CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) AND SWALLOWING: CURRENT TRENDS IN SPEECH-LANGUAGE PATHOLOGY CLINICAL PRACTICE PATTERNS

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Alexis Hodge

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CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) AND SWALLOWING: CURRENT TRENDS IN SPEECH-LANGUAGE PATHOLOGY CLINICAL PRACTICE PATTERNS

Project Approved:

Supervising Professor: Teresa Drulia, Ph.D.

Davies School of Communication Sciences and Disorders

Lynita A. Yarbrough, M.S, CCC-SLP

Davies School of Communication Sciences and Disorders

Stephanie Jevas, Ph.D.

Department of Kinesiology

Abstract

Chronic Obstructive Pulmonary Disease (COPD) is a progressive respiratory disease that limits a person's ability to perform everyday activities, leads to frequent disease exacerbations requiring hospitalizations, and reduces overall quality of life. COPD may co-occur with dysphagia (swallowing impairment) due to a discoordination between the respiratory and swallowing systems that can lead to aspiration and an increased risk of pneumonia. There is currently no optimal care plan for managing dysphagia in persons who have a primary diagnosis of COPD. The purpose of this study was to identify current clinical practice patterns for persons with COPD experiencing swallowing impairment. To identify different practice patterns of American Speech-Language-Hearing Association (ASHA)-certified SLPs, we deployed a 35-question Qualtrics online survey with recruitment accrual through medical SLP social media sites, ASHA Special Interest Group 13 (Dysphagia) Community forum, and flyers distributed at the Texas Speech-Language Hearing Association conference. Eighty-seven SLPs initiated the survey and 49 SLPs had a complete data set that were analyzed. An SLP's years of clinical experience was strongly associated with their inclusion of respiratory measures, such as respiratory rate monitoring and pulse oximetry, in assessment. A moderate association was found between a clinician's self-reported expertise in respiratory measure interpretation and their routine use of respiratory rate monitoring and pulse oximetry while no association was found between adjunctive respiratory measure use and the percentage of persons with COPD on their caseload. Speech-language pathologists are routinely using clinical swallowing examinations paired with instrumental assessments (VFSS or FEES) in this patient group and utilizing the findings to deliver patient-centered treatment approaches based on their presenting swallow physiology. Dysphagia intervention in persons with COPD has also evolved to include options

beyond compensatory strategy swallow training; SLP's use of interventions such as respiratory muscle strength training and respiratory-swallow pattern education is emerging. Additional investigation with a larger sample is needed to clearly identify clinical practice patterns for management of dysphagia in persons with COPD.

Background

Chronic obstructive pulmonary disease (COPD) is a progressive respiratory disease with reduced airflow and hyperinflation of the lungs that results in shortness of breath (dyspnea) during physical activity and diminishes quality of life. COPD is commonly caused by smoking, but one in four persons diagnosed with COPD have never smoked. In the United States, an estimated 24 million adults have been diagnosed with COPD (Mokhlesi et al., 2002). This disease is also the fourth leading cause of death in the United States, following heart disease, cancer, and unintentional injuries (Thomas, 2018) and, according to the Global Initiative for Chronic Obstructive Lung Disease (GOLD), COPD is the second leading cause of disability, following ischemic heart disease (2020).

When assessing, diagnosing, and treating patients whose primary diagnosis is COPD, each patient is evaluated based on phenotype and severity and then prescribed medication to reduce inflammation (steroids) and relax airway muscles (bronchodilators) based on the assessment findings. Not every COPD case is the same, so each patient must be looked at individually and then treated as such (Barrecheguren, et al., 2016). According to the study conducted by Barrecheguren et al. (2016), a majority of people diagnosed with COPD remain untreated or undertreated. In the US alone, it is thought that 59% of diagnosed COPD patients go untreated, and many people living with COPD do not get diagnosed (Barrecheguren, et al, 2016). COPD is a common comorbidity in patients with a variety of diseases or medical diagnoses frequently seen for swallowing by speech-language pathologists such as stroke, cardiovascular disease, cancer, and gastroesophageal reflux disease (GERD) (Martinez, et al., 2014).

In COPD, the person gradually loses the ability to perform daily activities, such as running the vacuum or walking up a set of stairs, due to dyspnea and fatigue with disease

progression. Therefore, additional adjustments to medications are required, including increased reliance on corticosteroids and bronchodilators to perform everyday tasks, and patients become dependent on supplemental oxygen (COPD Foundation, 2020). These factors may lead to further increased inactivity in this patient group, placing them at higher risk for co-morbidities.

COPD exacerbations increase with disease progression (COPD Foundation, 2020). According to the COPD Foundation, "an exacerbation of COPD is a flare-up or episode when your breathing gets worse than usual and you become sick" (2020). A person with COPD may have stable symptoms and then suddenly have a flare-up, or exacerbation. Symptoms may vary for COPD exacerbations but often include worsening pulmonary function with increased mucus production, coughing, wheezing, and frequent respiratory infection leading to hospitalizations and increased mortality (COPD Foundation, 2020; Halpin et al., 2012). The decline in respiratory function increases their dependence on supplemental oxygen due to oxygen desaturation with levels below 90% SpO_2. Importantly, persons with COPD often do not return to their baseline respiratory function following a disease exacerbation (Halpin et al., 2012). Persons with COPD report increased severity and frequency of dyspnea during exacerbations, further limiting their physical activities (COPD Foundation, 2020).

Dysphagia in Persons with COPD

Although the mechanisms contributing to the presence of swallowing impairment in COPD is not understood, swallowing dysfunction compromises airway safety and results in aspiration in this vulnerable patient group (Mokhlesi, et al., 2002; Cvejic et al., 2011). Further, dysphagia is associated with increased disease exacerbations in persons with COPD (Terada et

al., 2010). Clinical improvements in dysphagia have been posited to prevent debilitating COPD exacerbations and improve quality of life in these persons (Terada et al., 2010).

Aspiration is defined as when the bolus enters the airway (Webb, 2016). Aspiration may be a catalyst for exacerbation of the disease (Cvejic et al., 2011; Terada et al., 2010). However, exacerbation of the disease may also cause aspiration, therefore worsening the respiratory symptoms (Gross, et al., 2009). Aspiration of food and liquids is associated with aspiration pneumonia, increased mortality, and increased healthcare costs in this chronic disease (Kaplan & Marik, 2003; Cvejic et al., 2011). Aspiration pneumonia results from a person aspirating on food or liquid and the extraneous materials in the lungs causing inflammation and fluid or pus-filled air sacs.

The swallow has four phases in which the bolus travels from the lips to enter the stomach. The stages include the oral preparatory stage (mastication and bolus formation), the oral stage (posterior bolus transit to back of tongue), the pharyngeal stage (bolus transit through the pharynx and entry of esophagus), and the esophageal stage (bolus transit through the esophagus and entry in the stomach). Coelho (1987) evaluated the oral stage of the swallow through bedside examination and the pharyngeal stage of the swallow through video fluoroscopy. All fourteen patients, in different phases of COPD, had some degree of abnormal swallowing physiology (Coelho, 1987). Persons with COPD demonstrate slower oral and pharyngeal transit of the bolus (Coelho, 1987; de Dues Chaves, et al., 2014), reduced hyolaryngeal excursion (Mokhlesi, et al., 2002), and impaired opening of the pharyngeal-esophageal segment (Stein, et al., 1990). Clayton et al. (2014) reported that residue left in the pharynx after the swallow was found in 90% of patients with COPD. Reduced laryngeal elevation can cause residue to catch at the top of the airway that can then be aspirated during the

following inhalation (Logemann, 1988). Persons with COPD may also have a swallow initiation delay due to reduced requisite sensory input to initiate the pharyngeal motor sequence, resulting in a higher aspiration risk due to poorly timed airway closure. Aspiration, resulting from impaired or poorly timed airway closure, occurs more often in persons with COPD than in healthy persons (Cvejic et al., 2011).

Other studies found that persons with COPD and co-occurring dysphagia have an altered respiratory-swallow pattern (Cvejic et al., 2011; Gross et al., 2009). In typical swallowing, the swallow interrupts the respiratory cycle in the exhalation phase with a cessation of breathing (swallow apnea) while the material passes through the pharynx. An impaired coordination of breathing and swallowing has been found in persons with COPD in both the stable and exacerbated states (Gross et al., 2009). Persons with COPD often initiate a swallow or resume breathing in the non-preferred inspiratory phase, placing them at higher risk of aspiration (Cvejic et al., 2011; Gross et al., 2009). The central control centers for neuro-regulation of respiration and swallowing have to work together to ensure the bolus, as well as airflow, can pass through the shared pharyngeal space (Gross et al., 2009).

Eating is an activity that requires effort in persons with COPD, particularly as the disease progresses, and this exertion may exacerbate their shortness of breath (dyspnea). Importantly, dyspnea has been posited to contribute to the discoordination between breathing and swallowing and increase the risk of aspiration. Yet, speech-language pathologists are thought to routinely not include respiratory measures in their evaluation for persons with COPD and only a small number of SLPs are thought to have adequate training to interpret respiratory findings from other professions.

Clinical Practice Patterns in COPD-related Dysphagia

In this study, we are looking at the clinical practice guidelines and patterns that various clinicians are using in dysphagia management for persons with COPD. Practice patterns and guidelines are defined as a technique or strategy used in a clinical setting after being proven both effective and efficient through a systematic review (Martinez, et al., 2014). Similar to dysphagia practice patterns in other populations (Rumbach et al., 2018), Martin-Harris (2000) advocated that team-based assessment and management was imperative for ensuring dysphagia did not exacerbate the respiratory disease. Clinical symptoms in COPD, such as dyspnea, fatigue, anxiety, and hypoxia (reduced oxygen), warrants consideration during the SLP's swallowing assessment and treatment (Martin-Harris, 2000). Recommendations related to evaluation included instrumental swallowing evaluations based on a person's history and current symptoms (Martin-Harris, 2000) and providing treatments for optimizing swallow safety and efficiency centered on compensatory strategies. Examples of cited strategies that may be effective in persons with COPD included pacing meal intake, multiple swallows per bolus, avoiding larger bolus sizes, single liquid bolus swallows, or diet modification to minimize muscle fatigue (Martin-Harris, 2000). Nutritional assessment and monitoring should also be included when evaluating and managing care in persons with COPD due to weight loss and risk of malnutrition commonly seen in the later stages of the disease, suggesting optimal care should include a dietician in team management for this patient group (Martin-Harris, 2000). Since previously published optimal patterns of care for COPD, there have been advances in evaluation and treatment methodology. While still supporting the individualized approach, this study may provide insight on whether our current practice pattern is comprehensive and inclusive in considering the impact of the respiratory system on dysphagia in persons with COPD.

Clinical Practice Patterns in Dysphagia Treatment for Patients with other Etiologies

Amyotrophic Lateral Sclerosis (ALS) patients develop dysphagia independent of the time of onset of the disease; 85% of ALS patients demonstrate dysphagia. Yet, a recent survey investigating clinical practice patterns in persons with ALS and dysphagia identified a significant underutilization of gold standard assessment measures in this population (Plowman et al., 2017). ALS is a degenerative disease in which motor neurons arising from the pons, medulla, and spinal cord are affected. The degeneration of the upper motor neurons causes deep tendon reflexes and pathologic reflexes; the degeneration of the lower motor neurons causes muscle atrophy, decreased muscle force, fasciculations, and bulbar palsy (Kawai, et al. 2003). Dysphagia in early stage ALS is caused by the degeneration of the cranial nerves responsible for tongue movement and soft palate elevation (Kawai, et al. 2003). In all patients that presented with dysphagia, they demonstrated disorders in lingual elevation in the oral stage of the swallow. This leads to airway compromise and nutritional deficiencies in patients with ALS, requiring nutritional supplements, diet modifications (easy to chew, calorie-rich), and implementing techniques such as a supraglottic swallowing maneuver (breath-hold, swallow, and cough) to close the airway (Broasio and Miller, 2001). A survey of clinical practice patterns conducted by Plowman et al. (2017) found that the majority of patients with ALS are provided nutrition alternatively via percutaneous gastrostomy tube placement (PEG) at some stage in the disease.

Persons with head and neck cancer experiencing dysphagia is another patient population that benefits from developing clinical practice patterns of care. While the effects of head and neck cancer (HNC) and radiation therapy on swallowing may vary depending on the significance and type of cancer, all patients will be affected by dysphagia in some manner and more than half

will have significant dysphagia (Rosenthal, Lewin & Eisbruch 2006). Many patients report having no swallow issues at diagnosis, but, as treatment continues, they begin to develop dysphagia-like symptoms. Late effects from radiation, manifesting years after treatment completion, include increased fibrotic tissue that can significantly limit motor movements for a safe swallow. These patients benefit from early prophylactic therapeutic regimens of swallowing exercises that are designed to strengthen musculature, increase precision movements, and maintain range of motion (Rosenthal, Lewin & Eisbruch, 2006). These early and consistent interventions have been proven to provide the best prevention of long-term swallow dysfunction. Based on best clinical practices to keep muscle movement in HNC, Carnaby-Mann and colleagues (2012) developed "Pharyngocise," a high-intensity therapeutic program completed while the patient is undergoing cancer treatment to minimize later effects on swallowing.

Project Aims

The purpose of this study was to identify current clinical practice patterns for persons with swallowing impairment (dysphagia) and Chronic Obstructive Pulmonary Disease (COPD). Despite twenty-seven percent of persons with COPD being diagnosed with dysphagia (McKinstry, Tranter & Sweeney, 2010), there are limited clinical practice guidelines known to aid in dysphagia. This study aims to identify referral patterns and current evaluation and treatment practices, other than standard care in dysphagia, by speech-language pathologists (SLP) for persons with COPD experiencing swallowing impairment.

The Research Questions and Hypotheses for this study are:

1) What are the referral patterns for identifying persons with COPD experiencing dysphagia?

Hypotheses: Referral rates for persons with COPD will be low, comprising a small percentage of an SLPs' caseload for persons with dysphagia despite the known increased risk of aspiration and swallowing dysfunction. Additionally, referrals to SLPs will most frequently be requested by a primary care physician.

2) What is the association between the clinical service provider's characteristics and evaluation practice patterns for persons with COPD and swallowing impairment?

Hypotheses: There will be no association between the number of years in clinical practice as an SLP and the SLP's inclusion of respiratory measures in the evaluation. However, SLPs self-reporting greater knowledge for interpreting respiratory measures or a higher number of persons with COPD on their caseload will include respiratory measures in the evaluation.

3) What approaches to treatment are SLPs using in persons with COPD with dysphagia?

Hypothesis: SLPs will report emerging implementation of interventions that target respiratory-swallow function, such as expiratory muscle strength training and respiratory swallow pattern coordination.

Methods

Procedure

A 35-question electronic survey was deployed over a 2-month period (mid-February-mid-April 2020) using Qualtrics XM (www.qualtrics.com) to answer the research questions after obtaining Institutional Review Board approval at Texas Christian University. Participants were recruited using purposive, convenience, and snowball sampling methods by posting the

Anonymous Link (hyperlink to survey) and Quick Response (QR) codes on profession-specific social media sites and disseminating flyers at the Texas Speech-Language Hearing Association (TSHA) Conference in Houston, TX. The survey link and QR code were also posted on the American Speech-Language Hearing Association (ASHA) Special Interest Group 13 Swallowing and Swallowing Disorders community forum.

After survey questions were generated by a clinical & research speech-language pathologist with expertise in dysphagia and persons with COPD, survey questions were reviewed by three speech-language pathologists for content, clarity, and administration time. Reviewers had clinical expertise in adult dysphagia evaluation and treatment methods, including in persons with COPD and across a variety of service delivery site types (i.e. outpatient, acute, long-term care). The survey's estimated completion time was between 15-20 minutes. Participants completed an informed consent form electronically prior to entering the survey. The survey included multiple choice, rank ordering, scale, select all that apply, and free response question formats. Survey item categories included SLP statistics (Q1-12), COPD Characteristics (Q13-20), evaluation methods (Q21-27), treatment methods (Q27-32), and patient education (Q33-35). Participants did not receive an incentive for completing the study survey (see Appendix).

Participants

The survey included speech-language pathologists (SLPs) who were certified by the American Speech-Language Hearing Association (ASHA). Participants provided clinical services to adults with dysphagia of a variety of etiologies, including persons with COPD who were practicing across a variety of practice settings.

Analysis

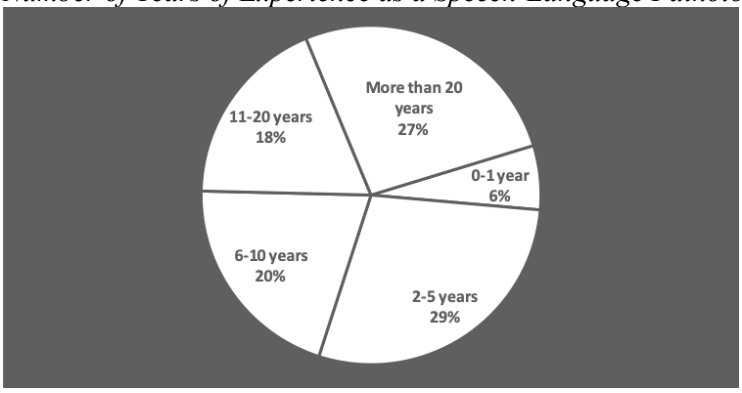
The data was exported into Microsoft Excel and analyzed using descriptive statistics including frequency distributions based on percentages. Bivariate analyses, such as Chi-square were also completed using IBM SPSS statistics 26. This type of analysis provided associations in the data to best answer the research questions. Free responses obtained in the survey were coded for content themes and categorization. Incomplete data sets were not included in the analysis.

Results

Participants

Eighty-seven speech-language pathologists completed the consent and initiated the survey. Forty-nine participants had a complete data set and were included in the analyses. Participants were certified by the American Speech-Language Hearing Association; one participant was completing the Clinical Fellowship to meet ASHA certification and was included in the data set. The SLPs reported a diverse range for number of years in clinical practice (Figure 1); Fifty-five percent of SLPs reported ten years or less while 45% reported over 10 years of clinical experience as an SLP. Clinicians were employed in a variety of settings including acute care (n = 30), outpatient care facility (n = 7), skilled nursing facility (n = 5), long-term acute care (n =3), home health (n=2), and a university setting (n =1). One SLP reported employment as a mobile diagnostic provider (Modified Barium Swallow Studies). Sixty percent of the SLPs reported employment in their primary setting for 2-10 years (Figure 2).

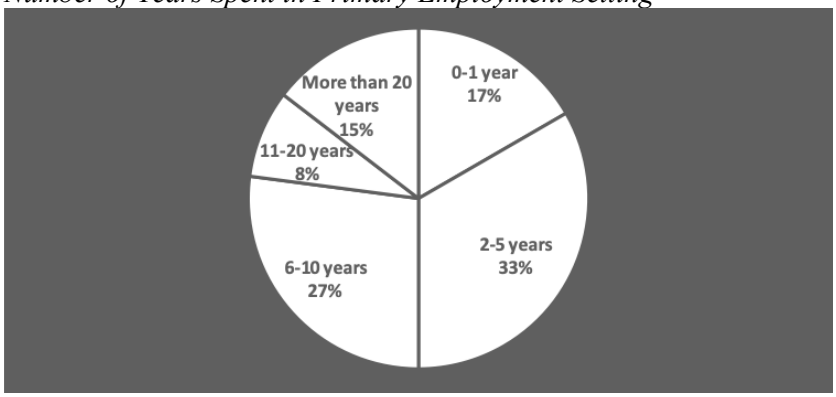
Figure 1:
Number of Years of Experience as a Speech-Language Pathologist



Note: Figure 1 demonstrates the amount of time each participant has been a practicing SLP.

While 37% of respondents reported a single employment site, 63% of participants reported working in a secondary adult medical setting practicing in the area of dysphagia. The majority of SLPs noted employment at the secondary site for more than 5 years. Approximately half of participants were employed in mid-to-large sized facilities based on self-report of patient bed numbers; the number of facility beds for respondents' employers were: 1-100 beds (n=9), 101-205 beds (n=12), 251-500 (n=11), and 500 or more (n=8). The participants practice in 22 different states across the United States and one recently began practicing in Canada.

Figure 2
Number of Years Spent in Primary Employment Setting



Note: Figure 2 represents the years that participants have spent working in their primary employment setting

Eight percent of SLPs reported that they had graduate coursework that covered evaluation and/or treatment specific to dysphagia in COPD. Furthermore, 14% said they have not taken any continuing education classes, seminars, or in-services that provided training for evaluating and treating dysphagia in COPD. However, 49% of SLPs reported that they had completed 1-2 continuing education classes on this topic, 35% reported completion of 3-5 classes, and 2% reported completion of more than 5 trainings that provided education on this topic. Participants' self-report of their ability to interpret respiratory measures such as a pulmonary function test indicate that a large percentage (49%) have an intermediate skill set in this area. Eight percent self-reported advanced skills while 4% reported expertise; yet, 25% considered themselves a novice, 10% reported fundamental awareness and one respondent reported having no knowledge on interpreting respiratory measures. Finally, survey participants included one Board-Certified Specialist in swallowing and swallowing disorders (BCS-S) and six stated that they are in the process of obtaining their BCS-S.

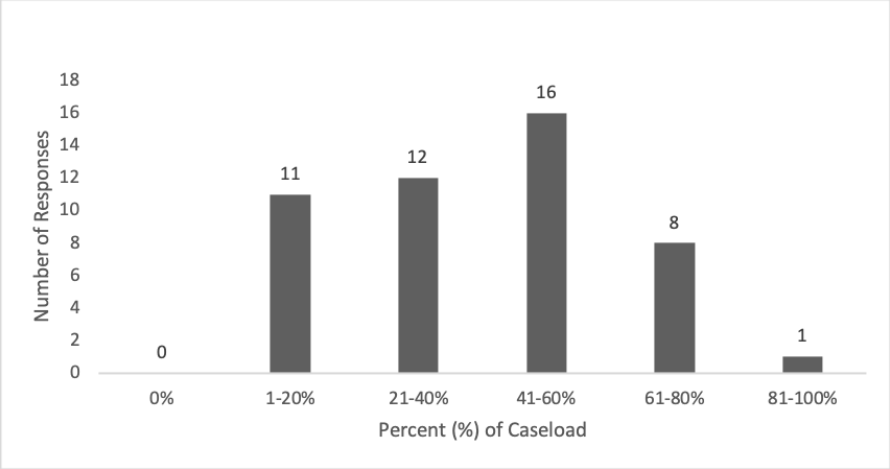
Referrals

Thirty-seven percent of respondents reported that referrals to evaluate persons with COPD for dysphagia were most commonly received from the patient's primary care physician; however, 35% reported the pulmonologist and 28% chose other referral sources. For the SLPs selecting other sources, 64% said the majority of their referrals are from a hospitalist and the remaining 36% identified internal medicine, intensivist, nursing, and the skilled nursing team as referral sources. Fifty-five percent of the SLPs reported patients with COPD comprised 21-60% of their dysphagia caseload in the last year (Figure 3). Furthermore, SLPs report that the percent of persons with COPD referred for a swallowing evaluation with COPD as the primary medical

diagnosis most commonly comprised between 21-60% of the referrals, supporting co-morbidities are present in this patient group. Forty-nine percent of respondents reported that the most frequently co-occurring diagnosis in patients with COPD is congestive heart failure. Additional common co-morbidities were inflammatory lung diseases (37%), such as pneumonia, and respiratory failure (29%). The remaining responses included: diabetes, Parkinson's Disease, cerebrovascular accident, emphysema, asthma, and traumatic brain injury. It should be noted that these percentages are greater than 100% because some participants offered more than one diagnosis and were, therefore, counted more than once.

Figure 3

Percent of Referrals for Patients with a Primary COPD Diagnosis



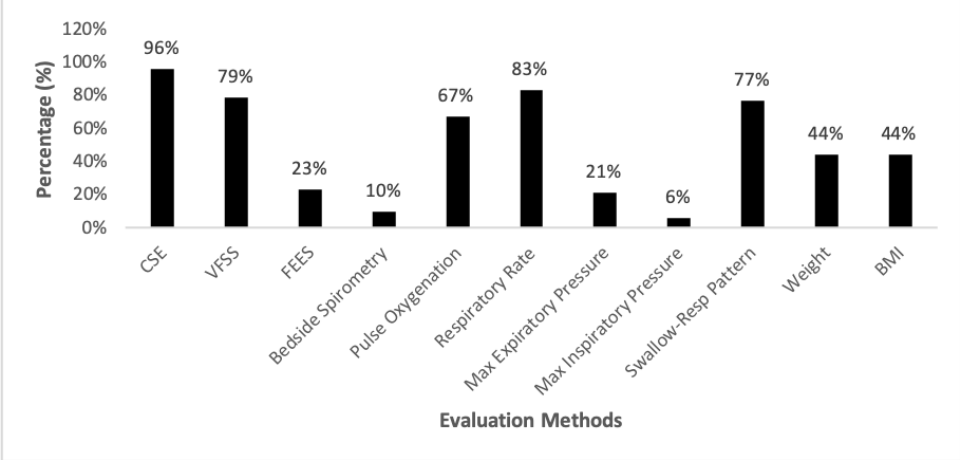
Assessment

The clinical swallow examination (CSE), performed at bedside, was reported as a routine evaluation method for persons with COPD in 96% of respondents (Figure 4). Instrumental swallow examinations (assessing pharyngeal pathophysiology and airway safety) such as the videofluoroscopy swallow study (VFSS) were routine practice for 79% of SLPs while 23% of SLPs reported using fiberoptic endoscopic evaluation of swallowing (FEES).

When considering adjunctive evaluation methods focused on respiratory function, SLPs most commonly reported using respiratory rate (83%; breaths per minute), pulse oxygenation saturation (67%; blood oxygen saturation level), and the respiratory-swallow coordination pattern assessment (77%). Less than half of SLPs reported including measures of weight and Body Mass Index (BMI) routinely in assessment. Though expiratory and inspiratory muscle strength training is commonly used in pulmonary rehabilitation and growing in practice with patients with dysphagia, SLPs reported infrequently completing respiratory maximum pressure threshold measures (21% and 6% respectively) in evaluation with persons with COPD.

Figure 4

Routine Dysphagia Evaluation Methods in Persons with COPD Reported by SLPs.



A chi-square test was conducted between the SLPs years of clinician experience and their routine use of respiratory measures during the dysphagia examination. There was a statistically significant association between years of experience and respiratory rate assessment, χ^2 (4) =18.59, *p*=.001, with a strong positive association (Cramers V=.650, *p*=.001). SLP's years of clinical experience was also associated with routine use of pulse oximetry during swallowing examinations in persons with COPD, χ^2 (4)=14.24, *p*=.007, with a strong positive association (Cramers V=.556, *p*=.007). Associations between clinical experience and the SLPs evaluation of

the respiratory-swallow pattern (p=.244) and expiratory muscle strength (p=.567) were not significant. Advanced years of practice was found to be disproportionately associated with the routine use of respiratory rate monitoring and pulse oxygen saturation measures in dysphagia assessment for persons with COPD.

SLPs' skills for interpreting respiratory measures (such as pulmonary function testing) were categorized as novice or advanced and associations were explored in relation to the SLPs' routine use of respiratory measures during swallowing assessments. Using the chi-square test, a significant association was found between the SLP's respiratory measure interpretation skills and their use of respiratory rate monitoring in their swallowing evaluations, χ^2 (1) =7.70, p=.006 with a moderate positive association (φ=.418, p=.013). An association was also found in routine use of pulse oximetry monitoring during swallowing examinations and the SLP's skills in respiratory measure interpretation (χ^2 =5.35, p=.021). There was a moderate positive association between SLP's expertise and the use of pulse oximetry (φ=.347, p=.021). No association was found with SLP's expertise at interpreting respiratory testing measures and in the other respiratory measures such as respiratory-swallow patterning assessment (p=.347) and maximum expiratory swallow pressure assessment (p=.081), The advanced knowledge of interpreting respiratory measures is disproportionately associated with routine use of respiratory rate monitoring and pulse oxygen saturation measures in dysphagia assessment.

Lastly, there was not a significant association between the percentage of persons with COPD on the SLP's caseload and routine respiratory measure inclusion during dysphagia assessment. While respiratory-swallow patterning approached significance (p=.055), the other measures including pulse oximetry monitoring (p=.124), respiratory rate (p=.389), and maximum expiratory pressure measurement (p=.925) were not significant.

Interventions

Forty-one percent of SLPs reported that they use compensatory strategies to treat their patients. Other interventions, such as respiratory resistance training (24%) and education (22%), which included respiratory-swallow coordination education, were routinely utilized. Fourteen percent of participants reported individualized treatment plans that are dependent upon the patient's history and symptoms. Finally, 8% chose the "other" option, listing exercise-based swallow-therapy, adjunctive biofeedback, and monitoring shortness of breath (dyspnea). One respondent noted that low resources for intervention tools limited routine treatment options in their setting. Some participants cited interventions that fell into two categories, so their data was included in two different categories and yielded a total percentage greater than 100%.

Discussion

The purpose of this study was to examine the current clinical practice patterns for speech-language pathologists evaluating and treating patients with COPD-related dysphagia. Using the framework from the previous work by Martin-Harris (2000), who reported on optimal clinical practice patterns in COPD, we aimed to determine how the SLP's approach to evaluation and intervention has evolved given advancements in evidence-based knowledge in COPD and dysphagia. Additionally, we assessed the current referral methods for persons with COPD to be evaluated by an SLP because under-determination of dysphagia in persons with COPD is suspect.

The distribution of data points in the survey were uniform and relatively equal across categories. This indicates that, even though the data set was small, we had a wide-range of respondents in terms of varied settings for clinical employment, years of clinical experience,

geographical regions of practice, and experience level using respiratory evaluation or treatment methods.

Referrals

We hypothesized that referral rates for persons with COPD would be low, however 55% of the SLPs reported patients with COPD comprised 21-60% of their dysphagia caseload in the last year. Furthermore, we found that the majority of SLPs (64%) reported 21-60% of their COPD referrals had a primary diagnosis of COPD as the reason for evaluation. These numbers should be cautiously considered based on the small sample size for this survey; however, a larger sampling may determine that the number of persons with COPD being referred and managed for dysphagia may be on the rise.

Primary care physicians were identified by SLPs as the most common referral source for persons with COPD (37%); however, pulmonologists only fell short by 2% less than the primary care physicians. We were surprised by the close parallel in frequency of pulmonologist referral initiation compared with primary care physician referral initiation given that a large number of patients with COPD are routinely monitored by their primary care physician and may see their pulmonologist once a year or less. However, the higher proportion of pulmonology-initiated referrals may be due to the large percentage of our respondents who work in large facilities (250+ beds) and are more likely to have access to larger numbers of specialists in their geographical area. Of note, no SLPs reported receiving the majority of referrals from other specialists, such as a neurologist. While persons with COPD may have co-morbidities such as stroke and other neuromuscular diseases associated with dysphagia, the majority of referrals were not expected to be initiated by this specialty area. This survey did not provide data to

determine the percentage of referrals from other specialists, therefore future studies should examine this factor.

Assessment

There are three assessment tools that are defined as the "gold standard" for swallowing: clinical swallow examination (CSE), video fluoroscopic swallow study (VFSS), and fiberoptic endoscopic examination of swallowing (FEES). While these are all accepted methods for assessing the swallow, not every clinician has access to all three methods. The CSE is performed at bedside and does not require expensive instrumentation; This is typically the first assessment administered to observe patient behaviors while swallowing, assess the oral stage of swallowing and identify the diagnostic questions to address in an instrumental examination. The CSE is not able to provide direct visualization of pharyngeal physiology or aspiration; The instrumental examination has capabilities of assessing oral, pharyngeal or upper esophageal physiology. The VFSS is conducted in a radiology suite with a radiologist or with access to a mobile fluoroscopy service; FEES requires costly endoscopy equipment but can be independently performed by a trained SLP. In the survey, SLPs were able to identify all procedures that they routinely use to evaluate persons with COPD for dysphagia in their response. Almost all of the SLPs reported conducting a CSE (96%) and results were similar to Rumbach et al. (2018) who found that 99% of Australian SLPs conduct a CSE. However, Martino et al. (2004) reported that 71% of Canadian SLPs conduct a CSE. For instrumental evaluation of swallowing, the routine use of VFSS (79%) compared with FEES (23%) was expected as SLPs in the United States may not have access to the equipment or employ adequately trained personnel for conducting FEES. Importantly, SLPs in this study reported routine use of both the CSE and at least one type of

instrumental examination for swallowing assessment in persons with COPD. Based on previous evidence finding the presence of pharyngeal pathophysiology and potential presence of aspiration in this patient group (Mokhlesi et al., 2002; Cvejic, 2011), we would expect SLPs to report high use of instrumental assessment in dysphagia management of COPD.

The SLPs' report of routine inclusion of adjunctive respiratory measures in their assessment for persons with COPD is promising. Respiratory rate assessment may provide vital information to aid in determining the impact of meal consumption on the patient's respiratory status. Events of tachypnea (rapid respiration rate), posited to alter coordination between their breathing and swallowing and placing the patient at risk for aspiration, can be measured and its impact should be considered when setting up the treatment plan. While pulse oximetry is not predictive for aspiration (Britton, Et al., 2018) and should not be used for aspiration determination, reductions in blood oxygen saturation levels in a person with COPD may occur during physical activity, such as eating, and may signal the need for a rest break or application of supplemental oxygen (if applicable) at meals. While additional investigation is needed to determine the roles for respiratory rate monitoring and pulse oximetry in dysphagia evaluations with persons with COPD, these assessment methods are simple, low-cost options that may add clinical information in assessment. The routine inclusion of respiratory-swallow pattern assessment (77%) in the dysphagia evaluation for this population is likely beneficial due to recent evidence supporting the relationship between altered respiratory-swallow patterning and the increased risk of aspiration in persons with COPD (Cvejic, 2011).

Routine use of respiratory rate monitoring and pulse oximetry was associated with SLPs who had the highest years of clinical experience and SLPs with advanced skills interpreting respiratory measures. Measures of respiratory rate and pulse oximetry are clinical measures used

regularly by multiple health professions. Yet, only 4% of SLPs reported receiving specific instruction related to dysphagia in persons with COPD in their graduate training program. Our data suggest that SLPs currently rely on years of clinical experience or continuing education opportunities to integrate these measures into their assessment measures. These findings may suggest that training programs should be including additional content related to adjunctive respiratory measures for persons with respiratory disease.

Intervention

Routine treatment strategies reported SLPs fell into four categories: compensatory strategies, respiratory muscle strength training, education, and individualized treatment approach. Compensatory strategy training continues to be commonly used and is the main method of treatment. Compensatory strategies contribute to improving swallowing efficiency or safety but do not restore physiological impairments. Importantly, more than half of the SLPs reported moving beyond singular use of compensatory strategies and are beginning to implement evidence-based interventions such as expiratory muscle strength training, respiratory-swallowing pattern education, and use of biofeedback to train swallowing maneuvers in this population. Importantly, they report that their application of a given treatment is based on the physiological findings observed in the evaluation and previously reported as best practice in dysphagia management for persons with COPD (Martin-Harris, 2000).

Limitations and Future Directions

While the survey was completed by 87 SLPs, the final complete data set included 49 participants. It is important to note that the timing of our survey deployment was during the

COVID-19 pandemic and likely contributed to the lower response rate. The study participants, medical speech-language pathologists, were professionally impacted by COVID-19. The principal investigators' recruitment abilities were also impacted when an international conference, Dysphagia Research Society Conference, was cancelled.

As such, the findings from this survey can only be considered pilot and additional investigation is warranted to make larger generalizations regarding SLPs' current practice patterns in assessment and treatment of dysphagia in persons with COPD. In the future, the survey should be disseminated more widely and consideration for incentives to participants should be considered. The survey was also only written in English, so only English-speaking SLPs could take the survey. In the future, the survey should be translated into other languages so that input from non-English-speaking SLPs could be included in the data set.

Further research needs to be conducted to consider clinical decision making in regard to service delivery with this population. In light of the high use of respiratory rate monitoring and pulse oximetry reported by SLPs, examination of its validity and reliability should be further explored in future research.

Conclusions

The current clinical practice patterns for SLPs delivering services to persons with COPD and dysphagia builds on previous work in this population (Martin-Harris, 2000). Speech-language pathologists are routinely using clinical swallowing examinations paired with instrumental assessments (VFSS or FEES) and utilizing the findings to determine patient-centered approaches for treatment based on their physiology of the swallow. However, SLPs are also routinely including adjunctive respiratory measures in their dysphagia assessments with this

population. This seems to suggest that SLPs are considering the impact of respiration on swallowing when selecting their assessment methods. Dysphagia intervention in persons with COPD has also evolved to include options beyond compensatory strategy training to include interventions such as respiratory muscle strength training and respiratory-swallow pattern education. While larger sampling is needed, these early pilot study findings may suggest translation of research to clinical practice is occurring in our clinical management of dysphagia in persons with COPD.

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Appendix

Research Survey

1. SLP statistics

1.1 Are you ASHA certified?

Yes
No

1.2 Identify your current primary employment setting.

Acute Care
Skilled Nursing Facility
Long-term Acute Care (LTAC)
Rehabilitation Unit
Outpatient
Home Health
None
Other: _____

1.3 Identify your secondary employment setting.

Acute Care
Skilled Nursing Facility
Long-term Acute Care (LTAC)
Rehabilitation Unit
Outpatient
Home Health
None
Other: _____

1.4 How many patient beds are in your primary employment facility?

1-100
101-250
251-500
501 and over
Not applicable

1.5 What state (or country if outside the United States) do you deliver speech pathology services?

_____

1.6 Identify the number of years in clinical practice as a speech-language pathologist.

0-1 year
2-5 years
6-10 years
11-20 years
More than 20 years

1.7 Identify the number of years in your primary employment setting.
- 0-1 year
- 2-5 years
- 6-10 years
- 11-20 years
- More than 20 years

1.8 Identify the number of years in your secondary employment setting.
- 0-1 year
- 2-5 years
- 6-10 years
- 11-20 years
- More than 20 years
- Not applicable

1.9 Did your graduate coursework cover evaluation and/or treatment specific to dysphagia in COPD?
- Yes
- No

1.10 How many continuing education courses, seminars, or in-services have you attended that included information on dysphagia in COPD?
- 0
- 1-2
- 3-5
- More than 5

1.11 Which of the following statements best describes your abilities with interpreting respiratory measures, such as in pulmonary function testing?
- Expert
- Advanced
- Intermediate
- Novice
- Fundamental awareness
- No knowledge

1.12 Are you a Board-Certified Specialist in Swallowing and Swallowing Disorders (BCS-S)?
- Yes
- No
- In process of obtaining the BCS-S

2. COPD characteristics

2.1 Excluding persons with COPD, identify the average number of persons with respiratory disease that you evaluate each week.

None
0-1
1-3
4-6
7-10
10-15
16 or greater

2.2 Excluding persons with COPD, identify the average number of persons with respiratory disease that you treat each week.

None
0-1
1-3
4-6
7-10
10-15
16 or greater

2.3 Identify the average number of persons with COPD that you evaluate each week.

None
0-1
1-3
4-6
7-10
10-15
16 or greater

2.4 Identify the average number of persons with a primary diagnosis of COPD that you treat each week.

None
0-1
1-3
4-6
7-10
10-15
16 or greater

2.5 Identify the average number of persons with a secondary diagnosis of COPD that you treat each week.

None
0-1
1-3
4-6
7-10
10-15
16 or greater

2.6 What percentage of your dysphagia caseload is persons with respiratory disease in the last year?

0%
1-20%
21-40%
41-60%
61-80%
81-100%
Not applicable

2.7 What percentage of your dysphagia caseload is persons with COPD in the past year?

0%
1-20%
21-40%
41-60%
61-80%
81-100%
Not applicable

2.8 What percentage of the persons with COPD on your dysphagia caseload are on supplemental oxygen?

0%
1-20%
21-40%
41-60%
61-80%
81-100%
Not applicable

3. Evaluation

3.1 Select a response that best applies to the following statements regarding your clinical practice with persons diagnosed with COPD.

Response choice for each statement
1=Strongly disagree
2=Disagree
3=Neutral
4=Somewhat Agree
5=Strongly Agree

The majority of referrals for persons with COPD you receive were diagnosed within the past year.
The majority of the time, I am aware of the COPD stage or severity when I complete the evaluation.
The majority of the time, I have access to the pulmonary functioning testing or respiratory related evaluation prior to completing my evaluation.
The majority of persons with a primary diagnosis of COPD are referred due to presence of aspiration pneumonia.
The majority of persons with a primary diagnosis of COPD are referred due to suspected risk of aspiration.
The majority of my persons with a primary diagnosis of COPD are referred due to a report of coughing at meals.
The majority of persons with a primary diagnosis of COPD are referred due to report of food sticking in the throat.

3.2 What percent of persons with COPD referred for a swallowing evaluation have COPD as a primary diagnosis?
0%
1-20%
21-40%
41-60%
61-80%
81-100%
Not applicable

3.3 What is the severity of COPD that you evaluate most often? Rank order from most frequent to least frequent.
At risk
Mild
Moderate
Severe
Very Severe
I do not know

3.4 What are the most frequently co-occurring diagnoses that patients with COPD in your practice are diagnosed with? _____

3.5 The majority of referrals for persons with COPD are from the _____.
Primary Care Physician
Pulmonologist
Neurologist
Other _____

3.6 What are your routine evaluation methods for persons with COPD?
Response choice for each statement
1=strongly disagree
2=Disagree
3=Neutral
4=Somewhat Agree
5=Strongly Agree

Clinical Bedside Swallow Examination
Videofluoroscopic Swallow Study (VFSS)
Fiberoptic Endoscopic Evaluation of Swallowing (FEES)
Bedside spirometry
Pulse oxygenation
Respiratory rate
Maximum expiratory pressure
Maximum inspiratory pressure
Swallow-respiratory patterning
Weight
Body Mass Index (BMI)

3.7 Identify any other evaluation methods not listed. _____

4. Treatment

4.1 Rank the frequency of your use for the following interventions in persons with COPD.
Compensatory strategies
Swallow-maneuver strategies
Inspiratory muscle strength training
Expiratory muscle strength training
Respiratory-swallow pattern training
Diet modification
Other_____

4.2 Select a response that best applies to the following statements regarding your clinical practice with persons with COPD and dysphagia.

Response choice for each statement

1=Strongly disagree
2=Disagree
3=Neutral
4=Somewhat Agree
5=Strongly Agree

Persons with COPD benefit significantly from compensatory strategy swallow training.
Persons with COPD benefit significantly from swallow-maneuver strategy training (e.g. effortful swallow).
Persons with COPD benefit significantly from resistance training (e.g. CTAR).
Persons with COPD benefit significantly from inspiratory muscle strength training.
Persons with COPD benefit significantly from expiratory muscle strength training.
Persons with COPD benefit significantly from respiratory-swallow pattern training.
Persons with COPD benefit significantly from diet modifications.

4.3 Which treatment do you find <u>most</u> successful in improving clinical outcomes in persons with COPD?

_____

4.4 How long, on average, are you treating persons with a primary diagnosis of COPD for Dysphagia?

1 visit (evaluation and education only)
2-4 visits
6-10 visits
10+ visits

4.5 How long, on average, are you treating persons diagnosed with Dysphagia, regardless of etiology?

1 visit (evaluation and education only)
2-4 visits
6-10 visits
10+ visits

<u>5. Education</u>

5.1 How do you educate persons with COPD on dysphagia?

Verbal
Educational handouts
Video
Referral to online resources
Other: _____
None of the Above

5.2 What topics do you include in your education of a person with COPD experiencing dysphagia? _____

5.3 How long, on average, do you spend in a session solely talking to patients about how they are feeling about their health?

0 minutes
1-5 minutes
6-10 minutes
11-15 minutes
More than 16 minutes