lack of strong support for aspects of diet modification as outlined in the previous systematic review, there remains both empirical and theoretical support for the use of diet texture modification. As noted above, the increased risk of choking (asphyxiation) with solid, particularly chewable, food has been supported in various research studies. For example, previous work has demonstrated an increased risk of choking on solid food

in the geriatric population (Kramarow et al., 2014). This may be due, in part, to the loss of muscle strength needed for mastication, reduced bite force, and loss of teeth needed to break food into smaller particles that occurs in older adults (Kramarow et al., 2014; Kurosu et al., 2021; Okamoto et al., 2012). It has also been found that .66 out of 100,000 individuals in the general population are at risk of death due to choking (Samuels & Chadwick, 2006) and that this incidence increases with the presence of oral dysphagia. In line with the results of the systematic review, the use of thickened liquids to prevent aspiration has been supported in the literature (Cichero et al., 2013). Thin liquids require fast and adequate coordination of swallowing to consume them safely. Therefore, increasing the thickness of the liquid consistency can help in the formation of the bolus, reduce transit time, and prevent the occurrence of aspiration. Thus, modified food and liquid consistencies still remain widely used to promote increased safety and efficiency during swallowing and are receiving growing attention. To promote increased evidence-based practices related to the use of modified textures and to decrease the variability in labels and consistencies by creating standardized definitions for each level, the International Dysphagia Diet Standardization Initiative (IDDSI) initiative was founded.

However, the use of modified diets in dysphagia management remains a controversial topic in the literature (e.g., Anderson et al., 2013; Beck et al., 2018; Howard et al., 2018; O'Keeffe, 2018). Some authors argue that the strength of the supporting research remains weak (O'Keeffe, 2018). In addition to the gaps in the literature previously identified in the systematic review (Steele et al., 2015), there are a number of potential negative consequences associated with modified diets such as decreased intake leading to dehydration and malnutrition (Garcia et al., 2005; Howard et al., 2018; Painter et al., 2017). One study found that only 6.7% of patients on modified diet met their daily fluid intake compared to 33.3% of patients on regular diet

(Bannerman & McDermott, 2011). Additionally, in another study conducted with 28 long-term care residents who were on modified diets, signs of dehydration were noted in 75% of the participants (Leibovitz et al., 2007). This is likely related to decreased fluid consumption of thickened as compared to thin liquids (Bannerman & McDermott, 2011). This decreased consumption can be attributed to various factors, such as the finding that thickening agents not only change the texture of liquids (i.e., increased viscosity), but can also alter the taste (Garcia et al., 2005). Previous research has also found that patients admitted to the hospital and who were on thickened liquids were offered fluids less often during their stay (McGrail & Kelchner, 2015), suggesting that the environment may play an important role in the consumption of modified diets. Similarly, the use of texturally modified foods, especially purees, can negatively affect health and quality of life (O'Keeffe, 2018). Pureeing foods can alter taste and decrease visual attractiveness (Colodny, 2005; Kayser-Jones, 2002; Keller & Duizer, 2014). In a qualitative study done by Colodny (2005), participants expressed their dissatisfaction of the pureed food with statements such as, "I don't want baby food. I don't want that mush. I want normal food." This can result in individuals on modified food textures losing their desire to eat, which can lead to malnutrition. This was also supported by another qualitative study, where 15 individuals on pureed food were interviewed. None of the participants expressed enjoyment consuming the pureed food due to reasons such as the loss of sensory appeal and all the food looking exactly the same (Keller & Duizer, 2014). Interestingly, studies have shown improved intake of pureed food when it was molded to look similar to its original shape (Germain et al., 2006). Other studies have also shown that pureed food often is nutritionally inferior to regular food. In one study conducted in Canada, the pureed food menus of 32 long term care facilities were compared to the regular menus in the same facilities (Vucea et al., 2017). Nutritional analysis looked at the

amount of energy, protein, carbohydrates, and other micronutrients offered by the pureed and regular menu for each day. The amount of energy offered by the pureed menu was 1801 kcal compared to 2058 for the regular menus. Additionally, the pureed menus contained 82.2 g of protein compared to 86.5 g of protein in the regular menus. Carbohydrate levels for both menus met the recommended daily levels needed for individuals and both menus offered comparable levels of vitamin D, calcium, and potassium.

Despite the presence of negative research suggesting barriers or other negative consequences associated with dysphagia dietary modifications, there still remains support for the positive effects of these diets in preventing aspiration and thus preventing pneumonia and death. This is especially important when dealing with patients in acute care settings, who may only need modified diets for a short amount of time. Specifically, the health status of patients in acute care settings is already compromised and the occurrence of aspiration can significantly affect their health status and recovery; these patients are also more susceptible to the negative consequences of aspiration as described earlier. Therefore, providing modified diets can be a safe, and important, temporary solution until their health improves.

Adherence to Diet Modification Recommendations

In order for dietary modifications to meet the intervention goals of increased oral intake and the prevention of negative health consequences, adherence is needed. That is, patients must actually be consuming the recommended modified textured food and drinks for this intervention to be effective. Yet, not surprisingly, not all patients follow these recommendations. A few studies have explored the prevalence of and factors related to nonadherence to dysphagia-related dietary recommendations across a number of settings. For example, data collected from 255 patients with dementia in hospitals and healthcare centers reported an 11.7% rate of

nonadherence to modified food consistency and 40.6% nonadherence to modified liquid thickness after discharge (Espinosa-Val et al., 2020). Another study investigated the degree of patient's adherence to dysphagia dietary recommendations and potential health consequences of nonadherence in 140 patients following admission to an acute care hospital in New Zealand (Low et al, 2001). During the initial admission, demographics, assessment, and swallowing recommendations were recorded. Participants were then interviewed by an SLP, either in their home, in the hospital (if they were readmitted), or via telephone (if they relocated to a different city). The target of these interviews was to record the reasons for readmission (if readmitted), any occurrence of pneumonia, and the degree of adherence to the swallowing recommendations. Adherence to safe swallow strategies, modified fluids, and modified foods were measured through a five-point scale (always, mostly, sometimes, rarely, never). Death certificates and medical charts were also reviewed for participants who passed away during the study. Results indicated that complete nonadherence (i.e., rating of "never") was noted in 21% of the participants, with a high percentage of readmission to hospitals being due to aspiration pneumonia. Among the participants who passed away, medical records and death certificates indicated that 52% died because of aspiration pneumonia. Seven medical records of the 140 participants stated clearly that they were not following the swallowing recommendations. Out of those seven patients, six died due to aspiration pneumonia, suggesting an important link between adherence and mortality due to aspiration pneumonia.

Another study of 62 Korean patients diagnosed with dysphagia in a tertiary university hospital investigated adherence to dysphagia dietary recommendations and patients' reasons for nonadherence (Shim et al., 2013). The mean age of participants was 64.1 years and all were placed on a modified diet. Data were collected by first reviewing the patient charts for dietary

recommendations made following a videofluoroscopic swallowing study (VFSS). Each patient was then asked what diet they were on and if they had been adherent to their swallowing recommendations before they participated in their second VFSS. All of the patients identified as nonadherent were interviewed by phone to understand their reasons behind their decision. Results revealed a nonadherence rate of 43.5% to modified diets. Of those participants who were nonadherent, they stated that their reasons for nonadherence were dissatisfaction with the texture and taste of the food, the inconvenience of preparing the modified diet, and/or increased swallowing difficulties with the modified diet. These findings related to dissatisfaction among patients discharged from a hospital were also supported by another study conducted with nursing home residents (Colodny, 2005). Among the residents placed on modified diets, the nonadherence rate was reported to be 90% and dissatisfaction with the modified diet was reported as one of the main reasons for nonadherence with the diet recommendations.

In addition, some individuals with dysphagia are dependent on the adherence of their caregivers and healthcare providers (e.g., nursing staff) to the diet recommendations due to cognitive and physical limitations (Krekeler et al., 2018). Yet still, adherence is not fully achieved. For example, Chadwick et al. (2003) examined adherence to dysphagia recommendations among individuals with intellectual disabilities. Participants included 40 adults with various degrees of dysphagia, diet modifications, and recommendations by the SLP. The authors also looked at adherence to recommendations across four different settings (day centers, family homes, public group homes, and private group homes) and an equal number of participants were included from each setting. To determine the level of adherence to the dysphagia guidelines, the adherence of either the independent participants themselves (n = 18) or the caregiver of the dependent participants (n = 22) was investigated. Data collection was

conducted through observations during mealtime, review of case files, and interviews. Background information, current diet, symptoms of dysphagia, severity of dysphagia, stage of the dysphagia impairment (oral, pharyngeal, esophageal), and videofluoroscopy results were collected during the interview and case file review. A personalized checklist that included all of the dysphagia recommendations for each participant was used during mealtime observations, to evaluate whether the independent participants or the caregivers of the dependent participants were following the recommendations. Results revealed that the average adherence rate of caregivers to the dysphagia recommendations was 76.9%. Of note, there is potential for adherence among individuals who are dependent for care to be improved. For example, one study provided healthcare members caring for patients with dysphagia with training programs about dysphagia (Rosenvinge & Starke, 2005). Results showed that staff who attended and completed more training sessions were the ones who were most adherent.

Unfortunately, while there are studies that have investigated adherence to dysphagia dietary recommendations, these studies remain limited, with few focusing specifically on adherence as the primary outcome. Further, given the frequent use of diet modifications, more studies are needed to better understand not only the behavior of adherence and current adherence levels in different groups of patients, but also what factors influence adherence in order to improve the behavior. Based on the current literature, adherence to dysphagia dietary recommendations has emerged as a complex activity, influenced by multiple factors. Thus, in order to effectively increase adherence, a better understanding of these factors and how they influence the behavior is essential. Various factors related to emotional, psychological, and cognitive health have been identified. As noted above and across other literature, patients' dissatisfaction with modified diets has been identified as one factor influencing adherence

(Colodny, 2005; McCurtin et al., 2018; Robbertse & Beer, 2020; Shim et al., 2013). Patients have been found to be dissatisfied with the texture of the modified food and liquids (Colodny, 2005; McCurtin et al., 2018; Shim et al., 2013) and also with the taste of the modified food and liquids (Colodny, 2005; McCurtin et al., 2018; Shim et al., 2013). One study examined the factors contributing to nonadherence among 63 nursing home residents (Colodny, 2005). All participants completed a clinical swallowing assessment and a fiberoptic endoscopic examination of swallowing (FEES) and were diagnosed with dysphagia and placed on a modified diet. Participants ages ranged from 65 to 100 years old and they all resided in a nursing home located in New York City. All participants were cognitively and legally able to make their own decisions about their healthcare. Information about adherence was collected through individual interviews that lasted 10 to 15 minutes conducted by the SLP. The participants were asked a direct, nonjudgmental open-ended question about their reasons for not adhering to the dysphagia dietary recommendations. Results showed that 90% of the participants were nonadherent. A key factor reported by 39.7% of the participants was their dissatisfaction with the modified diet. Participants stated poor taste, feeling nauseated, feeling full, and not feeling hydrated as the rationale for their nonadherence. Another reported reason for patients' dissatisfaction with modified diets and subsequent nonadherence was the inconvenience of preparing them, which was noted by 56.5% of patients in the tertiary university hospital in the Shim et al. (2013) study described above. Furthermore, the unappealing nature of modified texture foods has also been reported as a reason for patient dissatisfaction with their modified diet, as revealed in a study conducted by McCurtin et al. (2018). The study aim was to investigate the experience of post-stroke patients with swallowing disorders who were placed on modified diets. Participants included 14 post-stroke patients with good expressive communication skills who were able to

independently describe their experiences. Data collection was conducted through semi-structured interviews that lasted 15 to 30 minutes and were recorded. Results showed that all of the 14 participants reported their dissatisfaction with diet due to lack of flavor, unpleasant taste, and unappealing look. Across the existing literature, dissatisfaction with the modified diet has been reported by the patients themselves (Colodny, 2005; McCurtin et al., 2018; Shim et al., 2013) and also observed and reported by nurses caring for patients with dysphagia (Robbertse & Beer, 2020). Ultimately, when patients are not satisfied with their modified diet, it negatively affects their willingness to consume it and, ultimately, their adherence to the recommendation.

Another commonly occurring factor influencing adherence across the literature is the individual's level of knowledge about the recommended diet (Chadwick et al., 2003; Low et al., 2001; McCurtin et al., 2018; Rosenvinge & Starke, 2005; Seshadri et al., 2018). This includes knowledge regarding why they were placed on a modified diet, what modified diet they were on, how to use thickeners and prepare their modified diet, and what the consequences were of not following the recommended diet. The more knowledgeable the individual with dysphagia was about the benefit and the rationale behind the recommended diet, the more likely they were to adhere to the recommendations. For example, when interviewed about their experiences with modified diets, post-stroke patients reported nonadherence to the recommended modified diet as related to their lack of knowledge regarding the reason they were placed on the modified diet (McCurtin et al., 2018). Given this lack of knowledge, they reported that they felt that they did not need to be on a modified diet and therefore did not follow the recommendations.

The lack of knowledge as a contributing factor affecting adherence to dysphagia dietary recommendations was also supported in a study of 86 hospitalized patients with dysphagia (Low et al., 2001). All participants were patients admitted to a hospital in New Zealand for acute care

services. Participants included 55 males and 31 females with a mean age of 77.4 years. All of the participants had completed a videofluoroscopic swallow examination to determine their diagnosis of dysphagia. Interviews were conducted with all of the participants to gather information regarding their adherence to the diet recommendations and, as applicable, reasons for nonadherence, and information and reasons behind readmission to hospitals. Information was also collected about any diagnosis of chest infection or pneumonia. A 5-point rating scale of adherence was also used during the interviews. Data showed that 21% of the participants indicated that they never adhered to any of the dysphagia dietary recommendations. In addition, the rate of hospital readmission due to chest infection or pneumonia was higher in nonadherent participants (22%) when compared with adherent participants (1.5%). Participants' lack of understanding of the diet recommendations was a contributing factor for nonadherence. Another study investigated the adherence to dysphagia dietary recommendations in the acute care setting in addition to investigating the effects of changes in clinical practices on adherence (Rosenvinge & Starke, 2005). Participants included all inpatients diagnosed with dysphagia who were on the SLPs caseload during the two phases of the study. Participants were recruited from different wards (stroke, medical for elderly, general ward, surgical ward). Observational data on adherence was first collected over 5 consecutive days by visiting the wards 16 times each day. This resulted in the inclusion of 31 participants who were observed while eating and drinking. Then, according to the results of the first observational audit, changes were made to clinical practices and management of patients with dysphagia through the formation of a dysphagia adherence group. The group was responsible for improving quality of care for patients with dysphagia, which included presenting pre-thickened drinks, training nurses, increasing knowledge regarding conducting swallowing screenings, and writing and printing a sheet that

included patients' swallowing recommendations in a clear manner on a bright red color. This was then followed with a second observational audit which was conducted approximately 16 months later. This observational data was again collected over 5 consecutive days and resulted in the inclusion of 54 participants. Results showed an initial patient adherence level of 51.9% in the first phase of the study, followed by increased adherence level of 73.3% in the second phase. Data analysis revealed that lack of knowledge of the recommended diet was a contributing factor to nonadherence and the results supported that increasing education and training may contribute to increased adherence.

Moreover, a patient's psychoemotional and mental status have also been found to affect their level of adherence to dietary recommendations (Balandin et al., 2009; Colodny, 2005; Seshadri et al., 2018). In addition to the dissatisfaction with modified diets as described above, Colodny (2005) identified different psychoemotional and mental factors that also appeared to influence adherence. Sixty-three patients with dysphagia between the age 65 and 100 years old who were identified as nonadherent to dysphagia dietary recommendations were recruited and interviewed. Participants' responses and justification for their nonadherence were coded and placed into groups which resulted in the following psychoemotional and mental categories: denial, dishonesty, anger, aggression, and blaming. Around 50% of the participants were in denial of their swallowing difficulties. Denial was present even given a history of aspiration pneumonia as participants denied the connection between their dysphagia and the development of aspiration pneumonia. In addition, 17.5% of the participants reported their intention to follow the dietary dysphagia recommendations but were observed to be nonadherent. Anger and aggression were observed in 11.1% of the participants along with 5.6% of the participants blaming their family members and friends for not adhering to the dietary recommendations. It is

also important to note that some participants showed more than one reason for their nonadherence. While the study did not address education specifically, it is possible that these participants experienced a lack of understanding about the causes of aspiration pneumonia and/or the consequences of dysphagia. Another example is a study conducted with 32 adults with cerebral palsy and who were diagnosed with dysphagia (Balandin et al., 2009). The goal of this study was to gather data about the participants' experiences with dysphagia and modified diets through interviews. Open-ended questions were used in the interview to allow the participants to describe their experience and how emotionally they felt about their dysphagia and the modified diet they were placed on. Data analysis showed the development of different themes describing the participants' experiences. Loss of control in choosing what to eat and dependency on others is one of the themes identified in. Participants expressed that their inability to choose what they want to eat had striped their enjoyment during meals leading to nonadherence. This behavior of nonadherence could be appropriately framed as a volitional choice to not follow the diet recommendations, as a way for the individual to regain control over their body and what to eat and drink. Another theme was also identified as decreased in social interactions. Participants reported feeling embarrassed to eat and drink at social events due to their inability to control their bolus, coughing and being on modified diet which means that they are unable to eat and drink the food presented in these events.

A variety of factors related to the individuals caring for the patient with dysphagia, such as nurses, spouses, or other caregivers, have also been found to influence adherence to dysphagia dietary recommendations. Perception of importance was one factor identified as having an influence on adherence (Crawford et al., 2007; Smith-Tamaray et al., 2011). Those caregivers who perceived high importance of following the SLP recommendations for safe eating and

drinking experiences were more motivated to implement and make sure the dysphagia recommendations were met. For example, in one research study eight SLPs working in public health services managing stroke and patients with dysphagia were interviewed (Smith-Tamaray et al., 2011). The goal of the study was to gather information regarding SLPs services in team approach for stroke and dysphagia management. The study researchers were also interested in identifying factors that affect other healthcare providers' adherence to SLPs dysphagia dietary recommendations. Semi-structured face-to-face interviews were conducted with all of the participants. These interviews lasted from an hour and half to two hours and open-ended questions were used to gather information. Data from the interviews were then transcribed and thematic analysis was conducted. Results showed that perceived importance of the SLPs recommendations was a major influencing factor on adherence. Participants reported that there was a need within their setting to show the valuable effect SLPs' services have on improved patients' outcome. The more SLPs were recognized as an integral team member managing the patient, the more valued SLPs' services were by other healthcare providers.

Disagreement with the SLP recommendations was another factor identified across multiple studies (Colodny, 2001; Robbertse & Beer, 2020). Caregivers who did not agree with the recommended diet, often did not put the needed effort in to follow those recommendations. In a study conducted with 81 nurses working at two tertiary hospitals in South Africa, the researcher examined possible factors affecting adherence to dysphagia dietary recommendations (Robbertse & Beer, 2020). A self-administered questionnaire was distributed to all of the participants and collected after 24 hours. One of the barriers to adherence identified was disagreement with the SLP's dysphagia dietary recommendations, with 45% of nurses reporting nonadherence to the recommendation due to the disagreement. The study also identified that lack

of knowledge and experience of the nurses caring for patients with dysphagia was also a barrier to adherence. Out the 81 nurses included in the study, 72% were identified to be nonadherent due to lack of knowledge, indicating that knowledge level is a strong influencer on adherence to dysphagia dietary recommendations. Thus, the more knowledgeable and/or experienced the caregiver was, the higher the adherence to dysphagia dietary recommendations. Lack of knowledge as an influencing factor on adherence was also identified in another study that examined the relationship between adherence level and level of experience/education (Colodny, 2001). Participants included 42 registered nurses (RN), 131 certified nursing assistants (CNA), and 10 licensed practical nurses (LPN). Lack of knowledge was identified as a moderate to strong barrier to adherence to dysphagia recommendations, with RNs being more nonadherent than CNAs and LPNs. Another factor that has been found to influence adherence to SLP recommendations is the presence of supervision throughout the meal for individuals who are dependent on others for feeding (Rosenvinge & Starke, 2005). For example, Rosenvinge & Starke (2005) (discussed in the previous sections) found a nonadherence rate of 73% in inpatients due to a lack of supervision.

Other factors affecting adherence to dietary recommendations found in the dysphagia literature were more specifically related to the environment where the patient with dysphagia was present. Rosenvinge and Starke (2005) investigated adherence to dysphagia dietary recommendations in the acute care setting and the effects of changes in clinical practices on adherence. The study showed that changes in the facility-wide measures and policies can have a positive influence on adherence. The policy changes implemented in the study included presenting pre-thickened drinks, training nurses, increasing knowledge regarding conducting swallowing screenings, and printing sheets of the recommended swallowing recommendation in

bright colors. As a result, adherence levels increased from 51.9% (before the policies were implemented) to 73.3% after the new policies were administered. Finally, there was increased adherence in settings where SLPs were core and respected members of the healthcare team and in settings with enough stable staffing of SLPs (Smith-Tamara et al., 2011). When the SLPs are recognized as an important member of the healthcare team providing health services to the patient, their dietary recommendations are acknowledged and more likely to be followed. In addition, with proper staffing, SLPs working in the setting can have more reasonable caseload and workload requirements, allowing them time to provide appropriate education and additional services.

Education as a Key Factor and the Health Belief Model

Across the literature described above, education and knowledge level of both the patient and the caregiver have been identified as key influential factors on adherence (Chadwick et al., 2002; Chadwick et al., 2003; Colodny, 2001; Low et al., 2001; McCurtin et al., 2018; Robbertse & Beer, 2020; Rosenvinge & Starke, 2005; Seshadri et al., 2018; Smith-Tamaray et al., 2011). The literature has both highlighted education as a key contributor to adherence as well as supported clinical practices that promote increased education as also increasing adherence. For example, when hospitalized patients were provided with printed sheets of their dysphagia dietary recommendations to help ensure their understanding and knowledge of all of the recommendations, adherence increased from 51.9% to 73.3% (Rosenvinge & Starke, 2005). This relationship was also supported by findings in another study of 180 nursing home staff (Colodny, 2001). Results showed a strong correlation between adherence and nurses' knowledge, with lack of knowledge being a main reason for nonadherence among the nurses. Moreover, as stated

above settings that encourage or mandate educational tools have also observed a positive effect on increasing adherence (Rosenvinge & Starke, 2005).

This proposed relationship between education and adherence is aligned with components of the Health Belief Model, which may be beneficial to explore in order to better understand the behavior of adherence and improve adherence to dysphagia dietary recommendations. The health belief model was initially developed with the primary intention to understand why some individuals do not follow disease prevention strategies and do not participate in disease screening (Champion & Skinner, 2008). The model consists of six components: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cue to action, and self-efficacy.

"Perceived susceptibility" and "perceived severity" refer to an individual's beliefs of the risk of getting an illness and how serious that illness and its associated consequences are. This is relevant to dysphagia and adherence to dysphagia dietary recommendations. Individuals, including patients, caregivers or healthcare providers, may lack knowledge regarding the severity of dysphagia's complications and/or the likelihood of experiencing those consequences. For example, not consuming the recommended modified diet can increase the risk of aspiration and aspiration pneumonia, especially for individuals who are immunocompromised or older (Langmore et al., 2002; Low et al., 2001). Thus, when individuals do not believe that dysphagia is a serious disorder or that it will lead to serious consequences, this can then lead to nonadherence. Relatedly, when individuals are educated about the benefits of following the dysphagia recommendations and understand its importance, they tend to be more adherent ("perceived benefits"). This ties closely to "perceived barriers" which is another component of the health belief model. Perceived barriers refer to the individual's beliefs about possible obstacles to recovery or for performing the health-related behavior. As stated above, there are

various factors or barriers that can lead to nonadherence to dysphagia dietary recommendations, such as denial, dissatisfaction with the diet, blaming, and perception of importance. Many of these barriers, though, can be eliminated or decreased through education such as, for example, educating patients regarding the rationale behind the recommended modified diet or providing printed reminders of the SLP recommendations ("cue to action"). Furthermore, when an individual with dysphagia is better educated on the disorder and its management techniques, it can then increase their confidence in their ability to adequately accept and follow the recommendations ("self-efficacy"). A closely related construct is intent, a key component of the Theory of Planned Behavior (Montano & Kasprzyk, 2008), which is also relevant in discussing behavioral change. Behavioral intentions are influenced by a person's attitudes that they can make a change. These intentions are also driven by a person's evaluation of the risks and benefits of the change, further tying in components of the Health Belief Model.

Beyond the patients themselves, providing education can also increase caregiver and healthcare provider confidence. Caregivers and healthcare providers can feel more confident in their own clinical skills related to dysphagia management which can increase their motivation for change. Improved confidence and education in healthcare providers can lead to earlier identification of dysphagia, and improved intervention implementation, patient support, and treatment outcomes. For example, when nurses lacked the skills needed to identify and work with patients with dysphagia (perceived barriers), educational programs about dysphagia served as one solution to reduce that barrier (cue to action) (Hansell & Heinemann, 1996; Werner, 2010). When these nurses completed the education, the number of patients who were identified as having or being at risk for dysphagia increased, in part due to nurses' increased confidence in

their skills (self efficacy). This in turn led to improved dysphagia care. Such positive impact on behavior (adherence to dysphagia recommendations) is predicted by the Health Belief Model.

The effect of education and knowledge as an influencing factor on adherence has not only been noted in the dysphagia literature but has also been reported in the more general healthcare literature. Patients with higher educational levels tend to be more likely to follow healthcare recommendations, which could be related to increased knowledge of health consequences and increased trust in the healthcare system (Yilmaz & Colak, 2018). For example, one study examined increased adherence to lifestyle changes among 347 older adult patients admitted to the hospital with a diagnosis of coronary heart disease (CHD) (Alm-Roijer et al., 2004). Participants received an hour and a half group informational session provided by the specialist nurse, physician, and physiotherapist that discussed treatment recommendations, medications, and follow ups. After the patients were discharged from the hospital, they were offered an hour session with the nurse two weeks later. During this follow-up session the following topics were discussed: lifestyle changes (diet modification, exercises, smoking, stress management), psychological rehabilitation, and medication. Patients were also able to schedule personalized sessions with the nurse if they felt that they needed extra support and education. A questionnaire was developed for use in the study that included questions related to the patients' knowledge of CHD consequences and their adherence to medication and lifestyle changes. Results showed a significant correlation between knowledge level and the lifestyle changes including dietary modification ($p < 0.001$), supporting a link between increased knowledge and increased adherence to healthcare recommendations. Similarly, healthcare providers with a higher level of knowledge in their areas tend to adhere and more carefully administer the health recommendations. For example, another study investigated the relationship between nurses' skill

level in pain management for cancer patients and their knowledge level (Jang et al., 2016). A total of 295 nurses that worked in the cancer ward at seven different hospitals were included and a 30 items questionnaire was developed to use in this study. Results showed a positive correlation between knowledge level and the nurses' skills in pain management ($r = 0.488$, $p < 0.001$), again supporting a relationship between knowledge and clinical behavior.

Importantly, while SLPs are the main healthcare provider for dysphagia assessment and intervention, playing a primary role in providing dysphagia and diet modification education, the responsibility should not fall solely on the SLP alone. A broader, multidisciplinary approach is needed and should include other healthcare professionals involved in patient care. The positive advantages of a multidisciplinary approach in health management have been shown in many studies not only in dysphagia but in healthcare in general (Denton & Conron, 2016). This emphasizes the importance of developing a team that may include the following health professionals, in addition to the SLP, for improved dysphagia management: physicians, nurses, CNAs, dietitians, occupational therapists, physical therapists, social workers, and psychologists. These team members are not only responsible for overseeing their portion of a patient's healthcare plan, but also work collaboratively with team members being able to turn to each other for advice and education regarding healthcare options.

Nurses play a particularly important role in dysphagia management as they tend to spend the most direct time with patients, especially in wards such as stroke. Nurses are also able to carry out dysphagia-related responsibilities, such as administrating dysphagia screening tools, referring the patient to the SLP for a full dysphagia assessment when needed, observing the patient swallowing during mealtimes, and providing education. Nurses support for dysphagia related responsibilities can lead to positive effects such as improving adherence to dysphagia

recommendations. For example, a study examined patients' adherence to dysphagia recommendations after a nurse guided education was provided (Mateos-Nozal et al., 2022). The study included 447 adult patients admitted to a hospital with acute diagnosis of dysphagia. As soon as the patient was diagnosed with dysphagia by the SLP, the nurse caring for the patient was informed. This was followed by the nurse providing education to the patient about the following topics: diagnosis, treatment recommendations, rationale for the recommendations, modified food and liquid consistencies, and posture. In addition, participants were given individualized written sheets describing the modified diet they were placed on. The implementation of the nurse-led education, resulted in high adherence levels of 94.1% for modified food consistencies and 61.6% for liquid thickness consistency. Adherence levels were re-assessed one month after hospitalization through phone interviews where the participants reported on their own adherence to the recommendations. Self-reported adherence rate did not decrease after discharge with adherence remaining at 94.3% for modified food consistencies and 75.8% for liquid thickness consistency. Thus, not only can system-wide policy changes and education lead to improved adherence by healthcare providers, but, in turn, increased commitment on the part of the healthcare providers can improve compliance among patients as well. It is therefore of clear importance to target frontline healthcare providers, including nurses, in dysphagia education training.

Online Delivery of Educational Programs

In order to prevent adverse dysphagia consequences and improve clinical outcomes among vulnerable, medically complex hospital patients, it is clear that adherence to dysphagia dietary recommendations is important. Given their crucial role in care provision in this setting, providing education to nurses about dysphagia management is likely an important first step for

increased compliance across the care trajectory. Education can help increase nurses' understanding about the importance of the dietary recommendations, improving their adherence while also facilitating further patient training and understanding. However, it is often difficult for nurses to obtain the education they need due to their work schedule, including their long and varied work hours which make it difficult for them to commit to in-person learning opportunities (Karaman, 2011). In addition, in-person education requires many resources in addition to time as it often requires driving or flying to where the learning opportunity is provided, increasing cost and geographical constraints (Xing et al., 2018).

Online learning, especially asynchronous trainings, can offer increased opportunities for nurses to obtain continuing education. This modality provides more flexibility as nurses are able to participate when it is convenient for their schedule (Karaman, 2011; Xing et al., 2018). It is also more cost efficient; for example, it eliminates travel costs (Xing et al., 2018). Thus, online learning may increase nurses' motivation to seek continuing education programs and their satisfaction while decreasing their stress.

It is not surprising that many educational programs have been shifting to online methods of delivery. A growing body of research has been looking at this newer modality, which can provide insight into strategies for designing an effective educational program for dysphagia education. Previous, albeit older, research explored the implementation of an online education program for nurses working in dysphagia management as an alternative to the more costly and time-intensive in-services provided directly by the SLPs themselves (Davis & Copeland, 2005). The purpose of the study was to evaluate changes in nurses' knowledge about dysphagia management after completing the online educational program. Participants included 123 nurses and nursing assistants from 11 departments who were placed in either the control group or the

experimental group. Nursing units as a whole were randomized into the two groups leading to a total of 60 participants in the control group and 62 in the experimental group. Individuals in the experimental group completed 15 multiple-choice-question pre- and posttests before and after the online training program. Participants in control group completed only the pre- and posttests without the educational program. The training program could be accessed by the hospital server and it included a 45-slide presentation. All topics were related to dysphagia and included: normal swallowing, risk factors for dysphagia, and guidelines for administering nutrition, hydration, and medication. The program required approximately 30 minutes to complete and a score of 90% on the posttest was needed to pass the training. The content of the training program and test questions were developed by an SLP and reviewed by other SLPs to ensure validity; the calculated Cronbach's alpha for the test items indicated good reliability (0.78). Results showed significant differences in the posttest scores between the groups with the experimental group scoring higher that the control group. More specifically, 82% of participants in the experimental group improved their scores in the posttest compared to 49% in the control group. In addition, a score of 100% was achieved by 27% of the participants in the experimental group compared to 0% in the control group. Thus, online-based training, particularly in dysphagia management, has the potential to improve nurses' knowledge level. While this study did not focus on diet modification and while dysphagia best practices have been updated since this study was completed, it is clear that online-based training in dysphagia management has great potential to improve nurses' knowledge.

Additional related nurse-based education studies can offer further insights into key active ingredients for a successful online educational program. One study developed an online computer-based breastfeeding training program for nurses (Cianelli et al., 2015). The aim of the

study was to analyze the development and the preliminary outcomes of the online training. The designed program began with an initial guide for participants before starting the course. This guide provided participants with a summary of the training program, the goals that were hoped to be achieved at the completion of the training program, and instructions on how to navigate and complete the program. The breastfeeding online program consisted of a total of 16 training hours divided across 5 modules. Participants were only able to complete one module at a time and were unable to accesses the following module until they completed the current module. Each module included a series of animated PowerPoint presentations in addition to videos of scenarios related to the module content. Furthermore, each model had a 10-15 minute pre- and posttest in order to measure participants' knowledge levels before and after the specific training related to each module. Participants were required to achieve a score of 80% on the posttest in order to be able to access the following module and participants were allowed to review the module and take the posttest multiple times until they achieved the 80% score. Finally, after the completion of all of the training modules, participants were asked to complete an evaluation survey about their experience with the program. A total of 86 nursing students completed the developed program and results showed an increase in their knowledge based on the comparison of pretest and posttest scores across each module. For example, results from Module 5 (supports for mothers, contraindications to breast feeding, and developing friendly birth centers) showed that participants increased their test scores from pretest (M = 8.03, SD = 2.83) to posttest (M = 12.81, SD = 1.5; $t(85)$= -15.479, $p < 0.001$), supporting a positive effect of education on knowledge level. In addition, analysis from the evaluation survey showed that 68.9% of the participants rated the program as excellent and 34.1% as good. Aspects of this training program, including

length and structure, likely would be beneficial for nursing education programs on other related topics, such as modifying diet textures.

Another study looked into developing an online educational program to help increase oncology nurses' knowledge and spiritual care competence for pediatric patients (Petersen et al., 2017). Participants included 112 nurses who provided direct care for pediatric patients diagnosed with cancer. A three-hour online program was developed that focused on seven topics in the targeted area. Nurses provided demographic information such as: age, gender, educational level and years of experience. Similar to the previous work discussed, they also used videos, discussion, and case studies to present their content. Two different rating scales were administered to assess nurses' knowledge, including the Spiritual Care Competence Scale (SCCS) and the Spirituality and Spiritual Care Rating Scale (SSCRS). These rating scales were administered at three different times, before completing the online education program (baseline data), immediately after the completion of the online program, and 3 months after. Results showed improvement in nurses' competency level immediately after they completed the online program and up to three months after. Another study looked into the development and associated outcomes of a web-based program that aimed to improve nurses' clinical skills in acute nursing care (Liaw, 2015). Participants included 67 nurses working in an acute care hospital in Singapore. In the beginning on the study, participants were required to first complete a questionnaire on demographic information; this was followed with a 15-minute pretest using a simulated case study. Participants were then divided into two groups, an experimental group that received a 3-hour web-based simulation training and a control group that did not receive the training. The web-based training program incorporated videos and simulated virtual patient scenarios. After completing the web-based training programs, participants in the experimental

group completed a questionnaire about the training program. One week later, participants from both groups completed a posttest, the same simulated test provided initially (pretest). Results showed an improvement in the experimental group in the posttest scores when compared to the pretest scores after completing the training program ($p < 0.001$). On the other hand, there was no significant differences between the pretest and posttest scores of the control group. Further, posttest scores of the experimental group were higher than the scores of the control group. Overall, participants in the experimental group reported high satisfaction with the training program and how related and applicable it was to their clinical practice.

Other studies have investigated the effectiveness of transforming a face-to-face workshop to an online training program, which may be particularly beneficial given the time constraints experienced by nurses. In a study conducted by Sommer et al. (2019), the authors shared their experiences of transforming a three-day face-to-face workshop into an online training program. Their online program provided an introductory video, practice quizzes, and a 10-item graded pre- and posttest to measure performance. The face-to-face workshop content was transformed into five modules for the online version, and short transcribed video recordings were used. While no participant outcomes were provided, the article provided useful information related to modifying in-person instruction for the online workshop format.

In summary, a number of common features are observed across the literature related to key components of effective online or web-based training programs. Providing introductory information about the topics to be covered and including a pre and posttest were common features. It was also observed that multiple choice questions were an effective type of question to use in pre and posttests. Based on the outcomes results and participant feedback, dividing the information across multiple, shorter modules that can be completed at the participant's own pace

was important. Further, multiple modalities for information presentation, including visual and auditory, have been used across the studies.

Purpose of the Current Study

Dysphagia is associated with many medical consequences that can be particularly impactful for more medically fragile hospitalized patients. Thus, proper identification and management is extremely important, including adherence to the management recommendations. Diet modification is one such important recommendation for managing the health of patients with acute medical conditions and dysphagia as it can help prevent the occurrence of adverse consequences. As the front-line healthcare workers who often spend the most time with the patients, nurses are in a unique position to ensure appropriate adherence to dietary recommendations that increase safety in this patient population. Education has been shown to be a key contributor to increased adherence; however, barriers exist that limit nurses' access to in-person and synchronous trainings.

The purpose of the current study was to develop and pilot an online educational program about dysphagia and diet modification for inpatient nurses caring for patients with swallowing disorders. Increasing the knowledge base of nurses regarding dysphagia management and diet modification through such an educational program has the potential to improve adherence to SLP dietary recommendations. Thus, to support future implementation and maximize effectiveness, we aimed to examine the feasibility of program implementation and examine participants' overall perceptions of the impact of the program on their understanding of dysphagia and clinical work. To guide future work, we also specifically aimed to understand motivations to participate, barriers to continuing education, approval of the program, and strengths and weaknesses of the program. Such a study is also important for shifting clinical attention from focusing solely on the

patient and the impairment in dysphagia management to also considering and targeting the patient's caregiver and environment. In summary, the study addressed the following questions:

1. What is the acceptability and feasibility of a dysphagia-focused online educational program among inpatient nurses caring for patients with swallowing disorders?

   Hypothesis: There is no *a priori* hypothesis as inductive qualitative analysis was used.

2. What are the preliminary effects of a dysphagia-focused online educational program on the immediate and one-month post-intervention knowledge levels of inpatient nurses caring for patients with swallowing disorders about dysphagia and food and liquid consistencies?

   Hypothesis: It was expected that the educational program would increase nurses' knowledge regarding dysphagia and diet modification. Further, it was expected that the level of knowledge would be retained one month after completing the program.

3. What are the preliminary effects of a dysphagia-focused online educational program on self-efficacy, confidence, motivation, and clinical application among inpatient nurses caring for patients with swallowing disorders?

   Hypothesis: We anticipate participants reporting improved self-efficacy, confidence, motivation, and clinical practices based on their own perception and experiences.

CHAPTER III

METHODS

Participants

Nurses working in inpatient settings in the United States were recruited to take part in the educational training program. Final inclusion criteria for participants were broad and included nurses who: care for patients with dysphagia, work in an inpatient setting (e.g., not outpatient clinics), and are currently practicing (i.e., not retired or on leave). There were no restrictions for participation based on age, gender, racial or ethnic background, location, or level of experience. While not used as inclusion/exclusion criteria, demographic information was collected in order to characterize the study's participants and explore potential differences in outcomes based on these factors.

Participants were recruited through in-person and virtual flyers posted in local nursing homes, shared to email listservs, posted in dysphagia and nursing groups in ASHA and facebook, emailed to speech department in hospitals, emailed to SLPs coworkers to the primary researchers, shared through word of mouth, and social media platforms such as Twitter. A certificate of completion and a $20 gift card were provided for all participants who completed the online educational program. An additional financial incentive was also provided to all participants who completed the optional follow-up interview (see details below). These were provided in order to incentivize participation and compensate the nurses for their time while ensuring completion of the educational program.

In order to increase recruitment, inclusion criteria and incentives were changed multiple times across the study resulting in the final criteria and incentives described above. Initially, inclusion criteria only included hospital-based nurses and financial incentive was only provided

to those who completed the optional interview. This yielded a total of five participants, three who were recruited through word of mouth and two through virtual flyers online. Therefore, inclusion criteria were changed to include all inpatient nurses (e.g., including nursing homes and other settings) and the incentive was changed to offer a chance for participants who completed the educational program to enroll in a drawing for a $20 gift card. This led to the enrollment of one additional participant through word of mouth. Financial incentive for completing the online program was further changed to providing a $20 gift card to all individuals who completed the program, but this yielded no additional enrollment. Finally, inclusion criteria were further broadened to include certified nursing assistants, but this also yielded no additional enrollment.

Study Design

A mixed-methods design was used in this study in order to have a more in-depth understanding of the feasibility and acceptability of the online educational program and its effect on knowledge, self-efficacy, confidence, attitudes and clinical application. More specifically, a convergent parallel design, collecting quantitative and qualitative data concurrently and merging interpretation of the findings, was used to obtain a more complete understanding of the research questions of interest.

The sections below detail the structure, design, and implementation of the educational program used in the current study, and the types of data analyses used. Table 1 below outlines the sequence of study tasks participants completed. All research activities were conducted with approval from the University of Oregon Institutional Review Board.

Table 1. Summary of study activities

Time	Task
Prior to educational program	Baseline comprehensive test, which included: • Demographic questions • 20 multiple choice questions • 2 clinical application questions and 8 item survey
Educational program	5 online modules with a 10-item multiple choice test after each module
Immediately after program completion	Comprehensive test, which included: • 20 multiple choice questions • 2 clinical application questions and 10-item survey
Three to four weeks after program completion	Semi-structured interview (optional)
One month after program completion	Comprehensive test, which included: • 20 multiple choice questions • 2 clinical application questions and 8-item survey

A number of studies related to dysphagia education and/or nurses competency trainings, as introduced previously in the literature review above, were used to support the development of the current study's educational program. Relevant information extracted from these studies includes the structure, length, and content of the trainings, methods of content delivery, and evaluation practices as further summarized in Table 2 below.

Table 2. *Literature support for online educational program components*

Education Program Component	Sample Literature Support
Introductory Information	Cianelli et al. (2015)
Demographic information	Liaw et al. (2015) Petersen et al. (2017)
Length of the Educational Program	Liaw et al. (2015) Petersen et al. (2017)
The Use of Video Recording and Power Point Presentation	Cianelli et al. (2015) Davis & Copeland (2005)
Restricting Moving to the Next Module Before Completing the Current Module	Sommer et al. (2019) Wennerholm et al. (2021)
Implementation of Test Before and After Completing the Full Training Program	Cianelli et al. (2015) Davis & Copeland (2005) Liaw et al. (2015) Wennerholm et al. (2021)
Implementation of Test Before and After each Model	Cianelli et al. (2015) Davis & Copeland (2005) Liaw et al. (2015) Sommer et al. (2019) Wennerholm et al. (2021)
Passing Score for Modules' Posttests	Cianelli et al. (2015)

Program Design

Design. The online educational program was developed using two web-based platforms. The main components of the program were hosted on a University of Oregon WordPress site, including the consent form and educational modules/videos. The WordPress site linked out to Qualtrics where baseline, program, and post-program surveys were hosted (see further details of these outcomes measures below).

Following reading the informed consent document on the first page of the program, participants indicated consent by clicking on the "continue" button at the bottom of the screen. As suggested by the previous literature to support successful completion of the training program (Cianelli et al., 2015), the program used in the current study first presented an outline section that provided an overview of the program, ethical considerations while taking the tests (e.g., the

educational program and its tests were aimed to be completed individually), aims of the program, and guidelines on how to navigate and complete the program. Participants were then directed to a baseline test, which included pretest content questions and demographic questions to collect information about their age, gender, race/ethnicity, geographical location, educational degree, years of experience in nursing, if they administer dysphagia screening, and whether or not they have received previous training in dysphagia. The information gathered from this demographic section was considered to explore any possible relationships between demographic factors and knowledge scores (both at baseline and post training).

Following completion of the baseline test, participants began the educational program modules. Video recordings of PowerPoint presentations with the presenter's voice narrating, pictures, animations, and external videos were used to present the information in the modules (See Appendix A). The use of video recordings and PowerPoint presentations have previously been found to be effective methods for online training programs (Cianelli et al., 2015; Davis & Copeland, 2005). Additionally, a pdf copy of the PowerPoint presentations was provided to participants alongside each module's video to better support visual learners and note taking. The educational program contained five modules (further described below) that each contained multiple smaller subtopics; each module varied in length based on its content. To promote completion and best practices in learning, the module videos were no longer than approximately 2 hours in length total, the subtopics were short in presentation, and the training was able to be completed across multiple sittings, as supported by the literature described previously (Liaw, 2015).

To ensure the validity of the educational program, two SLPs (one in the United States and one in Saudi Arabia) and a nurse were asked to review the entire program and provide feedback

on the content of the modules, tests, the ease of navigating the program, technical difficulties, clarity, access, length, and instructions. Both SLPs reported positive feedback on the content of the modules, topics covered, tests and ease of navigating the program and only a minor technical issue was reported from the SLP in the United States. The SLP from Saudi Arabia noted that the content of the modules was appropriate for care practices in Saudi Arabia and had only few suggestions on question wording, which were modified accordingly. The nurse also provided positive feedback overall and did not report any technical issues. She did suggest adding access to a copy of the slides, which was updated in the program. She had additional clarifying questions regarding question wording; these questions were also updated.

Accessibility and Completion. After enrollment in the study, participants were sent the link to the educational program, which they were able to complete online at any time that was convenient for them. They were able to either complete the entire program in one sitting or complete each module separately. Participants were able to continue the program from where they left off by returning to the unique page they stopped at. This allowed for increased flexibility in participation and helped create a more supportive environment for participants to be able to interact with and understand the materials provided. Participants were allowed to take as long as needed to complete the program while the study was open; completion times ranged from one day to a one-month period. After starting the program, an initial reminder to complete the program was sent one week after they started, followed by two to three reminders until they had completed the program. The email reminder provided motivation to complete the program and offered support for any help they needed. Additionally, the overall study remained open for three months and two weeks for new recruitment before access was restricted.

Content. The educational training program contained five modules, developed based on the American Speech Language and Hearing Association's (ASHA) description of and guidelines related to adult dysphagia (ASHA, n.d.). Topics not related to our specific research question(s) focused on dietary modifications (e.g., swallowing exercises) were excluded. We also referenced the International Dysphagia Diet Standardization Initiative (IDDSI) for describing food and liquids consistencies. The content also considered components of the Health Belief Model and theory of planned behavior in terms of what information may be beneficial to increasing nurses' understanding of susceptibility and severity, decreasing perceived barriers, and increasing confidence and self-efficacy in order to increase the likelihood of behavior change (e.g., increased compliance). Each model had multiple subtopics in order to organize the information into "digestible units", which facilitated the participants' ability to follow and understand the information. Learning objectives were also developed for each module and were presented to the participants in the program outline. These learning objectives served as a foundation for developing the content and test materials, and also provided an outline to the participants about what would be covered in each module. The list of learning objectives for each module is available in Table 3 (see below). Finally, literature support and literature-derived definitions were integrated into the presented materials.

Table 3. *Outline of modules contents*

Module	Learning Objectives
Dysphagia	Participants will be able to: -Define the stages of normal swallowing processes -Describe impaired swallowing processes
Signs and Symptoms	Participants will be able to: -Identify risk factors and signs that indicate the possibility of dysphagia -Define silent aspiration and its risks
Causes	Participants will be able to: -Identify different disorders that can lead to dysphagia and how they impact the swallowing processes
Food and Liquid Consistencies	Participants will be able to: -Define the International Dysphagia Diet Standardization Initiative (IDDSI) levels of food and liquid consistencies -Describe how to accurately test each level using the IDDSI methods
Screenings and Collaborations	Participants will be able to: -Describe the role of the speech-language pathologist (SLP) in their setting, -State how to refer to and seek collaboration with SLPs -Describe how to conduct dysphagia screening protocols

The first module covered “Dysphagia”, and included two subtopics, normal swallowing and swallowing impairments (dysphagia). It is important for individuals to first understand the processes of normal swallowing in order to understand any abnormalities in the processes. The module also discussed the consequences of dysphagia on the physical and mental health of the individual. The second module, “Signs and Symptoms”, discussed the signs and symptoms of dysphagia as reported by the ASHA website and as supported across the previous literature. It additionally consisted of a subtopic discussing silent aspiration. Given the importance of knowing what the possible causes of dysphagia are and what disorders are highly associated with dysphagia, the third module covered “Causes”. The fourth module, titled “Food and Liquid Consistencies,” discussed diet modification, including standardized food and liquid consistencies and how to achieve appropriate consistencies. Finally, the fifth module, titled “Collaboration and

Dysphagia Screening," consisted of three subtopics: the role of SLP and what responsibilities they carry with patients experiencing dysphagia, particularly as related to diet modification; the importance of collaboration between SLPs, nurses, and other healthcare employees in increasing referrals and ensuring positive outcomes; and the importance of screening for early identification and prevention of aspiration pneumonia. It also discussed how screening tools can be administered by nurses and introduced different screening protocols. Examples of how the modules looked like in the program are presented in Appendix A.

The program's content was developed by the primary researcher and reviewed by another member of the research team, both licensed and certified speech-language pathologists, and integrated information from ASHA, peer-reviewed articles and books about dysphagia. Additionally, two videos were integrated into modules 1 and 3 of the program from the National Foundation of Swallowing Disorders, a dysphagia patient advocacy organization. Moreover, information and pictures from the IDDSI website were also used in the development of module. Lastly, regarding content validity of the created program, both SLP reviewers reported that the content of the educational program was appropriate, sufficient, and adequate and did not have any suggestion to edit as described above.

The outline of the current study's educational program content can be seen in Table 3. Modules had to be completed in order; each participant had to successfully complete the first module and posttest before they were able to go to the next module in order to ensure participants' understanding of one set of information before the introduction of a new set of information, as suggested by the previous literature (Sommer et al., 2019; Wennerholm et al., 2021).

Evaluation Tasks

Tests. Tests were implemented to measure participants' knowledge level before and after the full educational training program (i.e., primary outcome measures) and after each module (Cianelli et al., 2015; Davis & Copeland, 2005; Liaw et al., 2015; Wennerholm et al., 2021). The purpose of these tests was two-fold: to evaluate change in the nurses' knowledge level based on the training program overall and to ensure mastery of content during each individual module. A comprehensive test was implemented at the beginning of the training program, right after the completion of program, and one month after the completion of the training program (primary outcome) (see Appendices B, C, and D). The comprehensive test included 20 multiple choice items and clinical application questions on the content targeted in the educational program to assess participants' clinical application skills of the learned knowledge. The 20 multiple choice questions were chosen from the individual module tests, with equal numbers of question being included from each test. These specific questions were chosen due to their importance as related to information that nurses should learn. An example of how the tests were formatted in the program is presented in Appendix A. These clinical application questions included: a) "List the materials needed and steps for measuring the consistency of thickened liquids based on the IDDSI guidelines", and b) "An adult patient was admitted to the hospital with the medical diagnosis of traumatic brain injury (TBI). When you arrive in the room, the patient is drinking from a cup of water. You observe the patient to be coughing while drinking and see some water dripping from the corner of their mouth. What should you do next?". Participants took 26.37, 14.71, and 13.71 minutes, on average, to complete this test at baseline, immediately after intervention, and one month after intervention, respectively. In addition, posttests were also implemented within each module (see Appendices E, F, G, H and I). These tests consisted of ten

multiple choice items that required approximately 15 minutes to complete. The implementation of posttests was adapted from various studies in the literature as described above (Cianelli et al., 2015; Sommer at al., 2019). These multiple-choice questions were based on the learning objectives of each module (Sommer et al., 2019). Furthermore, to ensure content validity, these tests were reviewed by both SLPs as part of their review of the whole program in order to make sure that the test was set to measure what it was supposed to measure, which was nurses' level of knowledge.

It was important to implement a passing score on all of the module posttests in order to ensure participants' understanding of the information (Cianelli et al., 2015). Therefore, a score of 80% (8 correct multiple-choice answers) was needed to pass the posttest and move to the next module (Cianelli et al., 2015; Wennerholm et al., 2021). If the participants failed to achieve the score of 80%, they were required to review the module and retake the test until they achieved the passing score, as suggested in the previous literature (e.g., Sommer et al., 2019).

Survey. Participants took an additional survey in order to explore potential predictors of their knowledge level and knowledge level change as well as their perceptions of the overall training program. The content of the survey that focused on predictors was derived from theories related to behavior change, including the Health Belief Model and Theory of Planned Behaviors described above. A particular emphasis was placed on self-efficacy, attitudes, and intention given their likely valuable role in the current context. For the purposes of the current study, self-efficacy was operationalized as the individual's confidence in achieving or changing a behavior of interest (Bosnjak et al., 2020). Attitude was operationalized as the individual's opinions and feelings toward the behavior. Intention was operationalized as the individual's willingness to change or apply the behavior. In this study, participants were asked about their confidence levels

in caring for patients with dysphagia, identifying signs and symptoms of dysphagia, and applying the information they learned in the program (self-efficacy). Additionally, participants were asked about their attitudes toward understanding dysphagia and diet modification along with applying the information learned in the program. Finally, participants were asked about their intentions to complete the program and to apply the information they learned. These questions were included in the comprehensive test at the three time points (baseline, immediately after and one month later). However, they were modified appropriately based on time point or only included at the relevant time point. For example, the question, "In the past month, I have applied the information I learned from the program in my clinical practices at the hospital where I work" was only asked in the one-month-post-intervention comprehensive test.

Additionally, questions regarding the program functions and navigation qualities were asked in the posttest immediately after completing the program via the System Usability Scale (SUS). The SUS includes ten items that measures participants' acceptance of and satisfaction (i.e., usability) of a program. These ten items were adapted to fit the online educational program used in the current study as presented in Table 4. Participants indicated agreement with the ten items using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). In order to assess participants' acceptability of the program content, an additional six statements were presented related to program relevance and benefit to their job and learning, satisfaction with content presented, clarity of information, and recommendation to others to complete the program. Participants again indicated agreement using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree).

Table 4. *The System Usability Scale*

1	I think that I would like to use this dysphagia educational program frequently.
2	I found the dysphagia educational program unnecessarily complex.
3	I thought the dysphagia educational program was easy to use and navigate
4	I think that I would need the support of a technical person to be able to use and navigate the dysphagia educational program.
5	I found the various functions in this dysphagia educational program were well integrated.
6	I thought there was too much inconsistency in this dysphagia educational program.
7	I would imagine that most people would learn to use and navigate the dysphagia educational program very quickly.
8	I found the dysphagia educational program very cumbersome to use.
9	I felt very confident using the dysphagia educational program.
10	I needed to learn a lot of things before I could get going with this dysphagia educational program.

Interviews

Interviews can offer a great source of additional, rich information as they allow participants to discuss and share their own experiences, emotions, relationships, and feedback which cannot be observed in quantitative methods (Rossetto, 2014). Thus, voluntary semi-structured interviews were implemented in order to obtain additional data and information about the participants' acceptability of and the experiences with the educational program. These interviews also helped develop an understanding of the reason why participants decided to partake in the research study, which provided insight into reasons others did not participate, and how the training program was helpful for the participants.

After the completion of the educational program, each participant was provided with the option to participate in the interview. When participants expressed their willingness to be part of the interview process, they were contacted by the researcher in order to set a date, time, and Zoom link where the interview was conducted. A series of open-ended questions were used as a guide during the interview. As needed, general probes were used (e.g., tell me more, give me an example, how, why), along with specific probes to some of the interview questions. Please refer to Table 5 (below) for the list of questions and specific probes used. The list of questions was reviewed by a member of the research team with expertise in qualitative research and determined to be appropriate. Completed interviews lasted approximately 30 minutes.

Table 5. *Semi-structured interview guide*

Primary Questions	**Specific Follow-Up Probes**
To start, I would like you to Q1. Tell me about your current and previous experience working with patients with dysphagia. Please also discuss how dysphagia is managed by nurses in your facility.	Q1: Length of time (years), type of setting, role in dysphagia management, how often do you work with patients with dysphagia
Next, I am going to ask some questions about your training and continuing education, related both to dysphagia and more general nursing topics. Q2. Tell me more about how you were previously trained to care for patients with dysphagia. This can include both formal and informal training.	Q2: School versus post-graduation, on-the-job versus continuing education, types of topics trained on, hands-on training, trainings required by job/facility
Q3. Most nurses are required to obtain continuing education hours across a variety of topics. What are the barriers you face to completing those hours? What topics do you prioritize?	Q3: Where and when trainings occur

Table 5., continued

Primary Questions	Specific Follow-Up Probes
Now, I am going to have you to consider the dysphagia training program you just completed and discuss that further. Q4. How was your experience completing the educational program?	
Q5. Why did you decide to participate in this educational training program?	
Q6. Before participating in this research study, what did you know about diet modification? What has changed since completing the training program?	Q6: Did the program help in better understanding the rationale behind SLPs' recommendations about diet modification?
Q7. Do you perform dysphagia screening in your facility? If yes, how has your confidence changed since completing the program?	
Q8. Overall, what was the most beneficial information you learned from the program? Why?	
Q9. What were the strengths of the program based on your experience?	
Q10. What were the weaknesses of the program based on your experience or opportunities for change?	Q10: Format of program, content, length
Finally, I would like you to reflect on your own clinical practices since completing the educational program. Q11. Describe how the training program has impacted your clinical practices working with patients with dysphagia.	
To conclude, Q12. Are there any additional topics that you want to discuss or share related to dysphagia and the educational program?	

Data Analysis

Quantitative Analysis

In order to determine the preliminary effectiveness of the educational program in increasing nurses' knowledge levels, participants' scores on the comprehensive test were analyzed across the three time points (before, immediately after, and one month after completing the educational program). The independent variable was time and the dependent variable was score on the comprehensive test, which represents participants' knowledge level. Participants' scores on the baseline comprehensive test were compared to (a) their scores on the comprehensive test immediately after completing the program and (b) their scores one-month post completion. Given difficulties with recruitment resulting in a low number of participants (see additional details in results and discussion), quantitative analyses were limited to descriptive statistics (e.g., mean, standard deviation, and count), paired *t*-tests, and effect size calculations.

The current study also collected data on the program functions and navigation qualities using the SUS. In order to analyze the SUS, the first step is to sum all the points for the odd numbered questions (X) and then sum all the points for the even numbered questions separately (Y). This is then followed by subtracting 5 points from the sum of all the odd numbered questions (X0 = X-5) and also subtracting from 25 the sum of all even numbered questions separately (Y0 = 25-Y). The last step would include summing the scores calculated in the previous step (X0 + Y0) and then multiplying it by 2.5 ((X0+Y0) x 2.5). The final score can then be interpreted as a letter grade indicating the participant evaluation of the program, as shown in Table 6.

Table 6. *The System Usability Scale scoring system*

SUS score	Grade	Rating
> 80.3	A	Excellent
68 – 80.3	B	Good
68	C	Okay
51 - 68	D	Awful
< 51	F	Poor

Qualitative Analysis

In order to evaluate participants' acceptance of and attitudes toward the educational program, thematic analysis of the qualitative data was used, adapted from Braun & Clark (2006). Thematic analysis allows the researcher to examine the data first, identifying similarities, differences, and unanticipated concepts. Then based on the data collected, the researcher can generate data-driven categories to group those findings; thus, the themes are derived by the data available. Thematic analysis was selected for the current study in order to have the participants' responses and experiences drive the concept creation. This approach allows the researcher to construct a description of the experience of interest based on the patterns and shared meaning across the participants, leading to a deeper understanding of their shared experiences. These empirically derived concepts can be helpful in improving future program development and clinical practices.

All collected data were transcribed verbatim by the primary researcher. Transcription of the interviews was first conducted through a secure Zoom platform with an auto-generated transcription tool. Then, the generated transcript was manually reviewed, also known as cleaned,

to ensure its accuracy by the primary researcher. Throughout the data collection and transcription process, the primary researcher wrote down their thoughts in memos in order to capture potential theoretical connections or ideas that needed more exploration. The memos and the transcriptions were analyzed as primary sources of data. All data were then analyzed following an inductive thematic analysis procedure, including data familiarization, thematic code generation, and thematic building (Braun & Clarke, 2006; Terry et al., 2017; Vaismoradi et al., 2013). During data familiarization, the researcher completed initial readings and re-readings of the transcripts, noting potential codes (starting with in-vivo codes) and their patterns of occurrence. During the coding process, each transcription was analyzed line by line to find and create a set of thematic categories across the transcripts. As data were continually collected and analyzed, new concepts were documented, and the relationship between codes were found mid-data analysis. The new concepts were either added to a pre-existing category as sub-themes or formed a new thematic category.

Transcription coding was then reviewed by a second research team member. The two members of the research team participated in weekly debriefs to discuss any questions, thoughts, or discrepancies. Differences in team members' perceptions of coding categories or subthemes on the same transcription were discussed. Open conversations were encouraged about the discrepancies in order to reach a joint interpretation of data. During the process of data analysis, the primary researcher also pulled quotations that best exemplified the established categories and subthemes.

Ensuring the trustworthiness of findings is an important aspect for qualitative studies. It is developed to ensure data representation without any biases and to also represent the researcher confidence in the data collection processes, analysis, and presentation of the results in the study

(Creswell, 2018). Multiple steps were taken to ensure trustworthiness of the current study findings (Shenton, 2004). The dimension of dependability was addressed by providing clear details about the methods and coding procedures and the creation of an audit trail to facilitate replication of the study. In addition, the list of questions or any tools used in the study were either presented in tables or in the appendix section of the paper and the research team participated in regular debriefings. Furthermore, to ensure the dimension of credibility, transcriptions of the interviews were sent to each participant for them to review (i.e., member checking) in order to increase trustworthiness and strengthen the relationship and trust between participants and researcher. Participants were asked to verify the accuracy of the information and to provide any updates they wanted to contribute. Participants were specifically asked to respond back with any updates they wanted to contribute, if any. No participants responded with any requested changes. The dimension of confirmability was addressed via the triangulation of different data sources. In this study, the qualitative data were used in conjunction with the descriptive data, targeting similar topics across multiple methods.

CHAPTER IV

RESULTS

Participants

A total of six hospital-based nurses in the United States initiated the educational training program. Four completed the entire program (one dropped out due to time constraints; one did not complete the program and did not respond to attempted follow-up contact), with three agreeing to participate in the subsequent interview (Participants 1, 2, and 3). Table 7 presents the participant demographic information for the participants that completed the entire program.

Table 7. *Participant demographics*

	Participant 1	Participant 2	Participant 3	Participant 4
Gender	Female	Female	Female	Female
Age	29	43	42	38
Race/Ethnicity	White	White	White	Black
Nationality	American	American	American	Haitian
Highest Educational Level	Bachelor's degree	Bachelor's degree	Bachelor's degree	Bachelor's degree
Years of Experience	One year and 9 months	3 years	10 years	12 years
Type of setting currently working at	Acute care	Inpatient rehabilitation	Acute care	Acute care

Of note, the initial goal of the study was to recruit a larger sample of participants; however, recruitment was particularly challenging despite multiple recruitment techniques utilized (e.g., multiple modalities). As a result, multiple changes to the recruitment process and target population were implemented during the study in an attempt to increase participant numbers. Originally, only hospital-based nurses were eligible; however, inclusion criteria were

expanded to include all inpatient nurses. Inclusion criteria were further expanded to include certified nursing assistants (CNA), but no additional individuals contacted the primary researcher to enroll. Moreover, initially there was no financial incentive for participation in order to recruit individuals with primary intrinsic motivation to participate; however, with slow recruitment, that progressively changed to providing a drawing for a gift card and then to offering a $20 gift card for each participant. As noted above, attrition was also an issue in this study as originally six participants initiated the program, but two dropped out.

Descriptive/Quantitative Analysis

The following section will discuss participants' test scores and the analyses of the quantitative data. In reviewing the data, Participant 4's pattern of responses (all highly affirmative or extreme, such as "strongly agree" and "always") were suggestive of her being a mischievous responder, a participant whose responses may be untruthful (e.g., Robinson-Cimpian, 2014). Responses from such participants have the potential to misrepresent or skew the results. Thus, Participant 4 was not included in the overall data analysis and the following results only include Participants 1-3. Participant 4's data is presented separately at the end of this section.

Acceptability

Usability and acceptability of the program structure was assessed via the SUS. Participants' responses to each item on the SUS are presented in Table 8 (below), along with the relevant calculations. Across all of the participants, the average total score was 70.8 (*SD* = 1.1). All of the participants graded the program as a "B", or a good rating.

In order to assess participants' acceptability of the program content, six statements were presented directly after comprehensive test following completion of the program. Participants'

responses to each statement are presented in Table 9 below. Overall, scores were positive, with all of the participants rating items as either “strongly agree” or “agree”.

Table 8. *Participants’ SUS scores*

	Participant 1	Participant 2	Participant 3
Q1	4	4	3
Q2	2	3	3
Q3	4	4	4
Q4	2	2	2
Q5	3	4	4
Q6	2	2	2
Q7	4	4	4
Q8	2	2	2
Q9	3	4	4
Q10	2	2	2
X	18	20	19
Y	10	11	11
X0	13	15	14
Y0	15	14	14
SUS Total	70	72.5	70
Grade	B	B	B
Rating	Good	Good	Good

Table 9. *Program content acceptability scores*

Statement	Participant 1	Participant 2	Participant 3
I found the dysphagia educational program to be beneficial to my learning	Strongly Agree	Strongly Agree	Agree
I was satisfied with the content provided in the dysphagia educational program	Agree	Strongly Agree	Agree
The information was presented in a clear and engaging manner	Agree	Agree	Agree
The materials were easy to understand	Agree	Agree	Agree
I found the dysphagia educational program to be relevant to my job	Strongly Agree	Strongly Agree	Agree
I would recommend this dysphagia educational program to other nurses	Agree	Strongly Agree	Agree

Program Effectiveness

Participants' scores on the 20-item multiple choice comprehensive test at baseline, immediately after intervention, and one-month post-intervention are presented in Table 10. Due to participant non-response at the time of dissertation writing, Participant 3's one-month score was not available for analysis. At baseline, participants had a mean score of 11.7/20 on the comprehensive test (SD = 3.1) and immediately after completing the educational program they demonstrated a mean score of 17/20 correct (SD = 2.6; $t(2) = 1.70$, $p = .12$). The effect size of the change in score between baseline and immediately after program completion, as measured by Cohen's d, was $d = 0.97$, indicating a large effect size. For the participants who also completed the one-month follow-up, baseline mean scores for the comprehensive test were 10/20 (SD = 1.4) as compared to 16.5/20 at the one-month follow-up (SD = 0.7; $t(1) = 4.3$, $p = .072$). The effect size, as measured by Cohen's d, between baseline and one-month follow-up scores was $d = 3.06$ indicating a large effect size. Of note, individual participant performance varied greatly

following completion of the educational program, with Participants 1 and 2 showing large changes in performance while Participant 3 showed no change in performance.

Table 10. *Participants' scores on the 20-item multiple choice comprehensive test*

	Baseline	Immediately after intervention	One month after intervention
Participant 1	11 (55%)	19 (95%)	16 (80%)
Participant 2	9 (45%)	18 (90%)	17 (85%)
Participant 3	15 (75%)	14 (70%)	N/A

Responses to the open-ended clinical application questions were also analyzed across the three timepoints (baseline, immediately after, and one month later) by the primary researcher and an additional SLP. The first clinical question assessed the participants' knowledge of the steps needed to measure liquid consistencies according to the IDDSI guidelines. At baseline, none of the participants were familiar with the IDDSI guidelines and were not able to answer the questions (e.g., "I'm unfamiliar with IDDSI", "unsure"). Responses significantly improved immediately after completion of the program, with two out of the three participants able to answer the question and state the steps needed to appropriately measure thickened liquids (Participants 1 and 2). This improved knowledge level was also maintained at the one-month follow-up time point. The second clinical question presented a clinical scenario and asked participants what their next steps would be. No changes were observed in knowledge level for this question as all of the participants were able to respond accurately at baseline.

Participants self-efficacy was assessed using a 5-point Likert scale (1 = not at all confident to 5 = extremely confident). Four statements were presented at all three timepoints

(baseline, directly after, one month later). These statements and participants ratings are presented in Table 11 (below). Baseline scores for a majority of the statements showed some degree of confidence across all participants, with scores often increasing post-intervention. The exception for confidence at baseline was for the IDDSI-related question (question 1) in which two participants did not express confidence in their abilities (Participant 1 "somewhat unconfident" and Participant 3 "not at all confident"). After program completion, all participants had either increased or maintained their level of confidence with this skill. Similarly, participants maintained their level confidence in identifying signs and symptoms of dysphagia from baseline to one month, with the exception of Participant 1 who indicated an increase in her confidence from "somewhat confident" at baseline to "extremely confident" directly after completing the program and one month after. Confidence in identifying patients at higher risk and applying the knowledge learned from the program in clinical practices varied among the participants. For patient identification, all participants maintained or increased confidence directly after program completion, with one participant (Participant 1) moving from "extremely confident" to "somewhat confident" one month later. Similarly, for knowledge application, all of the participants maintained or increased confidence directly after completing the program with Participants 1 and 2 changing their confidence level to "somewhat confident" at the one-month point.

A seven-point Likert scale was used to measure participants' attitudes related to the importance of better understanding dysphagia and modified diets and applying such information to their clinical practices. Participants' responses are presented in Table 12 (below). At baseline, all of the participants stated that it is "extremely important" to understand dysphagia and dysphagia diet modification, which was maintained at the one-month follow-up, except for

Participant 3 who stated that it was “quite important”. At baseline, participants indicated that applying the information learned to their clinical practices was “quite important” (Participants 1 and 3) and “extremely important” (Participants 2). One-month after, all three indicated that it was “extremely important”. When participants were asked if learning more about dysphagia could help in reducing their stress working with patients experiencing dysphagia, Participants 2 stated “extremely likely” at all timelines whereas Participant 1 stated “quite likely” at all time points and Participant 3 moved from “slightly likely” at baseline to “quite likely” directly after completing the program.

Table 11. *Participants' self-efficacy statements and scores*

Statement	Participant 1	Participant 2	Participant 3
Your patient was placed on thickened liquids (IDDSI levels 1-4) and has asked you for some water to drink. How confident are you in your ability to prepare the thickened liquid consistency accurately?	B: Somewhat unconfident D: Somewhat confident O: Somewhat confident	B: Somewhat confident D: Extremely confident O: Somewhat confident	B: Not at all confident D: Neither O: N/A
When caring for new patients, how confident are you in identifying signs and symptoms of dysphagia?	B: Somewhat confident D: Extremely confident O: Extremely confident	B: Extremely confident D: Extremely confident O: Extremely confident	B: Somewhat confident D: Somewhat confident O: N/A
How confident are you in identifying patients who are at high risk for swallowing disorders?	B: Extremely confident D: Extremely confident O: Somewhat confident	B: Somewhat confident D: Extremely confident O: Extremely confident	B: Somewhat confident D: Extremely confident O: N/A
How confident are you in your ability to apply the knowledge learned in this training program to your clinical practice?	B: Somewhat confident D: Extremely confident O: Somewhat confident	B: Somewhat confident D: Extremely confident O: Somewhat confident	B: Somewhat confident D: Somewhat confident O: N/A

Note. B = Baseline; D = Directly after program completion; N/A = not applicable (did not complete); O = One month after program completion

Table 12. *Participants' attitudes statements and scores*

Statement	Participant 1	Participant 2	Participant 3
Better understanding dysphagia and modified diets is: *(Administered at all three timepoints)*	B: Extremely important D: Quite important O: Extremely important	B: Extremely important D: Extremely important O: Extremely important	B: Quite important D: Quite important O: N/A
Applying the information I learned in the current program to my clinical practices is: *(Administered directly after and one month after)*	D: Quite important O: Extremely important	D: Extremely important O: Extremely important	D: Quite important O: N/A
Learning more about dysphagia and modified diets can help reduce my stress and anxiety at work when dealing with patients with swallowing disorders *(Administered at all three timepoints)*	B: Quite likely D: Quite likely O: Quite Likely	B: Extremely likely D: Extremely likely O: Extremely likely	B: Slightly likely D: Quite likely O: N/A

Note. B = Baseline; D = Directly after program completion; N/A = not applicable (did not complete); O = One month after program completion

In order to measure intention to change and actual change resulting from the education program, participants were asked to rate the statements presented in Table 13 (below) using a 7-point Likert scale for intention to change statements and a 4-point Likert scale for an actual change statement. All participants indicated their intention to complete the program to improve their understanding at baseline, with Participant 2 choosing "extremely likely" and the other participants (Participants 1 and 3) choosing "quite likely". Directly after completing the program two of the participants stated that they would "extremely likely" to apply the information they learned, while Participant 3 indicated she was "slightly likely" to apply the information. Responses one month after completing the program were positive. Participants 1 and 2 indicated using the information they learned most of the time at their job.

Table 13. *Participants' intention statements and scores*

Statement	Participant 1	Participant 2	Participant 3
I intend to complete the educational program to improve my understanding of the subject matter *(Administered at baseline only)*	Quite likely	Extremely likely	Quite likely
I intend to apply the information I learn from the program to my clinical practices at the hospital where I work *(Administered at baseline and directly after)*	B: Quite likely D: Extremely likely	B: Extremely likely D: Extremely likely	B: Quite likely D: Slightly likely
In the past month, I have applied the information I learned from the program in my clinical practices at the hospital where I work *(Administered one month after)*	Most of the time	Most of the time	N/A

Note. B = Baseline; D = Directly after; N/A = not applicable (did not complete)

Participant 4's Quantitative Data

Participant 4's scores on the tests and survey are presented in this section. As stated previously, given Participant 4's pattern of responses, the validity of the data is questionable.

Participants 4's SUS scores are presented in Table 14 (below). Of note, Participant 4 responded "strongly agree" (Likert score 5) to all questions, despite there being the presence of both positive and negative statements on the SUS. Participant 4's scores on program content and acceptability are also presented below in Table 15.

Table 14. *Participant 4's SUS scores*

	Participant 4
Q1	5
Q2	5
Q3	5
Q4	5
Q5	5
Q6	5
Q7	5
Q8	5
Q9	5
Q10	5
X	25
Y	25
X0	20
Y0	0
SUS Total	50
Grade	F
Rating	Poor

Table 15. *Participant 4's scores on program content acceptability*

Statement	Participant 4
I found the dysphagia educational program to be beneficial to my learning	Strongly Agree
I was satisfied with the content provided in the dysphagia educational program	Strongly Agree
The information was presented in a clear and engaging manner	Strongly Agree
The materials were easy to understand	Strongly Agree
I found the dysphagia educational program to be relevant to my job	Strongly Agree
I would recommend this dysphagia educational program to other nurses	Strongly Agree

Participant 4's scores on the 20 multiple choice questions in the comprehensive test showed the least amount of knowledge improvement with a baseline score of 65% (13/20), immediate-post-program scores of 70% (14/20), and one-month-post-program score of 50% (10/20).

Participant 4's scores on the self-efficacy statements (Table 16 below) showed that she was "extremely confident" on all the statements at baseline and maintained that across all the items directly after completing the program and one month later. Participant 4's scores on attitudes statements are also presented below in Table 17.

Table 16. *Participant 4's self-efficacy statements and scores*

Statement	Participant 4
Your patient was placed on thickened liquids (IDDSI levels 1-4) and has asked you for some water to drink. How confident are you in your ability to prepare the thickened liquid consistency accurately?	B: Extremely confident D: Extremely confident O: Extremely confident
When caring for new patients, how confident are you in identifying signs and symptoms of dysphagia?	B: Extremely confident D: Extremely confident O: Extremely confident
How confident are you in identifying patients who are at high risk for swallowing disorders?	B: Extremely confident D: Extremely confident O: Extremely confident
How confident are you in your ability to apply the knowledge learned in this training program to your clinical practice?	B: Extremely confident D: Extremely confident O: Extremely confident

Note. B = Baseline; D = Directly after program completion; O = One month after program completion

Table 17. *Participant 4's attitudes statements and scores*

Statement	Participant 4
Better understanding dysphagia and modified diets is: *(Administered at all three timepoints)*	B: Extremely important D: Extremely important O: Extremely important
Applying the information I learned in the current program to my clinical practices is: *(Administered directly after and one month after)*	D: Extremely important O: Extremely important
Learning more about dysphagia and modified diets can help reduce my stress and anxiety at work when dealing with patients with swallowing disorders *(Administered at all three timepoints)*	B: Extremely likely D: Extremely likely O: Extremely likely

Note. B = Baseline; D = Directly after program completion; O = One month after program completion

Table 18 below shows Participant 4's intention scores, which also indicate that she had applied the information she learned from the program all the time at her workplace.

Table 18. *Participant 4's intention statements and scores*

Statement	Participant 4
I intend to complete the educational program to improve my understanding of the subject matter *(Administered at baseline only)*	Extremely likely
I intend to apply the information I learn from the program to my clinical practices at the hospital where I work *(Administered at baseline and directly after)*	B: Extremely likely D: Extremely likely
In the past month, I have applied the information I learned from the program in my clinical practices at the hospital where I work *(Administered one month after)*	All of the time

Note. B = Baseline; D = Directly after

Qualitative Findings

Data analysis of the interview transcripts resulted in the generation of various themes related to changes in knowledge, clinical application, self-efficacy, and confidence (i.e., perceived effectiveness of the educational program), the status quo in nursing training on dysphagia, and barriers to obtaining continuing education. One main finding that emerged from the data analysis was that increasing knowledge about dysphagia and dysphagia dietary recommendations can have an overall positive effect, including an improved understanding of the rationale behind SLP recommendations, better communication with patients and peers, and increased self-confidence in assessing the accurate consistency of food and liquids and determining when to request SLP input. Ultimately, these perceived positive effects can improve patient care, as illustrated by the following quote:

> Just a lot of appreciation, because I've certainly seen patients suffer from aspiration pneumonia when things aren't handled well, and when people aren't educated well enough, or don't take it seriously. And it's tragic. It's so sad…But anything we can do to just be more aware of it and help the patients, I think is great. (Participant 2)

A total of four interrelated categorical themes were derived from the data, including: (1) outcomes of and feedback related to the educational program, (2) formal and informal nursing training on dysphagia and dysphagia dietary recommendations, (3) barriers to obtaining

continuing education hours, and (4) relationship with the SLP. These themes will be described in detail below and further illustrated using participants' direct quotes.

Theme 1: Outcome of and Feedback Related to the Educational Program

A primary theme that emerged related to participants' reflections on what they gained from the educational program and their feedback on the program. Following completion of the program, participants reported a variety of benefits, including new knowledge acquired, changes in clinical practices, and increased confidence. Participants also described multiple strengths of the program and opportunities for further development.

All participants discussed their previous levels of knowledge regarding dysphagia and dysphagia dietary modification as well as changes in their knowledge as a result of completing the educational program that can also be triangulated with the descriptive data presented above. Not unexpectedly, knowledge levels before the program and subsequent changes varied between the participants as seen in the quantitative data. However, all participants agreed that they learned new information related to dysphagia and diet modification from the educational program. Knowledge gained was oriented toward topics such as differentiating food and liquid consistencies, how to prepare the different liquid consistencies, and the different disorders that can cause dysphagia. For example, Participant 2 expressed appreciation for her more in-depth understanding of modified diets after the program as she stated, "I think just a deeper understanding of…the different textures, so that I know what thickness is, more specifically". Similarly, Participant 1 acknowledged that while they may not be entirely independent with some of the content, their knowledge greatly improved:

> I don't did not have as much experience with like solid textures …But I could not tell you what the different levels, what the different forms of diet modification were… I would not be able to look at a tray that was incorrectly prepared and be like, Yeah, that's not right. And now I think that I would still probably look it up. But now, just like having the

> background information. I could probably look at something and be like I maybe should double check this, and I would know where to look or who to ask about it. (Participant 1)

Interestingly, participants appeared to be generally unaware of the IDDSI framework and guidelines related to dietary modifications. Participant 1 reported that before the educational program she had never seen anyone use a syringe to measure thickened liquid consistency. Similarly, Participant 3 expressed that she was unfamiliar with IDDSI's efforts to standardize terminology and how to follow their guidelines to measure liquids and solids, stating "I was unfamiliar with the international diet…That was something that you know- I was like, 'I have no idea what this is, and I don't know if it's the same that we use at my hospital'". This was supported by the data collected from the clinical application questions in the comprehensive test as none of the participants had any knowledge of the IDDSI guidelines at baseline.

Additionally, the educational program highlighted certain topics in dysphagia that may not have been addressed previously for these participants. One such topic included that dysphagia not only results in physical consequences, but also psychoemotional consequences. Such new information was highly valued by participants; for example, Participant 1 reported that better understanding the psychoemotional consequences of dysphagia was going to have a positive effect in changing her clinical practices. Specifically, she indicated that this information would help her be more empathetic toward her patients and understand her patients' perspectives better, as illustrated in this statement:

> A portion of it that I didn't expect to see, and that I thought was so so important, for, like myself as a healthcare provider was the psychoemotional aspects… I felt like it gave me like a better perspective …and I feel like I can meet them with more empathy and better care, knowing, like the physiological background of what might be happening. (Participant 1)

Knowledge about screening, another important topic for nurses related to dysphagia management, was also discussed during the interviews. All participants were aware of the

importance of screening, they all reported screening their patients, and they were all only familiar with the specific screener used in their facility. The rationale behind when to apply dysphagia screening varied between participants, with some reporting that the implementation of screening is a hospital protocol that must be implemented with specific populations (e.g., stroke patients) and others stating that implementing dysphagia screening is up to their own judgment and expertise. However, all participants agreed that following a failed screening test, an order for a full swallowing assessment by the SLP is requested. There were differences in additional actions that the participants would take following a failed dysphagia screening., Participant 3 reported that she would "immediately make them NPO [nothing by mouth], which is often the case until they are seen by speech." On the other hand, Participant 2 reported that in her setting the patient is not NPO but instead their diet is downgraded, and they must be fully supervised during meals as per the setting protocol. Participants also indicated that they were not aware of the different dysphagia screening protocols available that they learned through the educational program, and their baseline knowledge was limited only to the one they used in their facility. For example, Participant 2 stated, "We do this 3-ounce water swallow screen it's the only one that I've ever done".

One factor that appeared to possibly influence knowledge level was years of experience, particularly relevant experience. For example, Participant 2 reported some increase in knowledge gained, but stated that she had a good knowledge base on the topic due to her years of experience (approximately 3 years), the setting she worked at (long term care and long term acute care where diet modifications are frequently being managed by nurses), the percentage of patients with dysphagia on her caseload (everyday), and the good relationship she had with the SLPs in all of her settings. On the other hand, Participant 1, who was a recent graduate with less than two

years of experience, had not recognized how much she did not know prior to participating in the study, as illustrated by the following statement:

> A lot of the educational program that I did for this study was brand new information which I thought was really helpful … I think that I was very surprised at how much I didn't know. (Participant 1)

However, as noted above, all participants reported positive effects of the program on knowledge level, even highly experienced inpatient nurses. Participant 3, who had the most experience of the interviewed participants (10 years as a nurse), noted that she was not aware of some of the newer information and practices related to modified diets that are currently available. For example, when discussing IDDSI, she asked, "Is it the international diet? The IDDSI, that was something that, you know- I was like, 'I have no idea what this is.'" Thus, the educational program helped introduce this information and made her aware of the differences in modified diet terminologies used in the different settings she worked at.

Overall, participants' statements from the interviews supported positive effects of the educational program in increasing their knowledge about aspects of dysphagia and dysphagia dietary recommendations. As Participant 3 stated, "I mean, I think it was really just like a great review of the whole process and why it's important".

After completing the educational program, all of the participants also reported increased confidence in their clinical skills. They reported increased confidence in their ability to train other healthcare providers in their facility on caring for patients with dysphagia and in their ability to educate their patients and their caregivers about dysphagia and modified diets. As Participant 2 expressed, "Part of my job as an RN is to educate other people. So I have to educate the CNAs and you know anyone who's working with the patient…and educate the patients and educate the family…So it's given me more confidence to be able to do that education

component." The educational program also increased their confidence in their ability to keep their patients safe. Specifically, by increasing their ability to assess each individual situation related to patient safety to eat and drink, they are better able to request dysphagia assessments in a timelier manner and also help prevent any further consequences. As another participant noted, "And I think it just gave me more confidence in judging a patients like safety…with as many- as few complications. I think confidence again to recognize that maybe something isn't quite safe. Even if it wasn't my patient" (Participant 1). Overall, participants agreed they "do feel a little bit more confident in watching those patients now" (Participant 3).

Importantly, one participant stated that the program helped in correcting misleading and incorrect information previously learned, which is particularly critical when caring for vulnerable patients in a hospital. As Participant 3, who had been practicing the longest, indicated:

> Just because I remember, probably like 8 years ago, somebody saying, 'Their eyes are watering like that's a sign', and so I've always thought that. But then the education was like, well, it's not necessarily, like it could be something different. So I was like, okay, well, then, I don't need to necessarily panic. (Participant 3)

Participants also reported feeling more qualified, more observant, and more comfortable after completing the educational program. For example, one participant expressed that she now pays closer attention to patient diets, how patients are consuming the diets, and how they are taking their medication (Participant 1). Participants also reported feeling more comfortable expressing concerns regarding their patients swallowing to others, even expressing concerns about patients who are not theirs because they feel more knowledgeable. For example:

> I feel more comfortable now saying, 'Hey, I noticed this about your patient. I'm kind of concerned. Is this what you were noticing?' … because ultimately it's patient safety, right? …And it's often a team support. (Participant 1)

In addition to expressing the benefits of the program to their knowledge and clinical practices, participants also discussed the strengths of the program and their motivations to

participate. Participants described two main reasons that motivated their participation in the study. First, they recognized the importance of continuing education, especially in a topic they frequently deal with in their jobs. Second, they acknowledged the importance of research and "I'm always happy to help with research stuff. I try" (Participant 2). Thus, participating in the current study provided these nurses to both advance their own education while also contributing to the advancement of research.

The participants also identified various strengths of the online educational program. They reported the content to be clear, easily understood, and well organized, similar to the feedback provided in the survey responses. They also felt that it was very comprehensive in terms of content covered and that it did not just brush on basic points. Participants expressed appreciation learning more about the normal swallowing process, the different disorders associated with dysphagia, both the physical and psychoemotional consequences of dysphagia, and how to assess diet consistencies, many of which are not covered in their typical educational environments, as illustrated in these statements:

> I appreciate it actually, like the overview of like the swallowing mechanism. (Participant 3)

> I think just a- a deeper understanding of the different disorders and the different mechanisms and the different textures… like very basic but very specific information was really helpful. (Participant 2)

They also provided feedback on the format of the program, including how it was accessed and navigated. They thought it was user friendly and easy to navigate, similar to the majority of ratings provided on the SUS. Additionally, the use of videos and visual aids helped participants understand the information and stay engaged, keeping up with the content without losing interest. As the participants expressed:

> And I thought it was like easy to navigate and user friendly, you know. Yeah. (Participant 3)

> The information was very clearly presented …I felt like the program very concise … I felt like I understood what the main points were, without feeling like I was going to fall asleep while I was watching it. (Participant 1)

Participants were asked to provide feedback on any weaknesses or suggested modifications for the educational program. Only a few responses were provided. Participant 3 suggested adding a glossary for all the terminology used in the educational program that participants could access for later reference to aid in understanding. Additionally, both Participant 1 and Participant 2 reported difficulties with passing the Module 3 posttest. This module discussed the different causes of dysphagia. Thus, they suggested adding a way to help differentiate between the different disorders discussed, add additional definitions, and to make the questions and answers clearer and better connected to the content as illustrated in the following statements:

> Maybe making sure that the answers were very specific in the content. (Participant 2)

> So I think maybe like definition wise a way to differentiate some of them a little better if that makes sense, because I was like, well, I know that they're all neuro, muscular, and progressive …but when it came down to like having to do a test on it, I couldn't remember. I couldn't really differentiate them in my mind. (Participant 1)

Overall, the online educational program was met with positive feedback from the participants related to it functionality and content as well as the positive effects the program had on their knowledge level and clinical practices.

Theme 2: Formal and Informal Nursing Training on Dysphagia and Dysphagia Dietary Recommendations

All of the participants agreed that the topics of dysphagia and dietary recommendations were only minimally covered in nursing school. Typically, dysphagia was discussed either as a

small section in a lecture or a small unit in a book, a practice that had not seemed to change in curriculum despite the many years difference in practice between participants. They also reported that when dysphagia was discussed, the focus was primarily on screening, signs and symptoms of dysphagia, and referrals to the SLP, which aligned with the topics that the participants were more knowledgeable about as noted above. For example:

> In school there is not a huge section, but I think one of the very- very first, like, I think, first day of nursing school. They taught us how to do a bedside swallow assessment, and they were like is so so important. And then I don't remember it being integrated much into the curriculum beyond that. (Participant 1)

> It was touched on. It wasn't like an entire day of a lecture or something on it. It was like, you know. Probably maybe 10 min in one lecture or something. (Participant 3)

As a result of the minimal coverage during their education, many of the participants reported having to learn most of their dysphagia related skills on the job, as Participant 3 stated, “So I know we covered it, but we didn't go into. We didn't spend a lot of time on it. It was kind of like, oh, this is something you just like pick up as you're in the field working.”

Formal yearly training was usually required by the setting nurses work at, primarily in the context of a specific population (e.g., swallow screens for stroke patients). Participants reported that most of their formal training was provided via online modules along with a couple of in-person trainings in the setting they work at. However, the topics usually addressed in these modules were ward and hospital dependent and often not related to dysphagia; for example, Participant 3 worked in a cardiac ward and thus her continuing education topics were more related to heart attack. They all agreed that they had limited continued training related to dysphagia and dietary modification and, similar to their education programs, the topics covered were very limited, as illustrated by the following statements:

> There is a module that does go over more specifically, like signs and symptoms. So like basically just the bare minimum things that we should know to keep patients safe … and

> then, like what we are supposed to do in those moments when we notice that. But, as far as there's not a whole lot of depth in our like yearly education. (Participant 1)
>
> So we do have like yearly education … I know that we do. That's kind of short. But it talks about the nursing bedside swallow screen. (Participant 2)

Based on the participants' reports of their initial education and their formal continuing education, training on how to manage dysphagia and dietary recommendation for nurses appeared to happen more informally while on the job. This informal training happened in different ways across settings: learning from asking other nurses, having a good relationship with the SLPs and feeling comfortable asking questions and for help, and having the SLP train one of the nurses who then would train the rest of the nurses. For example, Participant 1 stated, "I feel like I can ask my SLPs that come to the ICU…ask them a lot of questions". Participants also indicated that before the program, when it came to determining what is safe for the patient to consume and providing the accurate modified diet, they tended to heavily rely on the SLPs to complete the dysphagia evaluation and for the kitchen to send the accurate food consistency. Participant 1 stated, "I didn't even know what any of those looked like. I just knew, like the kitchen would do it. But if I had to double check to make sure it was the appropriate tray, I would not have known". Many indicated this to be changed after completing the program, as they reported better understanding of the different food and liquid consistencies.

Theme 3: Barriers to Obtaining Continuing Educational Hours

Time was reported by all participants to be the main and major barrier to obtaining continuing education hours across any topic. Lack of energy was the second barrier reported by the participants, which was often attributed to their long shift hours along with high number of responsibilities and tasks at work. For example, Participant 1 stated that "we do 12 hours shifts, and so, as far as getting continuing education hours that are not already required for our unit, I

think it's more of just like a time and energy". As another example, Participant 3 detailed "time, most of us are trying to get these things done while we're at work, because when we're not at work, we want to be not at work". As such, participants found it difficult to complete any continuing education hours other than those required by the facility, and even reported these same barriers to completing the trainings required by their facility. Lack of time and fatigue and the requirement to complete continuing education modules in their setting all also had a significant effect on the quality of the inpatient nurses' learning as they described having to focus more on completing the training by any means possible rather than on focusing on actually learning. Participants reported:

> It's not very easy to get it done. It's like you're expected to do it while you're already there, working in the middle of your shift. So you're frequently interrupted. You start it. You don't get to finish it until 3 weeks later. (Participant 2)

> I feel like by the time we get to the end of them we're sort of just like click, click, click, click, click, click, click, click and so I think it's more of just like fatigue. (Participant 1)

> It's one of those things like, if you don't get them done like they will write you up. So there's a lot of pressure to get it done...It's like you can just sit there and like click through. You don't really have to pay attention, and then the quiz at the end you can take over and over and over. (Participant 3)

Theme 4: Relationship with the SLP

All three participants indicated a strong relationship with the SLPs in their setting, who "are amazing!" (Participant 1). Because of this strong relationship, participants felt comfortable enough to ask the SLPs questions, request evaluation and re-evaluation, discuss concerns, and problem solve issues. Importantly, the participants recognized the valuable unique role of the SLPs on the team; as Participant 3 noted that "obviously we call them if we see something right away." Overall, all of the participants spoke highly of their positive and collaborative relationship with their SLPs, as described here:

> I feel like we have a really good working relationship with our speech language pathologists…Sometimes I'll just call and they're really great about chatting with us, and kind of brainstorming and then after their assessment, they come right to us, and they let us know, this is what I saw and this is what I'm gonna put in for diet, and whether or not they're going to order like a modified barium swallow study. (Participant 1)

This same participant expressed how grateful she is for the work of the SLPs as members of the healthcare team and acknowledged that "I think our patients are much, much safer because of that team" (Participant 1).

Others expressed that because of this strong relationship, and likely also contributing to this relationship, they had a lot of trust in the SLPs' abilities and diagnoses. As a result, some participants felt comfortable just following the SLPs' lead and recommendations. For example, as one participant expressed, "I'm like I'm very happy to hand that back over to them and say, like, I think you need to come back and see the patient" (Participant 3). Similarly, Participant 2 stated, "I mostly just follow the speech language pathologist's recommendations."

CHAPTER V

DISCUSSION

Healthcare providers' adherence to dysphagia recommendations, particularly diet recommendations, can be crucial for patient safety. Current literature suggests that increasing knowledge can have a positive effect on increasing adherence, although less is known about the application of this finding to nurses working with patients with dysphagia. Thus, the purpose of the current study was to develop and pilot an online educational program focused on dysphagia and diet recommendations for inpatient nurses working with this population. The current study aimed to explore the feasibility and acceptability of the developed program. Additionally, the study aimed to preliminarily evaluate the program's effects on knowledge, self-efficacy, confidence, and clinical practices of inpatient nurses working with patients experiencing dysphagia. The hypothesis was that the program would have the potential to improve the knowledge base of inpatient nurses in addition to improving their clinical practices in their work settings. The following chapter discusses the findings of the present study in the context of previous literature, the limitations of the present study, the clinical implications of the findings, and future research directions.

Discussion of Research Findings

A primary aim of the current study was to explore the feasibility and acceptability of the piloted online dysphagia education program. Analysis of the System Usability Scale scores and the qualitative data shows promising preliminary results related to participant acceptability and satisfaction with the program. The majority of the participants rated the educational program as "good" based on the SUS. Of note, one participant rated the program poorly on the SUS. However, given their pattern of scores in which they rated each statement a "5" or "strongly

agree" in light of the presence of both positive and negative statements on the scale, the validity of their responses is questionable and they appeared to be a mischievous responder. Overall, participants specifically rated the program highly for categories of acceptability/feasibility of use including that the program was easy to use and navigate and anyone can quickly learn how to use it. They also appreciated the various functions the program provided and how those functions were integrated. As a result, participants expressed their willingness to use the program more frequently. These data support the feasibility of using such a program to further train nurses in the area of dysphagia management. These findings were also supported by the qualitative data collected during the interviews. Similarly, during the interviews, the participants stated how the program was "user friendly" and "easy to navigate" (Participant 3). They also indicated that the format the information was presented in, using videos and visual cues, kept them engaged and focused, which can often be a challenge with continuing education modules.

In assessing the feasibility and usability of a program, it is also important to consider the barriers to participation. During the interviews, participants identified two main barriers as time and energy, similar to what has been reported in the previous literature (e.g., Karaman, 2011; Shahhosseini & Hamzehgardeshi, 2015; Summers, 2015). Unfortunately, these barriers can have a negative effect on the learning process as nurses try to complete the trainings using any means possible given the pressures placed on them without focusing on the content or more deeply engaging with the content. The participants in the current study agreed, noting that training modules become just "click, click, click, click, click, click, click, click" (Participant 1) and "you don't really have to pay attention" (Participant 3). The design of the current dysphagia educational program purposefully allowed for flexibility by allowing the participants to stop the program and continue later as convenient and at a time they could better focus on the content of

the program. This allowed them to manage their time more efficiently, which can lead to better understanding of the content. The feasibility of such a program was supported by the previous nursing literature exploring how online methods of continuing education can allow for more flexibility (Karaman, 2011; Xing et al., 2018).

Participants stated that most of the educational programs that they are required to complete in their settings tend to be quick and brief. Thus, it was interesting that although the current study educational program content was not brief and provided more in-depth information about dysphagia and dysphagia dietary recommendation it was met with high acceptance from the participants. Along with the flexibility in completion schedule, modules were intentionally short, with short comprehension checks at the end of each to further support completion and learning, which may have contributed to the higher acceptability despite the increased length. This supports that it may not be necessary to simply shorten continuing education programs given completion barriers, which could exclude important pieces of information, but rather could be addressed differently by changing the format (e.g., online, can be completed at different time point) as we did in this study.

The second research question aimed to preliminarily investigate the effectiveness of the educational program on the knowledge level of inpatient nurses directly after the program and one month after completion. While the small sample size precluded more complex statistical analyses, there was an overall large effect size for change in scores between baseline and directly after completing the program and for change in scores between baseline and one month after, supporting an increase in knowledge level following completion of the program. Notably, in looking at individual scores, two of the participants (Participants 1 and 2) showed an increase in test scores from 45-55% at baseline to well into the “competency” range post intervention (90-

95% immediately after and 80-85% after one month). Of interest, these two participants were also those with the least amount of nursing experience (3 years or less as compared to 10-12 years of the other two participants) and, similarly, with lower knowledge scores at baseline (45-55% correct as compared to 65-75% for the other two participants). Complimenting the descriptive results, the participants also expanded on what they had learned in the interviews. All participants reported learning new information that they were not aware of before completing the program and how it positively influenced their clinical practices in their settings. More specifically, the educational program provided "a deeper understanding of…the different textures" (Participant 2) and provided "background information" and a tool for nurses where they "could probably look at something and be like, maybe I should double check" (Participant 1), all crucial for effective clinical practice related to diet modification.

The most commonly reported new information that participants were not previously aware of was the IDDSI guidelines. The IDDSI guidelines were officially implemented in the United States in 2019 in order to develop standardized diet modification guidelines after seven years of work by an international collaboration of a multidisciplinary group of volunteers. Prompting these guidelines was the recognition that standardized terminology reduces misunderstandings and ambiguity, ultimately helping to ensure patient safety (e.g., Cichero et al., 2017). For example, based on the group's seminal systematic review and global survey, 57 unique names were commonly being used to describe levels of food texture and 27 unique names were commonly being used to describe levels of liquid thickness. Due to its clear clinical importance, the American Speech-Language-Hearing Association (ASHA) and the Academy of Nutrition and Dietetics, the professional organizations for speech-language pathologists and dietitians in the United States, have both supported the implementation of these guidelines, with

the official launch date occurring May 1, 2019. However, it was clear that this initiative has not yet been adopted fully across other disciplines involved in dysphagia care. For successful implementation in the United States, the entire multidisciplinary team must be knowledgeable about the framework and its use. Participants learning about it in the current study suggest the positive impact an online educational program can have on knowledge for working professionals and, ultimately, on patient safety in general. Previous literature further supports the benefit of nurse training, as increased knowledge of nurses led to earlier identification of dysphagia, thus improving outcomes and preventing adverse consequences (e.g., Hansell & Heinemann, 1996; Werner, 2010). Further, knowledge levels about recommended diets, including what the diets are and how to prepare the diets, have been shown to increase adherence to the recommendations, crucial for safety (Colodny, 2001; Robbertse & Beer, 2020).

As noted previously, the described amount of new information learned appeared to be related to demographic factors such as years of experience, the setting they worked in, and the percentage of patients they work with who have dysphagia. For example, Participants 1 and 2, the two participants with the fewest years of experience working, showed the greatest effects in knowledge gained based on the comprehensive test. Previous literature has shown that years of experience has a significant effect on current knowledge level (Fulbrook et al., 2011). More specifically, years of experience working with the same type of patients has the greatest effect on knowledge level (e.g., a nurse with 10 years of experience but with only 2 years of experience in the intensive care unit [ICU] will have lower scores than a nurse with only 4 years of experience but that were all in the ICU) (Fulbrook et al., 2011). Other research has shown a correlation between higher levels of education and nurses knowledge level about dysphagia (Wang et al., 2023). All of the participants in the current study had a bachelor's degree, but their knowledge

levels at baseline varied; this finding should not necessary be considered as a lack of support for the previous literature and should be considered with caution due to the small sample size here. Further, the previous literature has also supported that the more the nurses work with patients experiencing dysphagia, the more knowledgeable they are about dysphagia (Wang et al., 2023), similar to the more general nursing literature of the importance of working within a specific population (e.g., Fulbrook et al., 2011). These previous findings align with current participant reports of seeking out guidance and more training when working with this unique population ("on-the-job training") and promotes a link between increased knowledge and changes in clinical practice.

The third research question aimed to preliminarily determine the effects of the dysphagia-focused online educational program on self-efficacy, confidence, motivation, and clinical application among inpatient nurses caring for patients with swallowing disorders. Looking over the participants' self-efficacy and confidence scores, it was interesting to note that prior to the start of the program, the majority of participant felt extremely to somewhat confident in their abilities about much of the information presented on the program, but they demonstrated low scores on the comprehensive tests. One example is participants' knowledge about the IDDSI guidelines, where some participants stated their confidence at baseline, such as Participant 2 who stated that she was somewhat confident about her knowledge at baseline. However, none of the participants were able to answer the specific question about IDDSI guidelines at the baseline comprehensive test and all noted in their interviews that this was generally new information for them. This may indicate a mismatch between some of the participants' perceived confidence and their actual knowledge, which can have implications for participation in training programs and benefits gained. Overconfidence is defined as an overestimation of the individual about their

knowledge, performance, abilities, and chance of success (Moore & Healy, 2008). Nurses' overconfidence can lead to mismanagement of patient care by, for example, blindly trusting their knowledge and skills, not asking for help when needed, or even skipping health management steps. Overconfidence can also affect nurses' judgments in what they need, including their need for continuing education on a given topic. This phenomenon may have been most present in Participant 4 if she did indeed accurately respond to the surveys and questionnaires. Of note, Participant 4 rated all the items related to confidence as "extremely confident". However, she showed the least amount of knowledge improvement with a baseline score of 65%, immediate-post-program scores of 70%, and one-month-post-program score of 50%—scores all below what would be considered as meeting "competency". Furthermore, her scores on the SUS rating scale were all identical despite the presence of both positive and negative statements, suggesting that she did not closely read the statements. Previous literature in the nursing field has indicated that the more confident someone feels, the less likely they are to engage in a clinical training or improve a clinical practice (e.g., Bushuven et al., 2023; Trifunovic-Koenig et al., 2022), which may have been displayed in the current study. Further exploration of overconfidence would be beneficial to target in future research within a larger sample to be able to better characterize the relationship between overconfidence and knowledge.

Furthermore, there was an agreement between all of the participants about the importance of better understanding of dysphagia and dysphagia diet modification in clinical practices and a potential outcome of reducing stress in their clinical practice based on increased knowledge. While the degree of importance varied across participants between extremely to quite important, none of the participants reported any doubt of its importance. Finally, looking at the participants' intention scores, all of the participants also reported that they were likely to complete the

program and apply the information they learned into their clinical practices. Thus, it appeared that all participants found the information covered to be important and were motivated to complete the program and improve their understanding. Participants expanded on their reasons to participate in the interviews where they reported that the importance of the topics and contributing to research were motivation for them to participate, again highlighting the value of the topic covered. Clinician/healthcare provider recognition of this importance has been previously recognized as a crucial factor influencing adherence (Crawford et al., 2007, Smith-Tamaray et al., 2011). It was also interesting to see that all of the participants who completed the one-month follow-up reported applying the information they learned from the program to their current clinical practices either most or all of the time, reflecting its positive impact on the study's participants.

Previous work has highlighted that collaboration between SLPs and nurses working with patients with dysphagia can have substantial benefits for improving health outcomes and preventing adverse consequences of dysphagia, especially in more acute settings where patients are more vulnerable and unstable (Dondorf et al., 2015). Such close collaboration is also important due to the fact the nurses tend to spend the most time with the patient. Analysis of the qualitative data collected in the current study supported that the participants also highly appreciated their relationships to the SLPs in their facilities. Participants reported numerous advantages of having a strong relationship, including better communication with SLPs about concerns and clarification, feeling comfortable to request swallowing assessments, and better understanding behind the rational of various dysphagia and dietary recommendations. It has been suggested that these, in turn, could lead to better adherence to those recommendations. For example, the previous dysphagia literature has shown that when healthcare providers disagree

with the SLP recommendations, adherence is decreased (Colodny, 2001; Robbertse & Beer, 2020). However, this study showed that all of the participants had a great relationship with the SLPs in their settings and followed any recommendations they stated. Significantly, increased adherence has also been observed in settings where SLPs are core and respected members of the healthcare team, working collaboratively with the other team members (Smith-Tamara et al., 2011), a relationship that the current study participants appeared to have.

Qualitative data gathered from the interviews highlighted that typical nursing education programs lack more in-depth learning and training opportunities on the topic of dysphagia, with a minimal focus on only the importance of administering screening. This limited coverage often appears to carry over into their clinical practice, where most nurses reported having to independently seek out guidance from other professionals, including the SLP, and where limited options are taught (e.g., only a single method of screening). Thus, nurses in the field are obtaining their knowledge and training about dysphagia and dysphagia dietary modification in the field, and often prompted by their own motivation. This is a huge disservice to the effective treatment of patients with dysphagia and a strong reason for the importance of implementing educational programs such as the one used in this study into clinical practices.

Clinical Implications and Implementation Challenges

Of clear clinical relevance, the results of the current study support that providing dysphagia education using an online format that incorporates videos, tests, and visual cues is both feasible and acceptable for inpatient nurses and may have a positive effect in increasing their knowledge about dysphagia and dysphagia dietary recommendations. Further, participating in the online educational program not only contributed to improved knowledge, but many participants also described improvements in self-efficacy and confidence related to dysphagia

management and positive changes in their clinical practices. One important mechanism by which increased knowledge, self-efficacy, and confidence can ultimately improve treatment outcomes is by increasing adherence to dietary recommendations, helping to mitigate the adverse consequences of dysphagia (Colodny, 2001; Robbertse & Beer, 2020).

Previous literature has supported that the nonadherence observed in different healthcare providers (e.g., nurses) is, in part, related to perceptions of importance and disagreement with SLPs' recommendations (Colodny, 2001; Crawford et al., 2007; Robbertse & Beer, 2020). These two factors can both be related to a lack of knowledge. The current participants had limited baseline knowledge regarding the nationally adopted IDDSI guidelines for diet modification. Participants were also unaware of the broadness of dysphagia's negative consequences. Participants here included both newer graduates as well as experienced nurses. It is not surprising, then, that if these key healthcare providers lack knowledge in these important areas, they may be less likely to adhere and accurately follow dietary recommendations. Therefore, continuing education for increased knowledge should be prioritized. Providing easy access and a flexible means of continuing education can help motivate nurses to take part of the training and thus improve their knowledge. The program developed here also highlights some valuable components that can address the time and fatigue barriers as were reported by the participants. These components included having the program be able to be accessed online and completed at the participants' own pace and on their own schedule as well as having the program provide short modules that take less time to complete and multimodal learning opportunities (e.g., videos, PowerPoint handouts), which can all help accommodate nurses' schedules without affecting the content and learning process.

The Health Belief Model and Theory of Planned Behavior also support that increasing knowledge can be closely tied to adherence and highlights nurse characteristics which should be targeted in future educational programs. Increased knowledge can influence an individual's beliefs about a disorder and its consequences, what obstacles prevent recovery, and how to take the necessary action to cause change. Additionally, increasing an individual's knowledge can result in a change in attitude and intention toward change. Participants in the current study experienced changes and maintenance in intention, attitude, and confidence after completing the educational program along with subsequent changes in clinical practices. They described the importance of accurate dysphagia management in the interviews, a highly positive characteristic for behavior change. While adherence was not explicitly measured as an outcome in the current study and participants only gave self-reports on clinical application, these results suggest that the nurse participants in the current study may be more likely to follow diet recommendations accurately and appropriately. It will be important for future research to explore this further.

While this study offers valuable insight into the process of program development, particularly as related to the online educational program on dysphagia management used here, it also highlights a variety of challenges faced that must be discussed in order to help guide future clinical implementation and research. The most prominent challenge was recruitment and retention of participants. Although flyers were distributed across different settings (e.g., nursing homes, listservs, Twitter) and via different modalities (in person, online), there were only four participants that completed the program. Additionally, it was also challenging to motivate participants to complete the program, particularly in a timely manner, with many stating time constrains as the barrier. Setting a pre-specified time frame to complete the program (e.g., two weeks from starting the program) was not achievable for most of the participants. While some

participants were able to complete the program in one sitting and do so independently, others required more time and multiple reminders. Based on the experience in this study, it appears that to increase the feasibility of completing such an educational program, facility buy-in may be valuable. Facilities could make such training about dysphagia and dysphagia dietary recommendations as part of their required training for inpatient nurses, rather than just an "on-the-job" learning experience, encouraging a higher rate of completion. In addition, it is important to also consider the quality of learning, as participants stated in their interviews that due to fatigue and time constraints, required training were often completed by "any means possible". Determining opportunities to allocate a couple of paid hours every month for nurses to complete such a program could be helpful to address this barrier.

Based on the participant feedback, a number of changes could be implemented in the next iteration of the program. Given concerns over time for completion, it may be beneficial to identify primary and secondary/optional modules, with the most important content appearing in the primary modules. There were certainly certain topics identified by the participants to be the most important and novel including the different causes of dysphagia and the standardized terminology for the different food and liquid consistencies. The information presented in each module should be re-reviewed to identify opportunities to merge modules, reducing the number of tests involved. In addition, time was the major barrier identified by participants for them to participate in completing continuing education training. Thus, as noted above, future research should aim to collaborate with specific facilities to implement the program as part of their facility-wide training or in conjunction with nurse co-sponsors to offer continuing education hours.

Limitations

As with all research, the current study was not without limitations that must be discussed. First, the study included a small number of inpatient nurses who participated in this study despite various effort to increase participation. Originally the goal of the study was to examine the effectiveness of the online educational program in increasing the knowledge of inpatient nurses and to identify predictors of knowledge change. Unfortunately, this aim was shifted to instead explore the feasibility and acceptance of the program with a more preliminary focus on the effectiveness of the program. Given the negative impact COVID-19 played on the nursing profession, particularly in terms of nurse burnout, it is not surprising that nurses were hesitant to participate in additional work outside of work hours (Galanis et al., 2021; Guixia & Hui, 2020). Thus, the current study provided valuable first-step information that can help guide a larger implementation of the educational program, particularly as the healthcare field begins to stabilize. Another limitation of this study is the lack of diversity in the sample in terms of ethnicity, experience, and age, particularly as only four participants were represented. Of note, all of these participants reported having a positive relationship with their SLP, which may have further motivated them to participate in a research study by SLPs and about a topic related to SLP practice. However, while the results may not be generalizable to all inpatient nurses, especially those not represented in the current pool, the information gathered from the current study can help guide future work with larger samples of participants.

Future Directions

The current pilot study provided preliminary results on the feasibility and the effectiveness of implementing an online educational program about dysphagia and dietary modification recommendations for inpatient nurses. Future research should focus on replicating

the study with a larger sample and implementing some of the changes identified by the current results. Since recruitment was an obstacle, future studies would benefit from integrating the educational program within an entire healthcare system, working with appropriate administrators to offer the educational program as a mandatory requirement. Results from a larger sample can help better explore the effectiveness of the program in improving knowledge, self-efficacy, confidence, and clinical practices and would allow for statistical analyses of change over time. Moreover, the larger sample will also allow for further exploration into the factors that influence baseline knowledge and program effectiveness and potential predictors of those knowledge levels over time. A number of factors were suggested to be relevant based on the current study (e.g., relevant experience), which should be explored further within the larger sample. Working within a healthcare system would also allow for a more diverse participant pool, including individuals who may not see a need for additional training in this topic (e.g., those experiencing overconfidence) and who do not have positive relationships with their SLPs. The inclusion of these participants could help better determine mechanisms for ensuring learning across different clinician groups. Lastly, future studies should expand the current study using a more diverse sample that includes a wider range of ethnicities and races for better representation and generalization of the result. Relatedly, further examination of ways to adapt the program to other countries and investigating the effectiveness of such program in those other countries would be beneficial. Dysphagia is a medical condition experienced by patients globally. However, clinical practices, access to resources, and cultural beliefs that impact healthcare delivery vary. Thus, it will be important to increase awareness of the applicability of such a program to different cultures and allow for better understanding of the effect of such an educational program in different countries.

The current study also benefited from implementing a mixed-methods design using both quantitative and qualitative methodologies. The qualitative data in this study supported the findings from the quantitative analyses, in addition to providing more information to help improve the program for future implementations. Thus, future studies are encouraged to implement a mixed-methods design. As part of the design, it would be beneficial to have study activities that allow for actual observation of clinical practice at baseline and following completion of the program, including measures of adherence. Such a design would not only allow for more "real-world" effectiveness data, but it could also promote further exploration of the factors that may influence knowledge levels and the relationships between the phenomenon of overconfidence and training participation and learning.

Conclusion

Inpatient nurses' adherence to dysphagia dietary recommendations is crucial in dysphagia management, particularly for the safety of acute, medically fragile patients. Previous literature has supported that improving nurses' knowledge about dysphagia and dietary recommendations can improve adherence to those recommendations, thus, improving treatment outcomes (Colodny, 2001; Crawford et al., 2007; Robbertse & Beer, 2020). The current study piloted an online educational program, which yielded promising preliminary findings regarding the effectiveness of such a program on increasing nurses' knowledge and how the learning may be integrated into their clinical practices. More broadly implementing such an educational program in nursing training or continuing education may have a significant effect on increasing knowledge about these topics and, ultimately, increasing adherence to dietary recommendations. By doing so, such a program can lead to earlier identification and appropriate management of

dysphagia, resulting in better treatment outcomes, including a reduction in the negative consequence of dysphagia, increased patient satisfaction, and improved quality of life.

APPENDIX A

SCREENSHOTS FROM THE ONLINE EDUCATIONAL PROGRAM

Dysphagia Educational Program

Consent form

I invite you to participate in a brief research study investigating the effect of an online educational program about dysphagia and dysphagia diet modification on nurses' knowledge levels. If you agree to participate in the research project, in addition to watching the online educational program, you will be asked to complete multiple knowledge base tests and surveys. The tests and surveys will be administered at various points during the duration of the program, including before you start and up to one month after you finish, and should take 5 to 15 minutes to complete.

The educational program will take approximately 2 hours to complete, however, the whole program does not need to be completed at one sitting. There are no known risks to you from taking part in this research and no foreseeable direct benefit to you either. Participation is voluntary, and it is up to you whether or not to participate. Confidentiality of all records related to the research will be strictly maintained.

If you have any questions regarding this research, contact **Bedoor Nagshabandi** at **001(541) 513 -9554** or **bedoorn@uoregon.edu**. If you have any questions regarding your rights as a research participant, please contact **Research Compliance Services at the University of Oregon** at **001(541)346-2510** or **researchcompliance@uoregon.edu.**

If you acknowledge that you have read the contents of this consent form and agree to participate in this study, please click the "continue" button below to be directed to the educational program:

Continue

Program Outline

This educational program will provide information regarding topics related to dysphagia and diet modification. The entire program should take approximately 2 hours to complete and does not need to be completed in one sitting. Below we describe the format of the program and specific learning objectives.

The program will start with a baseline survey, which will include: demographic questions, multiple choice and open-ended questions about dysphagia and diet modification, and questions related to your experiences with dysphagia.

After completing the baseline survey, you will be directed to the start of the educational modules. The program includes 5 separate modules, as described in the table below:

Module	Learning Objectives
1. Dysphagia	Participants will be able to: -Define the stages of normal swallowing processes -Describe impaired swallowing processes
2. Signs and Symptoms	Participants will be able to: -Identify risk factors and signs that indicate the possibility of dysphagia -Define silent aspiration and its risks
3. Causes	Participants will be able to: -Identify different disorders that can lead to dysphagia and how they impact the swallowing processes
4. Food and Liquid Consistencies	Participants will be able to: -Define the International Dysphagia Diet Standardization Initiative (IDDSI) levels of food and liquid consistencies -Describe how to accurately test each level using the IDDSI methods
5. Screenings and Collaborations	Participants will be able to: -Describe the role of the speech-language pathologist (SLP) in their setting, -State how to refer to and seek collaboration with SLPs -Describe how to conduct dysphagia screening protocols

Each module will be followed by a 10-item multiple choice test. You must achieve a score of at least 80% to pass the test and access the next module.

After completing all of the modules you will be directed to a required post-program survey, similar to the baseline survey. You will also receive one additional follow-up survey via email approximately one month after completing the program.

You will have the option to participate in an online (Zoom) interview regarding your experience with the educational program at the conclusion of the study. The interview is expected to last around 30 minutes and compensation will be provided. If you are interested in participating, please email the research team at bedoorn@uoregon.edu and/or indicate your interest when completing the post-program survey.

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Dysphagia Educational Program

Baseline Survey

Click on the link below to start the survey

https://oregon.qualtrics.com/jfe/form/SV_3xFXsXNzVMfFh6m

If you experience any technical difficulties, please email the primary researcher at bedoorn@uoregon.edu

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Which statement best describes dysphagia?

a. Dysphagia is characterized by sensorimotor impairments that results in an inability to swallow food and liquids

b. Dysphagia is characterized by impairment of emotional, cognitive, sensory, and/or motor acts involved with moving a substance from the mouth to stomach

c. Dysphagia is characterized by difficulty chewing and swallowing solid food which can lead to choking

d. Dysphagia is characterized by damage to the nerves responsible for triggering a swallow reflex

Pharyngeal phase dysphagia can be characterized by all of the following except:

a. Reduced laryngeal elevation

b. Reduced buccal tension

c. Inadequate velopharyngeal closure

d. Delayed swallow reflex

e. All of the above may be components of pharyngeal phase dysphagia

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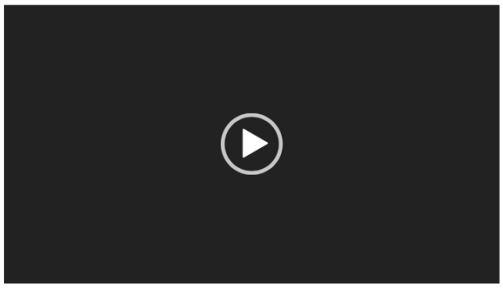
Dysphagia Educational Program

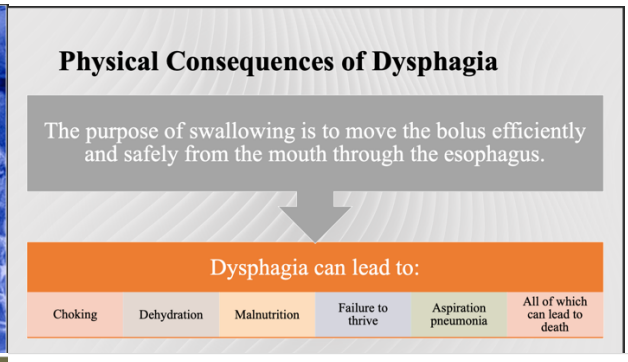
Module 1

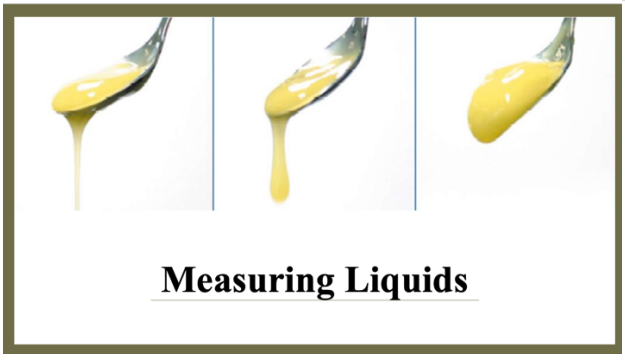


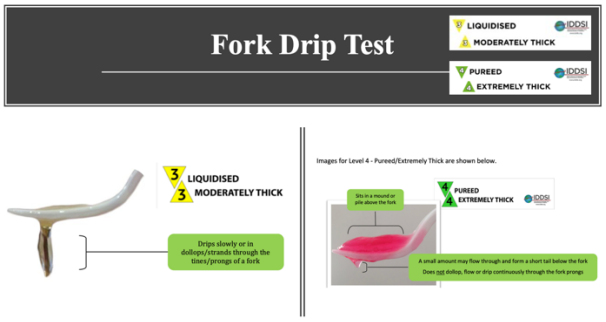
A printable copy of the slides is available here Module 1 – Dysphagia

Once you have completed watching the video, please click HERE to be directed to module 1 test

If you experience any technical difficulties, please email the primary researcher at bedoorn@uoregon.edu







Thank you

You have now completed the current requirements for the educational training program. In one month you will be receiving an email with the link to take the required follow-up surveys.

You also now have the option to participate in the voluntary brief Zoom interview regarding your experience with this program. Compensation will be provided. If you are interested in participating, you can email the research team directly at bedoorn@uoregon.edu.

Thank you for your participation!

APPENDIX B

COMPREHENSIVE TEST AT BASELINE

Demographic information:

1. What is your age (in years)?
2. What is your gender?
3. What is your race or ethnicity? (Select all that apply)
    a. Asian
    b. Black
    c. Middle Eastern
    d. White
    e. Mixed or multiple ethnicity
    f. Other: _____
4. What is your nationality?
5. What is the highest educational level you have completed?
    a. Associate's degree
    b. Bachelor's degree
    c. Master's degree
    d. Doctoral degree
    e. Other:_____
6. Where did you obtain your nursing degree (country)?
7. In what country are you currently practicing?
8. How many years of clinical experience in nursing do you have?
9. In what type of setting do you primarily work?
    a. Acute care
    b. Inpatient rehabilitation
    c. Nursing home
    d. Other, please specify: _____
10. How many years of experience working with patients with dysphagia?
11. Describe your experiences working with patients with dysphagia.
12. Do you (nurses) perform dysphagia screening at your work?
    a. Yes
    b. No
    c. Other:_____
13. Describe any previous training or education you received in dysphagia (e.g., during your nursing program, post graduate continuing education courses, on the job training)

Please choose the best answer for each of the following questions:

1. Which statement best describes dysphagia:
    a) Dysphagia is characterized by sensorimotor impairments that result in an inability to swallow food and liquids
    b) Dysphagia is characterized by impairment of emotional, cognitive, sensory, and/or motor acts involved with moving a substance from the mouth to stomach

c) Dysphagia is characterized by difficulty chewing and swallowing solid food which can lead to choking
d) Dysphagia is characterized by damage to the nerves responsible for triggering a swallow reflex

2. Pharyngeal phase dysphagia can be characterized by all of the following except:
a) Reduced laryngeal elevation
b) Reduced buccal tension
c) Inadequate velopharyngeal closure
d) Delayed swallow reflex
e) All of the above may be components of pharyngeal phase dysphagia

3. All of the following are possible physical consequences of dysphagia except for:
a) Dehydration
b) Low blood pressure
c) Aspiration pneumonia
d) Malnutrition

4. Which statement best describes penetration and aspiration:
a) Penetration occurs when food and liquid enter the airway above the vocal cords and aspiration occurs when food and liquid enter the airway below the vocal cords
b) Penetration occurs when food and liquid enter the airway below the vocal cords and aspiration occurs when food and liquid enter the airway above the vocal cords
c) Penetration and aspiration both occur when food and liquid enter the airway above the vocal cords
d) Penetration and aspiration both occurs when food and liquid enter the airway below the vocal cords

5. All of the following are signs and symptoms of dysphagia except for:
a) Gurgly voice quality
b) Difficulty coordinating breathing and swallowing
c) Prolonged chewing
d) Watery eyes

6. When signs and symptoms of dysphagia are noted with the patient, this indicates:
a) The patient definitively has dysphagia
b) The patient is in need of a comprehensive swallowing assessment (e.g., by a speech-language pathologist)
c) The patient should be made NPO immediately
d) Both a and b
e) All of the above

7. Silent aspiration occurs:
a) When food and liquid enter the airway and the patient shows signs and symptoms of aspiration

b) When food and liquid enter the airway without any signs and symptoms of aspiration
c) When food and liquids enters the airway and the patient is coughing
d) None of the above

8. Drooling may indicate all of the following except for:
a) Labial muscle weakness
b) Impaired alertness level
c) Velopharyngeal dysfunction
d) Oromotor dysfunction

9. Which statement is correct about dysphagia:
a) Dysphagia is a medical diagnosis that leads to swallowing difficulties
b) Dysphagia manifests as a result of underlying etiologies
c) Degenerative disease is the cause of the majority of swallowing disorders
d) Both a and b
e) All of the above

10. Intubation can result in:
a) Injury to the vocal cord(s)
b) Irritation to the structures surrounding the tube
c) Dysphagia
d) All of the above

11. Dysphagia caused by dementia is characterized by:
a) Delayed swallow reflex
b) Delayed pharyngeal response
c) Inappropriate chewing
d) Both a and c
e) All of the above

12. Presbyphagia refers to:
a) Typical alterations in the swallowing mechanism that occur in healthy older adults
b) The clinical diagnosis of swallowing disorders in older adults
c) The gradual muscle weakness of the tongue and jaw that occur in older adults
d) Both b and c
e) All of the above

13. Diet modification can have many benefits. They may include:
a) Preventing aspiration and choking
b) Increasing nutritional intake
c) Increasing hydration
d) All of the above

14. To assess food safety for Level 5 Minced and Moist, the size of the solid food particles should measure no more than _____, which is approximately equal to the space between the prongs of the fork.

a) 2-4 mm
a) 4-5 mm
b) 4-6 mm
c) 5-7 mm

15. Which statement is not accurate about the IDDSI framework?

a) Their goal is to establish a standardized definition and measurement system for food and liquid consistencies
b) The IDDSI standardized system for measuring food and liquids is primarily applicable only in the United States
c) The main concern addressed by the IDDSI framework is patient's safety
d) The use of the standardized terminology can help to improve communication between SLPs and other healthcare professionals
e) Both b and c are not accurate

16. All of the following statements are correct about the fork pressure test, except for:

a) The test is used to assess the softness of level 6 food
b) The test is conducted by placing pressure on food with a fork
c) Pressure is applied by placing the thumb on the bowl of the fork until the nail on the thumb is blanching to white
d) When the fork is lifted the food should be slightly squashed but is able to regain its shape

17. All of the following statements about collaboration between SLPs and other healthcare professionals are true, except:

a) Increases patient satisfaction
b) Increases cost
c) Decreases length of hospital stay
d) Improves patient care and safety

18. Dysphagia screeners can:

a) Diagnose patients with dysphagia
b) Diagnose the presence of aspiration
c) Identify the safest diet for a patient to consume
d) Identify individuals who need further evaluation by a speech-language pathologist
e) All of the above

19. The Eating Assessment Tool (EAT-10):

a) Assess a patient's self-perception of the impact of their swallowing disorder
b) Consists of 10 items that are scored from 0 to 4
c) Is a validated, easy-to-administer screening tool
d) Both a and c
e) All of the above

20. Why is collaboration between speech-language pathologist and nurses important?
    a) Nurses can administer screening tools, monitor a patient, and report nonadherence and any continued concerns
    b) Nurses can administer screening tools, determine if it is safe for a patient to swallow medication, and monitor the patient
    c) Nurses can determine if it is safe for a patient to swallow medication, refer a patient for SLP services, and report nonadherence and any continued concerns
    d) Nurses can determine the safest diet for a patient, monitor a patient, and refer a patient for SLPs services.

Clinical Application Questions:

1. List the materials needed and steps for measuring the consistency of thickened liquids based on the IDDSI guidelines.
2. An adult patient was admitted to the hospital with the medical diagnosis of Traumatic brain injury (TBI). When you arrive in the room, the patient is drinking from a cup of water. You observe the patient to be coughing while drinking and see some water dripping from the corner of their mouth. What should you do next?

Surveys:

Using the scale below, rate your confidence with each of the described scenarios.

1. Your patient was placed on thickened liquids (IDDSI levels 1-4) and has asked you for some water to drink. How confident are you in your ability to prepare the thickened liquid consistency accurately?
2. When caring for new patients, how confident are you in identifying signs and symptoms of dysphagia?
3. How confident are you in identifying patients who are at high risk for swallowing disorders?
4. How confident are you in your ability to apply the knowledge learned in this training program to your clinical practice?

1	2	3	4	5
Not at all confident	Somewhat unconfident	Neither	Somewhat confident	Extremely confident

Using the scale below, rate the importance of each of the following statement.

5. Better understanding dysphagia and modified diets is:

1	2	3	4	5	6	7
Extremely unimportant	Quite unimportant	Slightly unimportant	Neither	Slightly important	Quite important	Extremely important

Using the scale below, rate the likelihood of the following statement.

6. Learning more about dysphagia and modified diets can help reduce my stress and anxiety at work when dealing with patients with swallowing disorders.

1	2	3	4	5	6	7
Extremely unlikely	Quite unlikely	Slightly unlikely	Neither	Slightly likely	Quite likely	Extremely likely

Using the scale below, rate the likelihood of the following statements.

7. I intend to complete the educational program to improve my understanding of the subject matter
8. I intend to apply the information I learn from the program to my clinical practices at the hospital where I work

1	2	3	4	5	6	7
Extremely unlikely	Quite unlikely	Slightly unlikely	Neither	Slightly likely	Quite likely	Extremely likely

APPENDIX C

COMPREHENSIVE TEST DIRECTLY AFTER COMPLETING THE PROGRAM

Please choose the best answer for each of the following questions:

1. Which statement best describes dysphagia:
    a) Dysphagia is characterized by sensorimotor impairments that result in an inability to swallow food and liquids
    b) Dysphagia is characterized by impairment of emotional, cognitive, sensory, and/or motor acts involved with moving a substance from the mouth to stomach
    c) Dysphagia is characterized by difficulty chewing and swallowing solid food which can lead to choking
    d) Dysphagia is characterized by damage to the nerves responsible for triggering a swallow reflex

2. Pharyngeal phase dysphagia can be characterized by all of the following except:
    a) Reduced laryngeal elevation
    b) Reduced buccal tension
    c) Inadequate velopharyngeal closure
    d) Delayed swallow reflex
    e) All of the above may be components of pharyngeal phase dysphagia

3. All of the following are possible physical consequences of dysphagia except for:
    a) Dehydration
    b) Low blood pressure
    c) Aspiration pneumonia
    d) Malnutrition

4. Which statement best describes penetration and aspiration:
    a) Penetration occurs when food and liquid enter the airway above the vocal cords and aspiration occurs when food and liquid enter the airway below the vocal cords
    b) Penetration occurs when food and liquid enter the airway below the vocal cords and aspiration occurs when food and liquid enter the airway above the vocal cords
    c) Penetration and aspiration both occur when food and liquid enter the airway above the vocal cords
    d) Penetration and aspiration both occurs when food and liquid enter the airway below the vocal cords

5. All of the following are signs and symptoms of dysphagia except for:
    a) Gurgly voice quality
    b) Difficulty coordinating breathing and swallowing
    c) Prolonged chewing
    d) Watery eyes

6. When signs and symptoms of dysphagia are noted with the patient, this indicates:
    a) The patient definitively has dysphagia
    b) The patient is in need of a comprehensive swallowing assessment (e.g., by a speech-language pathologist)
    c) The patient should be made NPO immediately
    d) Both a and b
    e) All of the above

7. Silent aspiration occurs:
    a) When food and liquid enter the airway and the patient shows signs and symptoms of aspiration
    b) When food and liquid enter the airway without any signs and symptoms of aspiration
    c) When food and liquids enters the airway and the patient is coughing
    d) None of the above

8. Drooling may indicate all of the following except for:
    a) Labial muscle weakness
    b) Impaired alertness level
    c) Velopharyngeal dysfunction
    d) Oromotor dysfunction

9. Which statement is correct about dysphagia:
    a) Dysphagia is a medical diagnosis that leads to swallowing difficulties
    b) Dysphagia manifests as a result of underlying etiologies
    c) Degenerative disease is the cause of the majority of swallowing disorders
    d) Both a and b
    e) All of the above

10. Intubation can result in:
    a) Injury to the vocal cord(s)
    b) Irritation to the structures surrounding the tube
    c) Dysphagia
    d) All of the above

11. Dysphagia caused by dementia is characterized by:
    a) Delayed swallow reflex
    b) Delayed pharyngeal response
    c) Inappropriate chewing
    d) Both a and c
    e) All of the above

12. Presbyphagia refers to:
    a) Typical alterations in the swallowing mechanism that occur in healthy older adults
    b) The clinical diagnosis of swallowing disorders in older adults

c) The gradual muscle weakness of the tongue and jaw that occur in older adults
d) Both b and c
e) All of the above

13. Diet modification can have many benefits. They may include:
a) Preventing aspiration and choking
b) Increasing nutritional intake
c) Increasing hydration
d) All of the above

14. To assess food safety for Level 5 Minced and Moist, the size of the solid food particles should measure no more than _____, which is approximately equal to the space between the prongs of the fork.
a) 2-4 mm
b) 4-5 mm
c) 4-6 mm
d) 5-7 mm

15. Which statement is not accurate about the IDDSI framework?
a) Their goal is to establish a standardized definition and measurement system for food and liquid consistencies
b) The IDDSI standardized system for measuring food and liquids is primarily applicable only in the United States
c) The main concern addressed by the IDDSI framework is patient's safety
d) The use of the standardized terminology can help to improve communication between SLPs and other healthcare professionals
e) Both b and c are not accurate

16. All of the following statements are correct about the fork pressure test, except for:
a) The test is used to assess the softness of level 6 food
b) The test is conducted by placing pressure on food with a fork
c) Pressure is applied by placing the thumb on the bowl of the fork until the nail on the thumb is blanching to white
d) When the fork is lifted the food should be slightly squashed but is able to regain its shape

17. All of the following statements about collaboration between SLPs and other healthcare professionals are true, except:
a) Increases patient satisfaction
b) Increases cost
c) Decreases length of hospital stay
d) Improves patient care and safety

18. Dysphagia screeners can:
a) Diagnose patients with dysphagia
b) Diagnose the presence of aspiration

c) Identify the safest diet for a patient to consume
d) Identify individuals who need further evaluation by a speech-language pathologist
e) All of the above

19. The Eating Assessment Tool (EAT-10):
    a) Assess a patient's self-perception of the impact of their swallowing disorder
    b) Consists of 10 items that are scored from 0 to 4
    c) Is a validated, easy-to-administer screening tool
    d) Both a and c
    e) All of the above

20. Why is collaboration between speech-language pathologist and nurses important?
    a) Nurses can administer screening tools, monitor a patient, and report nonadherence and any continued concerns
    b) Nurses can administer screening tools, determine if it is safe for a patient to swallow medication, and monitor the patient
    c) Nurses can determine if it is safe for a patient to swallow medication, refer a patient for SLP services, and report nonadherence and any continued concerns
    d) Nurses can determine the safest diet for a patient, monitor a patient, and refer a patient for SLPs services.

Clinical Application Questions:

1. List the materials needed and steps for measuring the consistency of thickened liquids based on the IDDSI guidelines.
2. An adult patient was admitted to the hospital with the medical diagnosis of Traumatic brain injury (TBI). When you arrive in the room, the patient is drinking from a cup of water. You observe the patient to be coughing while drinking and see some water dripping from the corner of their mouth. What should you do next?

Surveys:

Using the scale below, rate your confidence with each of the described scenarios.

1. Your patient was placed on thickened liquids (IDDSI levels 1-4) and has asked you for some water to drink. How confident are you in your ability to prepare the thickened liquid consistency accurately?
2. When caring for new patients, how confident are you in identifying signs and symptoms of dysphagia?
3. How confident are you in identifying patients who are at high risk for swallowing disorders?
4. How confident are you in your ability to apply the knowledge learned in this training program to your clinical practice?

1	2	3	4	5
Not at all confident	Somewhat unconfident	Neither	Somewhat confident	Extremely confident

Using the scale below, rate the importance of each of the following statements:

5. Better understanding dysphagia and modified diets is:
6. Applying the information I learned in the current program to my clinical practices is:

1	2	3	4	5	6	7
Extremely unimportant	Quite unimportant	Slightly unimportant	Neither	Slightly important	Quite important	Extremely important

Using the scale below, rate the likelihood of the following statement.

7. Learning more about dysphagia and modified diets can help reduce my stress and anxiety at work when dealing with patients with swallowing disorders

1	2	3	4	5	6	7
Extremely unlikely	Quite unlikely	Slightly unlikely	Neither	Slightly likely	Quite likely	Extremely likely

Using the scale below, rate the likelihood of the following statements:

8. I intend to apply the information I learn from the program to my clinical practices at the hospital where I work

1	2	3	4	5	6	7
Extremely unlikely	Quite unlikely	Slightly unlikely	Neither	Slightly likely	Quite likely	Extremely likely

Program content

9. Using the scale below, rate the following statements:
    1) I found the dysphagia educational program to be beneficial to my learning
    2) I was satisfied with the content provided in the dysphagia educational program
    3) The information was presented in a clear and engaging manner
    4) The materials were easy to understand
    5) I found the dysphagia educational program to be relevant to my job
    6) I would recommend this dysphagia educational program to other nurses

1	2	3	4	5
Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree

The System Usability Scale (SUS)

10. Using the scale below, rate the following statements:

1) I think that I would like to use this dysphagia educational program frequently.
2) I found the dysphagia educational program unnecessarily complex.
3) I thought the dysphagia educational program was easy to use and navigate
4) I think that I would need the support of a technical person to be able to use and navigate the dysphagia educational program.
5) I found the various functions in this dysphagia educational program were well integrated.
6) I thought there was too much inconsistency in this dysphagia educational program.
7) I would imagine that most people would learn to use and navigate the dysphagia educational program very quickly.
8) I found the dysphagia educational program very cumbersome to use.
9) I felt very confident using the dysphagia educational program.
10) I needed to learn a lot of things before I could get going with this dysphagia educational program.

1	2	3	4	5
Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree

APPENDIX D

COMPREHENSIVE TEST ONE MONTH AFTER PROGRAM COMPLETION

Please choose the best answer for each of the following questions:

1. Which statement best describes dysphagia:
    a) Dysphagia is characterized by sensorimotor impairments that result in an inability to swallow food and liquids
    b) Dysphagia is characterized by impairment of emotional, cognitive, sensory, and/or motor acts involved with moving a substance from the mouth to stomach
    c) Dysphagia is characterized by difficulty chewing and swallowing solid food which can lead to choking
    d) Dysphagia is characterized by damage to the nerves responsible for triggering a swallow reflex

2. Pharyngeal phase dysphagia can be characterized by all of the following except:
    a) Reduced laryngeal elevation
    b) Reduced buccal tension
    c) Inadequate velopharyngeal closure
    d) Delayed swallow reflex
    e) All of the above may be components of pharyngeal phase dysphagia

3. All of the following are possible physical consequences of dysphagia except for:
    a) Dehydration
    b) Low blood pressure
    c) Aspiration pneumonia
    d) Malnutrition

4. Which statement best describes penetration and aspiration:
    a) Penetration occurs when food and liquid enter the airway above the vocal cords and aspiration occurs when food and liquid enter the airway below the vocal cords
    b) Penetration occurs when food and liquid enter the airway below the vocal cords and aspiration occurs when food and liquid enter the airway above the vocal cords
    c) Penetration and aspiration both occur when food and liquid enter the airway above the vocal cords
    d) Penetration and aspiration both occurs when food and liquid enter the airway below the vocal cords

5. All of the following are signs and symptoms of dysphagia except for:
    a) Gurgly voice quality
    b) Difficulty coordinating breathing and swallowing
    c) Prolonged chewing
    d) Watery eyes

6. When signs and symptoms of dysphagia are noted with the patient, this indicates:
    a) The patient definitively has dysphagia
    b) The patient is in need of a comprehensive swallowing assessment (e.g., by a speech-language pathologist)
    c) The patient should be made NPO immediately
    d) Both a and b
    e) All of the above

7. Silent aspiration occurs:
    a) When food and liquid enter the airway and the patient shows signs and symptoms of aspiration
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    c) When food and liquids enters the airway and the patient is coughing
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    c) Velopharyngeal dysfunction
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    a) Dysphagia is a medical diagnosis that leads to swallowing difficulties
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10. Intubation can result in:
    a) Injury to the vocal cord(s)
    b) Irritation to the structures surrounding the tube
    c) Dysphagia
    d) All of the above

11. Dysphagia caused by dementia is characterized by:
    a) Delayed swallow reflex
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    c) Inappropriate chewing
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    e) All of the above

12. Presbyphagia refers to:
    a) Typical alterations in the swallowing mechanism that occur in healthy older adults
    b) The clinical diagnosis of swallowing disorders in older adults

c) The gradual muscle weakness of the tongue and jaw that occur in older adults
d) Both b and c
e) All of the above

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d) 5-7 mm

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e) Both b and c are not accurate

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c) Pressure is applied by placing the thumb on the bowl of the fork until the nail on the thumb is blanching to white
d) When the fork is lifted the food should be slightly squashed but is able to regain its shape

17. All of the following statements about collaboration between SLPs and other healthcare professionals are true, except:
a) Increases patient satisfaction
b) Increases cost
c) Decreases length of hospital stay
d) Improves patient care and safety

18. Dysphagia screeners can:
a) Diagnose patients with dysphagia
b) Diagnose the presence of aspiration

c) Identify the safest diet for a patient to consume
d) Identify individuals who need further evaluation by a speech-language pathologist
e) All of the above

19. The Eating Assessment Tool (EAT-10):
    a) Assess a patient's self-perception of the impact of their swallowing disorder
    b) Consists of 10 items that are scored from 0 to 4
    c) Is a validated, easy-to-administer screening tool
    d) Both a and c
    e) All of the above

20. Why is collaboration between speech-language pathologist and nurses important?
    a) Nurses can administer screening tools, monitor a patient, and report nonadherence and any continued concerns
    b) Nurses can administer screening tools, determine if it is safe for a patient to swallow medication, and monitor the patient
    c) Nurses can determine if it is safe for a patient to swallow medication, refer a patient for SLP services, and report nonadherence and any continued concerns
    d) Nurses can determine the safest diet for a patient, monitor a patient, and refer a patient for SLPs services.

Clinical Application Questions:

1. List the materials needed and steps for measuring the consistency of thickened liquids based on the IDDSI guidelines.
2. An adult patient was admitted to the hospital with the medical diagnosis of Traumatic brain injury (TBI). When you arrive in the room, the patient is drinking from a cup of water. You observe the patient to be coughing while drinking and see some water dripping from the corner of their mouth. What should you do next?

Surveys:

Using the scale below, rate your confidence with each of the described scenarios.

1. Your patient was placed on thickened liquids (IDDSI levels 1-4) and has asked you for some water to drink. How confident are you in your ability to prepare the thickened liquid consistency accurately?
2. When caring for new patients, how confident are you in identifying signs and symptoms of dysphagia?
3. How confident are you in identifying patients who are at high risk for swallowing disorders?
4. How confident are you in your ability to apply the knowledge learned in this training program to your clinical practice?

1	2	3	4	5
Not at all confident	Somewhat unconfident	Neither	Somewhat confident	Extremely confident

Using the scale below, rate the importance of each of the following statements:

5. Better understanding dysphagia and modified diets is:
6. Applying the information I learned in the current program to my clinical practices is:

1	2	3	4	5	6	7
Extremely unimportant	Quite unimportant	Slightly unimportant	Neither	Slightly important	Quite important	Extremely important

Using the scale below, rate the likelihood of the following statement.

7. Learning more about dysphagia and modified diets can help reduce my stress and anxiety at work when dealing with patients with swallowing disorders

1	2	3	4	5	6	7
Extremely unlikely	Quite unlikely	Slightly unlikely	Neither	Slightly likely	Quite likely	Extremely likely

Using the scale below, rate the following statement

8. In the past month, I have applied the information I learned from the program in my clinical practices at the hospital where I work

1	2	3	4
Not at all	Some of the time	Most of the time	All of the time

APPENDIX E

MODULE 1 TEST

Please choose the best answer for each of the following questions:

1. The pharyngeal phase of normal swallowing:
    a) Involves moving the bolus toward the esophagus while simultaneously protecting the airway
    b) Includes the propulsion of the bolus toward the pharynx, primarily through the movement of the tongue
    c) Consists of the peristaltic movement of the pharynx and esophagus
    d) Includes the preparation and formation of the bolus to be swallowed

2. Which of the following cranial nerves are involved in swallowing:
    a) Trigeminal (V)
    b) Glossopharyngeal (IX)
    c) Hypoglossal (XII)
    d) Both a and c
    e) All of the above

3. Which statement best describes dysphagia:
    a) Dysphagia is characterized by sensorimotor impairments that results in an inability to swallow food and liquids
    b) Dysphagia is characterized by impairment of emotional, cognitive, sensory, and/or motor acts involved with moving a substance from the mouth to stomach
    c) Dysphagia is characterized by difficulty chewing and swallowing solid food which can lead to choking
    d) Dysphagia is characterized by damage to the nerves responsible for triggering a swallow reflex

4. Reduced labial closure in the preparatory and oral phase can cause:
    a) Difficulty removing food from utensils
    b) Loss of food from the mouth when eating
    c) Drooling
    d) Both a and b
    e) All of the above

5. All of the following are possible physical consequences of dysphagia except for:
    a) Dehydration
    b) Low blood pressure
    c) Aspiration pneumonia
    d) Malnutrition

6. Which statement is correct about normal swallowing processes in the preparatory and oral phases:

a) Require the elevation of the larynx to protect the airway
b) Are primarily under volitional control
c) Involve an automatic sequence of movements
d) Involve peristaltic movement of the esophagus
e) All of the above

7. An example of dysphagia's social and psychological consequences includes:

a) Isolation
b) Depression
c) Embarrassment
d) Both a and c
e) All of the above

8. Which statement best describes penetration and aspiration:

a) Penetration occurs when food and liquid enter the airway above the vocal cords and aspiration occurs when food and liquid enter the airway below the vocal cords
b) Penetration occurs when food and liquid enter the airway below the vocal cords and aspiration occurs when food and liquid enter the airway above the vocal cords
c) Penetration and aspiration both occur when food and liquid enter the airway above the vocal cords
d) Penetration and aspiration both occurs when food and liquid enter the airway below the vocal cords

9. Pharyngeal phase dysphagia can be characterized by all of the following except:

a) Reduced laryngeal elevation
b) Reduced buccal tension
c) Inadequate velopharyngeal closure
d) Delayed swallow reflex
e) All of the above may be components of pharyngeal phase dysphagia

10. Aspiration pneumonia is a commonly occurring physical consequence of dysphagia caused by:

a) Foreign objects occluding the airway
b) A viral infection in the oral cavity
c) Food and liquid entering the airway
d) None of the above

APPENDIX F

MODULE 2 TEST

Please choose the best answer for each of the following questions:

1. All of the following are signs and symptoms of dysphagia except for:
    a) Gurgly voice quality
    b) Difficulty coordinating breathing and swallowing
    c) Prolonged chewing
    d) Watery eyes

2. Which of the following signs and symptoms are identified from the patient medical chart:
    a) Nasal regurgitation
    b) History of aspiration pneumonia
    c) History of an explained fever
    d) Both b & c

3. Which signs/symptoms can indicate residue in the pharyngeal cavity:
    a) Throat clearing
    b) Wet and gurgly voice quality
    c) Pain when swallowing
    d) Both a and b
    e) All of the above

4. Coughing observed when might indicate dysphagia and/or aspiration?
    a) During drinking and eating
    b) After drinking and eating
    c) Regularly throughout the day
    d) Both a and b
    e) All of the above

5. Nasal regurgitation refers to:
    a) Food and liquids coming into the nose
    b) Difficulty breathing through the nose while swallowing
    c) Reflux
    d) None of the above

6. When signs and symptoms of dysphagia are noted with the patient, this indicates:
    a) The patient definitively has dysphagia
    b) The patient is in need of a comprehensive swallowing assessment (e.g., by a speech-language pathologist)
    c) The patient should be made NPO immediately
    d) Both a and b
    e) All of the above

7. Silent aspiration occurs:
    a) When food and liquid enter the airway and the patient shows signs and symptoms of aspiration
    b) When food and liquid enter the airway without any signs and symptoms of aspiration
    c) When food and liquids enters the airway and the patient is coughing
    d) None of the above

8. Which of the following are sign and symptoms of dysphagia:
    a) Coughing, nasal congestion, lethargy and fatigue during meals
    b) Watery eyes, nasal congestion, lethargy and fatigue during meals
    c) Coughing, drooling, lethargy and fatigue during meals
    d) Watery eyes, drooling, lethargy and fatigue during meals

9. Drooling may indicate all of the following except for:
    a) Labial muscle weakness
    b) Impaired alertness level
    c) Velopharyngeal dysfunction
    d) Oromotor dysfunction

10. Asphyxiation caused by food not being chewed properly can be due to:
    a) Reduced masticatory muscle strength
    b) Reduced bite force
    c) Loss of or missing dentition
    d) Both b and c
    e) All of the above

APPENDIX G

MODULE 3 TEST

Please choose the best answer for each of the following questions:

1. Which statement is correct about dysphagia:
    a) Dysphagia is a medical diagnosis that leads to swallowing difficulties
    b) Dysphagia manifests as a result of underlying etiologies.
    c) Degenerative disease is the cause of the majority of swallowing disorders
    d) Both a and b
    e) All of the above

2. Intubation can result in:
    a) Injury to the vocal cord(s)
    b) Irritation to the structures surrounding the tube
    c) Dysphagia
    d) All of the above

3. The severity of dysphagia after traumatic brain injury is often dependent on:
    a) Location of the injury
    b) Length of coma
    c) Current diet
    d) Both a and b
    e) All of the above

4. Dysphagia caused by dementia is characterized by:
    a) Delayed swallow reflex
    b) Delayed pharyngeal response
    c) Inappropriate chewing
    d) Both a and c
    e) All of the above

5. Amyotrophic lateral sclerosis (ALS) is characterized by:
    a) A progressive decline in memory and cognitive abilities, negatively influencing an individual's ability to do everyday tasks
    b) A loss of dopamine leading to resting tremors, stiffness of the limbs and bradykinesia.
    c) A progressive deterioration of the neurologic systems controlling voluntary movement, including both upper and lower motor neurons
    d) An impaired information transmission between the brain and body caused by impaired central nervous system

6. Patients with head and neck cancer have a high chance of developing dysphagia as a result of:
    a) Surgery
    b) Chemotherapy or radiotherapy
    c) The mass, depending on location and size
    d) Both b and c
    e) All of the above

7. Presbyphagia refers to:
    a) Typical alterations in the swallowing mechanism that occur in healthy older adults
    b) The clinical diagnosis of swallowing disorders in older adults
    c) The gradual muscle weakness of the tongue and jaw that occur in older adults
    d) Both b and c
    e) All of the above

8. Dysphagia in Parkinson's disease can be characterized by:
    a) Poor bolus control
    b) Anterior spillage
    c) Insufficient swallow response
    d) Both a and c
    e) All of the above

9. All of the following statements are correct about muscular dystrophy except for:
    a) Muscle weakness and decreased motility are associated with the muscular dystrophy
    b) Muscular dystrophy usually has a significant affect on the pharyngeal and esophageal phases of dysphagia
    c) Muscular dystrophy generally does not affect the oral phase of dysphagia
    d) Dysphagia in muscular dystrophy is characterized by residue in the valleculae, weak pharyngeal peristalsis, and incomplete relaxation of the cricopharyngeal sphincter
    e) All of the above statements are correct about muscular dystrophy

10. All of the following statements are correct about aging and swallowing except for:
    a) Dysphagia can be caused by aging as it can affect the muscles of mastication
    b) Taste, temperature, tactile sensation, and olfaction all change with aging, impacting the typical swallowing process
    c) Older adults have decreased functional reserve
    d) Decrease in the muscle strength of the pharynx, larynx, and esophagus can lead to decreased swallow efficiency and clearance

APPENDIX H

MODULE 4 TEST

Please choose the best answer for each of the following questions:

1. Diet modification can have many benefits. They may include:
    a) Preventing aspiration and choking
    b) Increasing nutritional intake
    c) Increasing hydration
    d) All of the above

2. When testing fluid consistency using the IDDSI guidelines, for how many seconds do you let the syringe flow before stopping/measuring?
    a) 8 sec
    b) 10 sec
    c) 12 sec
    d) 15 sec

3. To assess food safety for Level 5 Minced and Moist, the size of the solid food particles should measure no more than _____, which is approximately equal to the space between the prongs of the fork.
    a) 2-4 mm
    b) 4-5 mm
    c) 4-6 mm
    d) 5-7 mm

4. Which statement is not accurate about the IDDSI framework?
    a) Their goal is to establish a standardized definition and measurement system for food and liquid consistencies
    b) The IDDSI standardized system for measuring food and liquids is primarily applicable only in the United States
    c) The main concern addressed by the IDDSI framework is patient's safety
    d) The use of the standardized terminology can help to improve communication between SLPs and other healthcare professionals
    e) Both b and c are not accurate

5. Diet modification:
    a) Refers to the processes of changing food texture and/or liquid thickness consistency
    b) Is generally a permanent treatment for dysphagia in adults
    c) Is the only and most effective treatment for acute dysphagia
    d) Generally includes a set of swallowing exercises along with thickening liquids
    e) All of the above

6. All of the following statements are correct about the fork pressure test, except for:
    a) The test is used to assess the softness of level 6 food
    b) The test is conducted by placing pressure on food with a fork
    c) Pressure is applied by placing the thumb on the bowl of the fork until the nail on the thumb is blanching to white
    d) When the fork is lifted the food should be slightly squashed but is able to regain its shape

7. Which of the following liquid levels can only be consumed using a spoon?
    a) Level 1 slightly thick liquids
    b) Level 2 mildly thick liquids
    c) Level 3 moderate thick liquids
    d) Level 4 extremely thick
    e) None of the above

8. Which statement is true about food level 6 soft and bite sized for adults?
    a) Foods that are soft and moist but has no liquids dripping from it, with pieces not larger than 1.5x1.5 cm and food can be easily smashed using a fork
    b) Foods that are soft and moist with minimal liquids dripping from it, with pieces not larger than 1.5x1.5 cm and food can be easily smashed using a fork
    c) Foods that are soft and moist with minimal liquids dripping from it, with pieces larger than 1.5x1.5 cm and food can be easily smashed usin0g a fork
    d) None of the above

9. When testing fluid consistency using the IDDSI framework, what size syringe should be used?
    a) 10 ml syringe
    b) 12ml syringe
    c) 15ml syringe
    d) 16ml syringe

10. Passing the spoon tilt test requires:
    a) Food to be cohesive enough to hold its shape
    b) Food to easily slide and plop when the spoon is tilted
    c) No residue to be left on the spoon
    d) Both b and c
    e) All of the above

APPENDIX I

MODULE 5 TEST

Please choose the best answer for each of the following questions:

1. All of the following statements about collaboration between SLPs and other healthcare professionals are true, except:
    a) Increases patient satisfaction
    b) Increases cost
    c) Decreases length of hospital stay
    d) Improves patient care and safety

2. Dysphagia screeners can:
    a) Diagnose patients with dysphagia
    b) Diagnose the presence of aspiration
    c) Identify the safest diet for a patient to consume
    d) Identify individuals who need further evaluation by a speech-language pathologist
    e) All of the above

3. The Eating Assessment Tool (EAT-10):
    a) Assess a patient's self-perception of the impact of their swallowing disorder
    b) Consists of 10 items that are scored from 0 to 4
    c) Is a validated, easy-to-administer screening tool
    d) Both a and c
    e) All of the above

4. Nurses support for dysphagia management can lead to:
    a) Early identification of dysphagia and improved adherence to dysphagia recommendations
    b) Early identification of dysphagia and reduced need for dysphagia recommendations
    c) Reduced need for diet modification and improved adherence to dysphagia recommendation
    d) Reduced prescribed medications and weight increase

5. All of the following statements about the 3-ounce water swallow test are true, except:
    a) The test is quick and easy to administer in a hospital setting.
    b) The patient is instructed to drink all of the water without stopping
    c) The patient can drink the water with a cup or straw
    d) If the patient passes, then puree trials are provided using a spoon
    e) All of the above statements are true

6. Why is collaboration between speech-language pathologist and nurses important?
    a) Nurses can administer screening tools and refer the patient to for SLP services
    b) Nurses can monitor a patient and report nonadherence and any continued concerns
    c) Nurses can determine the safest diet for a patient
    d) A and b
    e) All of the above

7. Which of the following screeners involves trials of different levels of liquid consistencies:
    a) The 3-ounce water swallow test
    b) The Volume Viscosity Swallow test
    c) Eating Assessment Tool
    d) Both a and b
    e) All of the above

8. According to the World Health Organization, the goal of collaboration is:
    a) To provide optimal care and the best health outcomes
    b) To decrease burden on the healthcare professional
    c) To decrease use of the hospital resources
    d) All of the above

9. The Volume Viscosity Swallow test (V-VST), includes presenting trials:
    a) of mildly thick consistency first followed by extremely thick trials only
    b) of mildly thick, thin and extremely thick consistencies depending on the patient performance
    c) of mildly thick consistency first followed by thin and extremely thick trials
    d) of mildly thick liquid consistency first followed by thin trials only

10. Patients are referred for further assessment in the 3-ounce water swallow test if:
    a) The patient was unable to complete the task
    b) Coughing/choking was noted during or immediately after the swallow
    c) Wet vocal quality was present after the swallow
    d) Both a and b
    e) All of the above

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