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Self-Efficacy, Perceived Skills, and Real Knowledge of Speech-Language Pathologists

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Walden University
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Abstract

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by

Meredith L. Baker-Rush

M.S., Rush University, 1995

B.S., Illinois State University, 1992

Proposal Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Psychology

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Abstract

Although speech language pathologists' (SLPs) knowledge of communication and swallowing has been undisputed, their knowledge and skills related to tracheostomy and mechanical ventilation (MV) seem varied. The consequences associated with the presence of tracheostomy or MV demonstrate the necessity of training. Guided by Bandura's social cognitive theory, this study was designed to determine if SLPs' training influenced self-efficacy and real knowledge, and to evaluate trends associated with SLPs' pursuit of specialized training. A total of 236 SLPs practicing in the United States responded to a researcher-developed knowledge and confidence test for tracheostomy and mechanical ventilation (KCT-TMV). Data were analyzed via *t*test, one-way ANOVA with post hocs, regressions, and correlations. Knowledge scores of SLPs were low as identified by responses on the KCT-TMV. SLPs reported confidence and high self-efficacy, yet those ratings did not correlate with high levels of knowledge. Therefore, some SLPs may not recognize they lack knowledge/competency. A lack of competency in continued practice is a violation of the Rules and Code of Ethics of the American Speech Language Hearing Association as well as nonmaleficence. Trends related to the pursuit of training were focal to a lack of resources from employers and inconsistencies in healthcare practice. These results may bring positive social change to the training of SLPs. By doing so, the social impact may result in improved patient care and patient health outcomes for the tracheostomized and MV patient populations.

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Dedication

This research study is dedicated to the advanced training of speech-language pathologists and the critically ill patients/clients that we serve.

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To my dissertation committee, thank you for your knowledge, skills, and expertise through the countless phone calls and emails. Dr. Stadtlander, my chair, my mentor, and my colleague; your dedication to my success and fun-loving humor helped to make the dissertation process manageable! Your honest and forthright approach was priceless and foundational in my success. I can only hope that I will be able to be the mentor and support for others as you have been for me.

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Chapter 1: Introduction to the Study

I am a speech-language pathologist (SLP) with 21 years of clinical experience in the areas of acute and critical care. Throughout my career, I have had the opportunity to provide clinical services in 10 acute care centers in the Chicagoland metropolitan area, serve as the chairperson for an acute care tracheostomy-ventilator team, develop critical pathways, policy, and procedures for evidence-based practice (EBP) for tracheostomized and mechanically ventilated patients, and teach around the country regarding tracheostomy and mechanical ventilation management. I am a member of the American Speech Language Hearing Association (ASHA) and several ASHA special interest groups (SIG) related to the complications associated with acute and chronic illness. ASHA has recognized me as an expert on the topic of tracheostomy and mechanical ventilation and invited me to present at the 2013 national convention in Chicago regarding practice and education for tracheostomy and mechanical ventilation. Currently, I continue to provide clinical services, continuing education, and consultative training in the area of tracheostomy and mechanical ventilation to facilities across the country.

Speech-language pathology is a health related field that continues to be one of the top jobs in the United States with a projected need of an additional 22,100 SLPs between 2008 and 2018 (Brook, 2011; Bureau of Labor Statstics, 2015; Weiss, 2015). Recognizing that SLPs serve communication, swallowing, cognition, learning, hearing, and speech related disorders across the life span demonstrates the diversity of the skills and knowledge essential for practice. It is due to the vast diversity of skills, settings, and disorders in clinical practice that in 1995, ASHA began to recognize specialties in the areas of swallowing, fluency, and child language (Simpson & Page, 2013). However, specialty programs and specific training remain nonexistent in the area of acute care, critical medicine, and complex patient populations (e.g., tracheostomized and mechanically ventilated patients) across the life span. Despite the lack of or limited academic-based training specific to tracheostomy and mechanical ventilation (MV), SLPs continue to diagnose and treat tracheostomized and mechanically ventilated patients, with unknown quality and types of postgraduate training (e.g., on the job, online training, courses in general). This raises concerns as to the quality and consistency of SLP education and ethics, and impact they may have on patient safety and outcomes. Due to the lack of regulated training in content, methods, and quality, SLPs may have a diverse and disproportionate level of perceived knowledge (i.e., what the SLP believes they know) as compared to real knowledge (i.e., true, evidence-based knowledge as determined by assessment) in this complex patient population. To date, no one has studied the knowledge and skills of practicing SLPs, their self-efficacy and confidence, or trends associated with obtaining knowledge and skills in the areas of tracheostomy and MV management for swallowing and communication disorders until this study. This study begins to fill the gap in the understanding of SLPs' real skills as they relate to complex patient populations (e.g., tracheostomized and mechanically ventilated), the factors reported to influence training, and self-efficacy (i.e., individuals' judgments as to their ability to perform in and manage various conditions). Due to the complex nature of training, knowledge, and the management of tracheostomy and MV, I utilized a mixed methods approach to address the various factors individually as well as determined relationships between variables.

The implications of the study have been multifactorial. From the perspective of training and skill acquisition, this study provided insight into specific skill sets lacking in the current curricula dictated by ASHA. The results of this study provides a foundation for positive change in the training of SLPs and the approach to this patient population via a reevaluation of SLP graduate curriculum and potentially demonstrated the need for a specialization in tracheostomy and MV. In addition, considering the projected growth rates of tracheostomized and mechanically ventilated patient populations, current skill demands, and the impact of cost and patient care outcomes, this study provided insight into the need of national and facility-based regulation of competency to aid in patient outcomes and the efficient use of healthcare resources. In addition, the study identified driving factors of SLPs seeking or not seeking additional training for complex patient populations across the life span. These factors included perceived knowledge, personal or environmental phenomenon, and the psychological aspect of self-efficacy. Through the evaluation of current practicing SLPs and their level of self-efficacy, real knowledge, confidence in their knowledge, and factors that may influence the obtainment of knowledge, the study created a potential for creating positive social change by highlighting the identified areas of needed training and skill acquisition for SLPs serving complex patient populations (e.g., tracheostomized or mechanically ventilated). Furthermore, it lends an opportunity for future research toward the assessment of patient care outcomes with specialty training verses generally trained SLPs and the impact of self-efficacy as it relates to knowledge/skill acquisition. Lastly, given an understanding of the relationship of self-efficacy as it relates to obtaining knowledge, self-efficacy serves as a predictor of success in academics, job satisfaction, or the commitment to lifelong learning, which is discussed in chapter 2.

In this chapter, factors related to the background and problems associated with current SLP practice, the nature and purpose of study, research questions, theoretical and conceptual frameworks, key definitions, assumptions, scope and delimitations, limitations, and significance are discussed. Subsequent chapters provide details regarding the background and current literature as it pertains to the importance of the study and the methodology.

Background

This study offered a multifactorial analysis of SLPs diagnosing and treating tracheostomized and mechanically ventilated patient populations. The projections for growth in the tracheostomized and mechanically ventilated population in the next quarter century are significant (Zilberberg, de Wit, & Shorr, 2012; Zilberberg, de Wit, Pirone, & Shorr, 2008). Current training for healthcare providers covers general matters related to this population, yet does not necessarily include the mental and physical complications that develop secondary to a critical care admission and the presence of a tracheostomy or MV. In addition, factors related to the patient health outcomes and maximizing institutional resources can relate directly to the level of education, skills, and knowledge of the healthcare providers (Dasta, McLaughlin, Mody, & Piech, 2005; Kahn, Rubenfeld, Rohrbach, & Fuchs, 2008; Schumaker & Hill, 2006; Zilberberg, Luippold, Sulsky, & Shorr, 2008).

In the United States, United Kingdom, and Australia, studies have examined the development and utilization of various surveys and interviews to identify and analyze tracheostomy knowledge, skills, and management practices in nurses, medical students, and physicians (Casserly, Lang, Fenton, & Walsh, 2007; Dorton, Rees Lintzenich, & Evans, 2014; Lighthall & Barr, 2007). The results indicate a diversity of knowledge and skills predominantly below what would be acceptable, as well as the need for additional and simulation training for adequate practice. In the United Kingdom and Australia, additional studies focused on SLP knowledge and training as it relates only to the tracheostomy population. Results found SLPs were practicing with less than adequate skills (Ward, Agius, Solley, Cornwell, & Jones, 2008; Ward, Morgan, McGowan, Spurgin, & Solley, 2012). Furthermore, Ward et al. (2008) and (Ward et al., 2012) discuss the need to support SLPs in their ongoing pursuit of specialized education in the various skills required to diagnose and treat tracheostomized patient populations. No studies in the United States have examined the real knowledge and skills of SLPs, nor has any study assessed the impact of self-efficacy on obtaining training related to tracheostomized and mechanically ventilated populations.

Multidisciplinary healthcare teams, the impact of resource utilization, and the trends and challenges associated with the tracheostomized and mechanically ventilated populations were additionally considered in the development of this current study (de Mestral et al., 2011; Hopkins, Spuhler, & Thomsen, 2007; Pandian et al., 2012; Parker et al., 2007; Perme & Chandrashekar, 2008; Pierce, 2007; Sudderth, 2011; Tobin & Santamaria, 2008). A core set of professionals that are collectively termed a "tracheostomy team" was involved in the diagnosis and treatment of tracheostomized patients. The studies completed various analyses of the benefits, challenges, and outcomes of such teams focal to patient outcomes, mortality, length of stay in the hospital or intensive care (de Mestral et al., 2011; Pandian et al., 2012; Parker et al., 2010; Parker et al., 2007; Sudderth, 2011). The results found general benefits in reducing complications (de Mestral et al., 2011; Pandian et al., 2012), increasing knowledge of age specific patient needs (Parker et al., 2007), reduction in health care costs (Pandian et al., 2012; Sudderth, 2011), and improved compliance with care standards (Arora, Hettige, Ifeacho, & Narula, 2008). Limited studies evaluated the benefits of multidisciplinary tracheostomy teams as they relate to confidence, knowledge, and awareness of professional roles in tracheostomy and critical care teams (Parker et al., 2010), however, none of these studies considered the impact of self-efficacy on these same variables. No studies have addressed confidence, knowledge, or self-efficacy in health care professionals related to mechanically ventilated patient populations. Therefore, the current study assessed knowledge, confidence, self-efficacy, as well as trends associated with the obtainment of knowledge for SLPs in the United States.

The literature on SLPs and self-efficacy is lacking, therefore, the nursing literature on self-efficacy was utilized in the current literature review as nurses share similar training guidelines and direct patient contact. Previous studies in nursing considered the use and application of EBP as it relates to Bandura's (1977) social learning theory and construct of self-efficacy (McLaughlin, Moutray, & Muldoon, 2008; Oh, Yang, Kim, Yoo, & Lee, 2014; Reeb, Folger, Langsner, Ryan, & Crouse, 2010; Salbach & Jaglal, 2011; Zimmerman, 2000). Previous researchers have tended to focus on the definition of EBP rather than the idea of an individual's self-efficacy (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996). Sackett et al. (1996) discussed the importance of integrating both clinical training and expertise with clinical evidence. Sackett et al. (1996, p. 71) defined evidence-based medicine as

> the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence-based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research.

While the definition of EBP is essential in the application of knowledge and skills, other studies focused on the impact of self-efficacy as it applies to the performance capabilities of students in general (Zimmerman, 2000). Furthermore, Judge and Bono (2001) completed a meta-analysis of employed adults in diverse vocations and self-efficacy and found that generalized self-efficacy was positively correlated to job performance. While self-efficacy has been found to have an influence on these factors in other disciplines, there is a gap in the literature regarding self-efficacy, EBP, knowledge, and confidence as it relates to SLPs.

In summary, the literature indicates a significant need for appropriately trained healthcare providers in the care of the critically ill for reasons including but not limited to patient health outcomes, reduction in adverse events, resource utilization, financial responsibility, and decreased hospital length of stay. The present study provides insights into factors inhibiting specialized training, specific skills sets lacking in the standard training of SLPs, and the relationship of self-efficacy to the obtainment of knowledge.

Problem Statement

Patients requiring a breathing tube inserted in the neck (i.e., tracheostomy tube) and a machine intended to support breathing and gas exchange (i.e., mechanical ventilation) present with complex health care needs. Adult patients' need for acute MV has been reported as increasing faster than the general United States population (Zilberberg, de Wit, et al., 2008). The care of these patients is as diverse as their comorbidities. Unfortunately, training, knowledge, and skills of the health care professionals (e.g., nurses, SLPs, residents, physicians) in the areas of tracheostomy equipment, emergency procedures, EBP, and tracheostomy management when caring for these patients is lacking formalized education (Casserly et al., 2007; Dorton et al., 2014; Smith-Miller, 2006; Ward et al., 2008; Ward et al., 2012). The matter of training is vital for patient safety and outcomes given the anticipated growth in the geriatric population and patients requiring MV (United States Census Bureau, 2011; Zilberberg et al., 2012; Zilberberg, de Wit, et al., 2008).

The presence of tracheostomy or MV can create impairments in communication and swallowing (dysphagia; de Larminat, Montravers, Dureuil, & Desmonts, 1995; Leder, 2002; Leder, Cohn, & Moller, 1998; Leder, Joe, Ross, Coelho, & Mendes, 2005; Leder, Tarro, & Burrell, 1996; Skoretz, Flowers, & Martino, 2010). SLPs are expected to address the communication and dysphagia in this population, yet ASHA does not indicate the need for formalized and regulated training for tracheostomy and ventilator dependency (ASHA, 2014). SLPs continue to provide services to this specialized population despite reports of lacking formalized training, reduced confidence levels, reduced knowledge of EBP standards, or advances in care with and without clinical support teams (Manley, Frank, & Melvin, 1999; Ward et al., 2008; Ward et al., 2012). There is a gap in the literature regarding SLPs and the relationship between real and perceived skills, knowledge of anatomy and physiology, terminology used with the tracheostomized and mechanically ventilated patient population, lab values, medical equipment, disease related to cardiopulmonary illness, and the psychology of critical illness. The gap extends to self-efficacy, or the belief that SLPs can achieve positive outcomes in patient care, despite factors related to knowledge. Speech pathology services are vital considering that communication, swallowing, and safety are priorities when patients are tracheostomized and mechanically ventilated (Pandian et al., 2014). Knowing that communication and swallowing are rated as significant quality of life (QoL) factors in the tracheostomized and mechanically ventilated patient population, the current practices of SLPs including training, knowledge, and the relationship of self-efficacy as it influences patient care provision and outcomes warrants investigation. The current study addressed this gap by assessing the real knowledge of practicing SLPs in the United States, their self-ratings of self-efficacy (the personal belief in the ability to act and manage specific situations), their perceived knowledge, and analysis of trends associated with therapists providing care to tracheostomized and mechanically ventilated patient populations.

Purpose of the Study

This two-part study contained multiple purposes. In study 1, the purpose was to establish a valid assessment of knowledge of tracheostomy and MV using the knowledge and confidence test of tracheostomy and mechanical ventilation (KCT-TMV) that demonstrated a difference between the participants, experts (e.g., intensivists, pulmonologists, otolaryngologists, and critical care nurses), SLPs, and graduate students in the school of communication sciences and disorders. The validation of the test tool was important to maintain reliability and validity of the results in study two as well as to offer a knowledge, confidence, and self-efficacy test that can be used in clinical practice to demonstrate real knowledge and level of self-efficacy and confidence of SLPs in the skill areas of tracheostomy and MV.

Study 2, a mixed methods study, had multiple purposes. First, the purpose of the quantitative aspect of the study was to assess the real knowledge, confidence, and self-efficacy of practicing SLPs in the United States, and to determine a task value rating as it related to the tracheostomized and MV populations. Second, a qualitative online survey explored and described the phenomenon associated with obtaining or not obtaining training after graduate school and the pursuit of specialized education for the diagnosis and treatment of tracheostomized and mechanically ventilated patient populations in the areas of communication and swallowing. The qualitative online survey was completed by a subgroup of the participants in the quantitative knowledge test. The specifics of participant recruitment, selection, and randomization are discussed in chapter three.

Study 2 was important for a number of reasons. The need to demonstrate a core set of knowledge and skills for SLPs in the diagnosis and treatment of communication and swallowing is essential for the psychological and physical well-being of the tracheostomized and MV population. In addition, this study has begun to fill a gap in the literature related to self-efficacy and the pursuit of professional knowledge for SLPs as literature in nursing and general employment has demonstrated a relationship between self-efficacy, job satisfaction, and performance (Judge & Bono, 2001; McLaughlin et al., 2008; Oh et al., 2014; Zimmerman, 2000). Lastly, by identifying the phenomena associated with obtaining postgraduate training regarding tracheostomy and MV, this study demonstrates the need for change in training programs (e.g., national professional associations, regulated continuing education, or facility based), and to increase the support of professionals in the development or advancement of tracheostomy and MV knowledge. This potential positive social change may decrease adverse events, length of stay, and treatment costs for tracheostomized and mechanically ventilated patients while simultaneously increasing overall patient health outcomes.

Research Questions and Hypotheses

This two-part study focuses on the following questions:

Study 1: Knowledge and Confidence Test of Tracheostomy and Mechanical Ventilation (KCT-TMV) for SLPs?

RQ1, quantitative: To what degree does the type and amount of tracheostomy and MV training differ for expert versus SLP versus student (independent variable) and real knowledge (dependent variable) as measured by a dichotomous skills assessment?

Study 2: SLP Self-Efficacy

RQ2, quantitative: To what degree does the type and amount of tracheostomy and MV training for SLPs as measured by demographics (independent variable) influence self-efficacy (i.e., confidence; dependent variable), real knowledge (dependent variable), and task value (dependent value) as measured by the new skills assessment, KCT-TMV?

$H_0$2: The type and amount of tracheostomy and MV training for SLPs has no influence on self-efficacy, perceived skills sets, and real knowledge.

H_a2: The type and amount of tracheostomy and MV training for SLPs has an influence on self-efficacy, perceived skills sets, and real knowledge.

RQ3, qualitative: What factors do SLPs perceive to influence the obtainment of specific training for tracheostomized and mechanically ventilated population?

Mixed Methods

RQ4: How do self-efficacy, confidence, qualitative factors reported to influence training, and real knowledge, as measured by a demographic survey and the KCT-TMV, a validated real knowledge questionnaire, relate?

Theoretical Framework

The theoretical framework of this study was Bandura's (1986) social cognitive theory (SCT). Bandura (1986) purports that individual functioning occurs via an interaction of behavior, cognition, environmental events, and personal factors. The various capabilities of an individual including symbolizing, forethought, self-regulation, and self-reflection capability allow an individual to behave based on the interactive process of anticipation, consequences, observation, learning, motivation, incentive and metacognitive functions (Bandura, 1986). The SCT purports that self-efficacy has an influence on an individual's choice of activity and environment (Bandura, 1982). Bandura's work in self-reinforcement, self-efficacy, collective efficacy, and the above stated interaction of multiple factors on behavior, serves as a foundation toward understanding SLPs' behaviors regarding diagnosing and treating the tracheostomized and ventilator population with or without formal training (Bandura, 1977; Bandura, 1986; Bandura, 2000). These various predictions based on Bandura's (1977; 1982; 1986; 2000) work were measured in the current study via surveys regarding the amount and type of training, tests of real knowledge developed through the literature of EBP within the past 10 years, and an assessment of an SLP's self-rating on confidence and self-efficacy.

Conceptual Framework

Due to the two-part nature of this study, the discussion of the conceptual framework requires clarification between the studies. In study 1, which is the validation of the quantitative assessment of knowledge between the three groups, the conceptual framework was based in educational psychology. It is accepted that training in an individual's preferred learning style improves learning (American Psychological Association [APA], 2014) and that students' belief in their capabilities has influence on motivational factors (Zimmerman, 2000). It is generally accepted that a greater duration of training provides greater knowledge. Gopee (2005) add that if a training program (e.g., nursing education) prepared students for lifelong learning, they would become self-directed learners, seek additional training, and be more efficient at gaining knowledge. It is additionally supported in the nursing literature that skill development is dynamic and continuous from novice to expert over time and experience (Gopee, 2005; Zimmerman, 2000). Due to gaps in the literature in regard to knowledge, self-efficacy, life-long learners in healthcare, and factors that influence the obtainment of education, study 1involved a basis of educational psychology, basic areas of learning, measurement, and development (APA, 2014).

In study 2, the conceptual framework was focal to Bandura's (1977; 1986) SCT included multiple factors (e.g., behavior, cognition, environmental events, and personal factors) as influential in an individual's actions and their ability to perform in a given environment. Furthermore, the dynamic relationship among the factors indicated collective influence on an individual and the pursuit of knowledge.

The framework(s) for both study 1 and study 2 are essential to the rationale for the division of the two studies as well as the research questions. Based on the nature of learning, study 1 was designed to ensure that higher education and experience did result in greater knowledge, thus validating the new survey measure. In study two, the multitude of factors that influenced the obtainment of training and knowledge was assessed. The research questions were designed to dissect the possible influencing factors on the pursuit of knowledge in the areas of communication and swallowing for the tracheostomized and mechanically ventilated patient population. In the KCT-TMV, factors related to knowledge, confidence, and self-efficacy was analyzed in conjunction with the demographic data, followed by a subsequent qualitative assessment of the potential environmental events and personal factors that were not captured in the knowledge assessment. The data analysis was completed with the understanding that many potential factors may influence the obtainment of knowledge.

Nature of the Study

The nature of this study was a mixed methods study with equal focus on qualitative and quantitative elements. Multiple research questions with different foci are necessary to allow for increased understanding of both the phenomenon and the relationship between demographics, knowledge, confidence, self-efficacy, and qualitative factors reported as influencing training. I developed and validated an online skills assessment based on the past 10 years of EBP to quantify knowledge and skills. In addition, I created a self-rating survey embedded in the skills assessment focused on SLPs' confidence associated with the knowledge and skills responses. The self-efficacy questions were adapted from the work of Spek, Wieringa-de Waard, Lucas, and Dijk (2013). The biographical survey was developed and modified based on prior research (Ward et al., 2008; Ward et al., 2012). Participants included speech language pathologists in the United States currently licensed and practicing in their respective state of employment with a successful completion of the Certified Fellowship Year (CFY; a supervised practice term defined by a nine-month period of active practice under the direct supervision of a licensed SLP). The specific inclusion criteria are discussed in detail in chapter 3, the methodology. Power analysis completed from http://www.math.yorku.ca/SCS/Online/power/ given a 3x1-power analysis for an

ANOVA utilizing 0.05 alpha, 0.25 medium effect size, and a statistical power of 0.80, indicated that 75 participants (25 in each group) should be recruited. Correlations and a side-by-side comparison of qualitative and quantitative results were completed in efforts to address the qualitative and qualitative research questions rather than merging or combining data.

Purposeful sampling of participants were recruited from the 186,000-speech language pathologists registered with the ASHA (2016d) through an online announcement in the ASHA Community, SIG groups, via ASHA community e-mail invitation, and direct e-mail notification. Proportionate stratified sampling was warranted due to the multiple geographic regions for the participant population (Trochim, 2006). Power analysis completed from http://www.math.yorku.ca/SCS/Online/power/ utilizing 0.05 alpha, 0.25 medium effect size, and a statistical power of 0.80, specified 360 total participants (90 within each geographic group); however, in effort to account for potential dropout rates, the sample size was increased to 400 (100 in each geographic region). A goal of equal distribution across all four geographic regions in the United States resulted in the potential for ongoing sampling efforts to obtain equal groups above the original goal of 90. In all four regions, the initial 90 completed surveys were utilized in the data analysis. Within the design of the quantitative survey, participants were asked if they were willing to participate in the qualitative aspects of the study. Qualitative sample size would include five within each geographical region for a total of 20 participants.

Definitions

Acute Physiology and Chronic Health Evaluation (APACHE): A tool that provides an objective measure of the severity of disease, estimating the potential prognosis based on physiological variables such as age, the Glascow Coma scale, oxygenation, chemistry, and hematology, and if the individual is organ system insufficient or immunocompromised. It allows a prediction of mortality and potential need for organ support (Jacobs, Edbrooke, Hibbert, Fassbender, & Corcoran, 2001; Knaus, 1989; Knaus, Draper, Wagner, & Zimmerman, 1985; Kollef, O'Brien, & Silver, 1997).

Billable productivity: The total time of direct patient service provision divided by the total number of hours worked (Dennis & Gonzenbach, 2011).

Certificate of Clinical Competence (CCC): "Represents the achievement of a rigorous, validated, widely recognized set of standards for entry into the professions of speech-language pathology and audiology" (Brown, 2003, p. 1).

Chronic critical illness: Refers to an individual that survived the acute nature of an injury or illness yet continues to require additional life sustaining medical interventions to continue with recovery or maintain a state of being (Carson, 2012).

Evidence-based practice: The sensible and analytical use of knowledge and clinical experience combined with current systematic research to make decisions about the optimal care of a patient (Sackett et al., 1996)

Gas exchange: The main function of the lungs in which inspired oxygen is transferred into the blood stream and carbon dioxide is transferred out of the blood into the exhaled air (MedicineNet.com, 2015).

Lifelong learning: The act of obtaining additional training and the progression of knowledge and skills resulting in a professionals' ability to meet their potential (Gopee, 2005)

Organ support: Medical interventions needed to support a deficient organ of the human body (Knaus et al., 1985; Knaus et al., 1991).

Ventilation: The oxygenation of blood (1993).

Mechanical ventilation: The machine-based support of respiratory workload in efforts to maintain alveolar ventilation, restore or maintain acid-base balance, and increase oxygen transfer in the blood (Mason, Frey, & Fornoff, 1993).

Assumptions

The assumptions of the study include those aspects that are believed to be true yet unable to be proven. These include that the experts in the test tool face and content validation process are appropriate experts in the field and have taken the time to complete the validation process and that if they did, it was an honest evaluation and rating of the stimulus in order of importance. In addition, it can be assumed that the skill sets within the test tool cover the range of needed skill sets for tracheostomized and mechanically ventilated patient care that are above the standard training of SLPs. In both studies, it was assumed the participants responded honestly and participated without the assistance of external support (e.g., peers, resources). It was assumed that the third party survey company (Survey Monkey) recorded and tracked the data with precision. All data was assumed to correctly populate the fields in the statistical software, although it was checked for accuracy. Lastly, while the study was completed in the United States, it can be assumed that knowledge, confidence, and self-efficacy for SLPs worldwide are similar as this fragile population continues to grow.

Scope and Delimitations

In study 1, the KCT-TMV for SLPs included three groups: experts, SLPs, and students. Group 1 consisted of experts defined as professionals practicing in otolaryngology, critical care nursing, critical care medicine, and pulmonology. Group 2 was comprised of speech language pathologists defined as non-CFY, licensed, employed, and actively working professionals. Finally, group 3 included graduate students in the first or second year of graduate training in the field of communication sciences and disorders, otherwise known as speech language pathology. CFYs will not be included in the study. The three groups were sampled from within a geographic radius of 100 miles from my home. Those outside the radius were not included due to geographical challenges of costs, time, and travel.

Study 2: SLPs and self-efficacy included speech language pathologists currently practicing and licensed in their respective state of employment with a successful completion of the CFY. Experts, CFYs, and students were not included in this aspect of the study. Participants included those in the continental United States. Those outside the continental United States were not included.

Limitations

My professional role may be a limitation of the study. Per the ASHA rules of ethics (ASHA, 2010), I must report ethical violations, including serving patient populations, when the clinician's knowledge and skills are not adequate. This may potentially limit the willingness of the participants. While the survey and test was completed anonymously, participants may have worried or questioned if they will be recognized as not meeting competency requirements as defined in the rules of ethics. Secondly, I have been recognized by ASHA as a knowledgeable professional in the matters of tracheostomy and MV. If the participants recognized my name as the researcher and know my professional expertise, it may have confounded the participants' concerns.

In the matter of potential bias, expert medical providers in the field of otolaryngology, nursing, intensive care, and pulmonary medicine evaluated the test tool in efforts to ensure the stimuli were valid to the construct assessed. Significant time and consideration has been placed on the validity and reliability of the test tool and the removal of any bias in the KCT-TMV via the multiple stages of the pilot. These steps are discussed in chapter three.

Participant sampling additionally contains some limitations. Based on the design of study 1, participants were recruited only from a local area in the northwest suburbs of Chicago. In study 2, only those SLPs in the United States with access to a computer or online environment could participate in the study. In addition, due to the anonymity of the study, I did not have the ability to block participants from taking the online survey more than once. Participants may have reattempted the study later, which would increase the potential for learning bias.

Significance

As stated by Zilberberg, de Wit, et al. (2008), the growth rate of mechanically ventilated patients is rapidly increasing while academic and clinical education of speech pathologists remains stagnant. Additional factors such as the hospital business demands (including recent increases in productivity and billing demands) may influence SLPs' behaviors toward obtaining skills and knowledge to diagnose and treat critical patient populations. A necessary part of treatment for this population is the equipment collection, patient preparation, and recruitment of support staff needed for diagnostic and treatment sessions, which can require 30 – 45 minutes of unbillable time. This preparation time is considered a cost to the institution by decreasing the potential billable time a SLP could potentially use for other direct patient care services. The non-billable work time reduces potential revenue, while the SLP's salary is a constant cost. However, if the SLP has knowledge of the equipment, medical diseases, anatomy and physiology, and EBP procedures, the non-billable preparation time can be reduced. This allows the SLP to provide direct billable patient care in a timely manner resulting in a financial benefit for the institution and a patient medical management benefit for health, function, and rehabilitation. Overall, given the appropriate level of training and knowledge, therapists could reduce non-productive time, increase patient centered care, decrease hospital length of stay, and decrease psychological impacts of MV through the provision of early communication options (Arora et al., 2008; Rattray, Johnston, & Wildsmith, 2005; Walter, 2012).

The psychological impact of an intensive care or critical care admission, or need of a tracheostomy and MV has been a key factor in the recovery and prognosis for patients from both subjective and objective perspectives. Rattray et al. (2005) noted the severity of the disease or illness did not demonstrate significance in the subjective and objective factors, but it was more the act of being in and receiving the treatments associated with the intensive care. Additional literature demonstrates the impact of MV and the inability to communicate increases patients' psychological and emotional stress that coincides with post-traumatic stress disorder, anxiety, depression, and reduced self-esteem during the length of hospitalization and beyond (Girard et al., 2007; Menzel, 1998; Myhren, Ekeberg, Toien, Karlsson, & Stokland, 2010). If SLPs have knowledge of anatomy and physiology, lab values, cardiopulmonary terminology, tracheostomy and ventilator equipment, disease, and the psychology of illness, they would have the ability to provide communication, swallowing diagnostics, and diverse therapeutic interventions; thus increasing the options for verbal communication and oral nutrition in light of the presence of tracheostomy and MV. The psychological, medical, psycho-emotional, and prognostic results of such knowledgeable and timely interventions have the potential for decreasing overall patient length of stay, duration of tracheostomy need, negative psychological effects, and increase use of verbal communication options and compliance with tracheostomy care improvement (Arora et al., 2008; Walter, 2012). This could improve factors related to QoL, immediate and long-term psychological impact, and a cost savings to the patient and the institution.

The construct of self-efficacy when referring to the speech language pathologists is also of significance in this study. Utilizing Bandura's (1982) description of self-efficacy as the personal judgments that an individual makes on their ability to act and manage specific situations, factors related to knowledge and skill warrant consideration. This proposed study addresses this gap by objective measurement of knowledge, self-efficacy (via a self-rating of confidence of perceived knowledge and several questions specific to self-efficacy), and analysis of trends associated with practicing SLPs in the United States. In addition, it will identify trends that influence patient care and SLPs pursuit of specialized knowledge. Results of this study may indicate a need for standardized and regulated specialty training for SLPs serving these fragile populations. To date, there has been no research on the relationship between training and education as compared to the SLP's perceptions of knowledge and self-efficacy in the diagnosis and treatment of the tracheostomized and /or mechanically ventilated patient populations.

Summary

Literature is lacking regarding the impact of self-efficacy as it relates to the knowledge and skill acquisition toward the diagnosis and treatment of the tracheostomized and MV populations for SLPs working in the United States. Given the rapid growth rate projections of the tracheostomized and MV populations and the lack of ASHA regulated and recognized specialty training, the knowledge and skills of practicing clinicians is variable and can pose a threat of harm to this fragile patient population. The impact of multidisciplinary teams and utilization of resources has influenced the need to evaluate self-efficacy and the factors that influence the obtainment of knowledge for SLPs.

Through a knowledge and skills assessment and phenomenological survey, this study fills a gap in the literature regarding the real knowledge of practicing SLPs as it relates to the tracheostomized and MV populations, including factors of confidence and self-efficacy. In the following chapters, the literature review, methodology, and the results identify the implications of social change in the training and management of SLPs serving this fragile patient population.

Chapter 2: Literature Review

Introduction

Patients requiring a breathing tube inserted in the neck (i.e., tracheostomy tube) and a machine intended to support breathing and gas exchange (i.e., MV) present with complex health care needs. Adult patients' need for acute MV has been reported as increasing where the "increase outpaces growth in the general U.S. population and in overall hospital volume" (Zilberberg et al., 2012; Zilberberg, de Wit, et al., 2008, p. 1451). The care of these patients is as diverse as their comorbidities. Unfortunately, education and skills of health care professionals, specifically SLPs, are lacking formal training in this area (Smith-Miller, 2006; Ward et al., 2008; Ward et al., 2012). In 2014, ASHA developed an updated statement on standards and implementation for speech language pathologists earning a degree and a certificate of clinical competence (CCC; ASHA, 2014). However even in the update, the overall training was general and did not provide specific direction on specific skill training, psychology, or counseling training for SLPs as they address MV and tracheostomy populations. The matter of specialized training is vital for patient safety and outcomes given the anticipated growth in the geriatric population and patients requiring MV. It is essential that the healthcare practitioner has the knowledge of the mental and physical complexities, variety of equipment, and anatomical and physiological changes in cardiopulmonary function associated with critical illness, tracheostomy, and MV in efforts to prevent harm (United States Census Bureau, 2011; Zilberberg et al., 2012; Zilberberg, de Wit, et al., 2008).

The presence of tracheostomy or MV creates impairments in multiple functional areas; however, for the SLP, the focus is on communication and swallowing disorders (dysphagia; de Larminat et al., 1995; Leder, 2002; Leder, Cohn, et al., 1998; Skoretz et al., 2010). SLPs continue to provide services to this specialized population despite the lack of formal training, reports of reduced confidence levels, reduced knowledge of EBP standards, or advances in care with or without clinical support teams (ASHA, 2010; Manley et al., 1999; Ward et al., 2008; Ward et al., 2012). ASHA does provide an online discussion community based on the various SIGs, which one can join for a nominal fee. Within the ASHA online community, various SLPs post questions and requests for information regarding the care and practice guidelines of tracheostomy and MV among other topics. However, any professional (trained or otherwise) can respond and post anything whether it is valid, appropriate, supported by the literature, or otherwise. Other SLPs may utilize the posts to aid their learning and clinical decision-making. This is concerning as the information posted may or may not be accurate, and practicing clinicians may not have the training to determine appropriateness of postings.

Researchers who investigated the experiences of patients with or with a history of tracheostomy and MV found that communication, QoL, swallowing, and relationships with healthcare providers were among the most significant concerns (Foster, 2010; Gul & Karadag, 2010; Pandian et al., 2014). These basic needs relate to Maslow's (1943a) hierarchy of needs. Maslow's (1943a) theory states that an individual needs (e.g., physiological, safety, love, esteem, and self-actualization) are arranged in a tier of "prepotency" (p. 370) or "if one need is satisfied, then another emerges" (p. 388). This does not imply that each need must be satisfied in totality, however he theory postulates the more fundamental (e.g., physiological) must be achieved in a greater percentage prior to conscious or unconscious progression to a "later" need (Maslow, 1943a). Nutrition/hydration (e.g., swallowing/dysphagia management), oxygen consumption, and safety, love, esteem (e.g., communication) are physiological needs recognized as compromised in tracheostomized and mechanically ventilated populations. Therefore, from a QoL, functional, and Maslow's hierarchy of needs perspective, speech pathology services are vital in efforts to achieve advancement in levels of need. (See appendix A for a visual comparison of "Maslow's Hierarchy of Needs" as compared to "Maslow's Hierarchy of Needs in Critical Care" as presented by Jackson et al. (2014, p. 440)

SLPs address communication and dysphagia in this population; however, ASHA does not indicate a need for formal, regulated, and specialized training (e.g., anatomy/physiology, tracheostomy and MV terminology, lab values, medical equipment, disease related to cardiopulmonary illness, or counseling) for SLPs treating tracheostomy and ventilator dependent populations (ASHA, 2014). There is a gap in the literature regarding SLPs and the relationship between their real and perceived skills, knowledge of anatomy and physiology, terminology specific to tracheostomy and MV, lab values, medical equipment, disease related to cardiopulmonary illness, and counseling. The gap extends to self-efficacy, or the belief that the SLP can achieve positive outcomes in patient care, despite factors related to knowledge. The current practices of SLPs, including training and knowledge, and the relationship of self-efficacy to SLPs' abilities in combination with the importance of communication, swallowing, and ratings of QoL in the tracheostomized and MV population warranted investigation. This study addressed the gap via a mixed methods approach in which SLPs in the continental United States completed a series of surveys. The quantitative aspects included a demographic survey, the KCT-TMV that included a knowledge and skills assessment with a self-rating of confidence and self-efficacy (the personal belief towards the ability to act and manage specific situations) related to their knowledge. Upon completion of the online skills assessment, self-rating of confidence, and rating of self-efficacy participants were provided an opportunity to participate in a survey focused on various perceived trends associated with training, competency, limitations, and methods in the provision of care to the tracheostomized and MV populations.

Significance

In the general United States population and in overall hospital volume, the growth rate of mechanically ventilated patients is rapidly increasing (Zilberberg et al., 2012; Zilberberg, de Wit, et al., 2008). Literature and ASHA recognize the increasing skill and knowledge demands of SLPs; however, the academic and clinical requirements toward the education of speech pathologists remain stagnant (ASHA, 2014; Campbell & Taylor, 1992; Manley et al., 1999; Ratcliff, Koul, & Lloyd, 2008). Additional factors such as the hospital business demands (including recent increases in productivity and billing demands), removal of continuing educational funding for SLPs, limited time off allowed for continuing education, and reduced mentorship within the institutions may influence SLPs' behaviors toward obtaining skills and knowledge in the diagnostics and treatment of critical patient populations.

A necessary part of treatment for this patient population is the equipment collection, patient preparation, and recruitment of support staff needed for diagnostic and treatment sessions, which can require 30–45 minutes of unbillable time. This unbillable preparation time is considered a cost to the institution because it decreases the potential billable time that an SLP could potentially use for other revenue generating services (e.g., direct patient contact and care). Therefore, there is a reduction in potential revenue while salary is a constant cost. However, if the SLP has knowledge of the equipment, medical diseases, anatomy and physiology, and EBP procedures and serves on an interdisciplinary medical team, a reduction in nonbillable preparation time may be possible. This allows the SLP to provide evidence-based communication and swallowing interventions while simultaneously providing more revenue generating patient care in a timely manner resulting in a financial benefit for the institution. In addition, therapists could increase patient centered care and QoL while decreasing nonproductive time, length of stay, and negative psychological impacts of MV if they have real knowledge of equipment, lab values, cardiopulmonary anatomy and physiology, and work with an interdisciplinary team (Arora et al., 2008; de Mestral et al., 2011; Garuti et al., 2014; Hopkins et al., 2007; Perme & Chandrashekar, 2009; Rattray et al., 2005; Tobin & Santamaria, 2008; Walter, 2012). This may translate to improved health, physical function, QoL, and overall rehabilitative prognosis.

The psychological impact of an intensive care/critical care setting MV has been a key factor in the recovery and prognosis for patients from both subjective and objective perspectives. Rattray et al. (2005) noted the severity of the disease or illness did not demonstrate significance in the subjective and objective factors; however, it was more the act of being in and receiving the treatments associated with the intensive care. Additional literature demonstrates the impact of MV and the inability to communicate increases patients' psychological and emotional stress that coincides with posttraumatic stress disorder, anxiety, depression, and reduced self-esteem during the length of hospitalization and beyond (Girard et al., 2007; Menzel, 1998; Myhren et al., 2010). If SLPs have specific training in the areas of anatomy and physiology, lab values, tracheostomy and ventilator equipment, illness/disease, and the psychological aspects of critical illness care, they would have the ability to make evidence-based decisions for diverse therapeutic interventions focusing on communication and swallowing. Given the use of evidence-based clinical decision-making, the SLP may provide increased options for verbal communication and oral nutrition in light of the presence of tracheostomy and MV. The psychological, medical, psychoemotional, and prognostic results of such knowledgeable and timely interventions have the potential for decreasing overall patient length of stay, duration of tracheostomy need, negative psychological effects, and increased use of verbal communication options and compliance with tracheostomy care improvement (Arora et al., 2008; Walter, 2012). In addition, knowledgeable and timely interventions may improve factors related to QoL, immediate and long-term psychological impact, and a cost savings to the patient and the institution.

The construct of self-efficacy when referring to the SLP is also of significance in this study. Using Bandura's (1982) description of self-efficacy as the personal judgments that an individual makes on their ability to act and manage specific situations, the factors related to competence and skill warrant consideration. This study addressed the gap regarding the relationship between SLPs real and perceived skills through the use of a newly developed and validated test tool focal to several aspects: knowledge of anatomy and physiology, cardiopulmonary and MV terminology, lab values, tracheostomy and ventilator equipment, disease and acute illness, and the psychoemotional impact related to tracheostomy and MV. This study addressed self-efficacy despite factors related to knowledge through SLPs self-rating of belief in their ability to act and manage situations based on the six above stated aspects. The gap was addressed by objective measurement of knowledge, confidence, and self-efficacy, and analysis of trends associated with practicing SLPs in the United States providing care to tracheostomized and MV patient populations. In addition, it identified reported trends and various factors that may influence practicing SLPs from obtaining specific training for the diagnosis and training of tracheostomized and MV patient populations. Results of this study indicated a need for standardized and regulated training for SLPs serving this fragile population. To date, there has been no research on the relationship between training and education as compared to the SLP's perceptions of knowledge and self-efficacy as it relates to the diagnosis and treatment of the tracheostomized and MV patient populations.

In summary, this study holds many benefits and opportunity for positive social change in the training and provision of health care for tracheostomized and mechanically ventilated populations receiving services from SLPs in the United States. The study adds value to the current literature as it relates to the training and skill acquisition of SLPs. It additionally allowed analyses of the impact of self-efficacy on practicing SLPs working with the tracheostomized and mechanically ventilated populations. Through the analysis of the findings, this study provides suggested areas of needed training to maximize patient care outcomes and reduce overall healthcare costs. In addition, through the lens of the ASHA's guidelines, the results of this study recommend changes in policy and training required to coincide with the ASHA scope of practice (ASHA, 2001), "Rules of Ethics" (ASHA, 2010), and ASHA standards for the certificate of clinical competence (ASHA, 2013).

Literature Search Strategy

The databases and search engines used include PsycINFO, PsycARTICLES, CINAHL, Medline, Academic Search Complete, ProQuest Central, Google Scholar, Published International Literature On Traumatic Stress (PILOTS), PubMed, Thoreau, and national professional associations' websites. The key terms used included a*cute, acutely ill, acute illness, anxiety, artificial airway, aspiration, cardi*, cardiopulmonary, complications, competency, critical care , critically ill, critical illness, delirium, depression, doctor, dysphagia, education, emotion, epidemiology, history, intensive care, interdisciplinary, hospital, hospital patients, intensive care, mechanical ventilation, medical, medicine, morbidity , mortality, multidisciplinary, nursing, penetration, physician, post-traumatic stress disorder, prolonged intubation, psych*, psychological, psychiatric disorders, pulmonary, quality of life, self-efficacy, sedation, sedation holiday, simulation, speech pathology, speech language pathologist, stress, training, trach*, tracheostomy, tracheotomy,* and *wakefulness.*

Peer-reviewed literature from 2000 to 2014 was the initial and primary search focus; however, several studies and theories extend back into the early 1970s. MV and tracheostomy related foundational literature date back to 1970, while the seminal works of Bandura originate in 1976, and Maslow originates in 1943. Literature regarding self-efficacy with speech pathologists (students and practicing clinicians) was limited; therefore, another vocation, nursing utilized to evaluate self-efficacy on training, knowledge, and skills. Nursing was identified as the ideal comparative discipline based on their frequency of patient interaction and communication, similar national training, guidelines, and a significant body of literature discussing self-efficacy on training, knowledge, and skills. The literature regarding the patient's perspectives on the psychological impact of tracheostomy and MV is limited; therefore, the literature search was expanded to include the patient's psychological and emotional changes in the critical care, intensive care, and long term acute care hospitals.

Theoretical Foundation

Bandura (1982) describes self-efficacy as the personal judgments that an individual makes on their ability to act and manage specific situations. The specific theoretical framework of this study targets the SCT proposed by Bandura (1986). Bandura (1986) purports individual functioning occurs via an interaction of behavior, cognition, environmental events, and personal factors. The interaction between factors was defined as "triadic reciprocality" indicating "mutual action between causal factors" (Bandura, 1986, p. 23). It is important to clarify that the concept of "reciprocality" does not indicate an equal action or equal effect of the various variables, but rather, variable interaction allows for changeability in the strength of one variable over the other(s). See Figure 1. Banduras Triadic Reciprocality. One variable may have greater influence based on person, situation, or action (Bandura, 1986). The various capabilities of an individual including symbolizing, forethought, self-regulation, and self-reflection capability allow an individual to behave based on the interactive process of anticipation, consequences, observation, learning, motivation, incentive and metacognitive functions (Bandura, 1986).

Figure 1. Bandura's Triadic Reciprocality

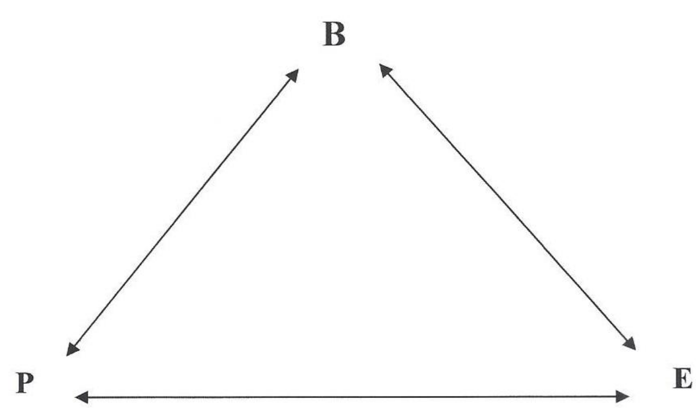

Figure 1. Schematic of the relationship between the three determinants in triadic reciprocal causation: (B) behavior, (P) cognitive and other personal factors, and (E) environmental determinism. Figure reprinted with permissions from *Social foundations of thought and action: A social cognitive theory* by A. Bandura, 1986, p. 24. Copyright 1986 by Prentice-Hall, Inc.

The SCT purports that self-efficacy has an influence on an individual's choice of activity and environment (Bandura, 1982). A significant amount of research over the past few decades demonstrates the impact of self-efficacy on learning, the pursuit of training, performance, student effort and persistence where high levels of self-efficacy translate to higher grades (Heslin & Klehe, 2006; McLaughlin et al., 2008; Stanley & Pollard, 2013). Literature additionally noted an increase in effort and persistence (Andrew, 1998; Zimmerman, 2000), nursing job satisfaction and performance (Judge & Bono, 2001). While the literature may use terms such as self-confidence or self-efficacy, however, it must be clarified that self-efficacy and self-confidence are not synonymous. Self-efficacy is considerably more dynamic than self-confidence and responsive to behavior, cognition, environmental events, and personal factors. Therefore, an individual's level of self-efficacy in one area does not imply universal or equal self-efficacy in other areas (Heslin & Klehe, 2006; Stanley & Pollard, 2013).

Bandura's work in self-reinforcement, self-efficacy, collective efficacy, and the above stated interaction of multiple factors on behavior (e.g., triadic reciprocality), serves as a foundation toward understanding SLPs' behaviors regarding diagnosing and treating the tracheostomized and ventilator population with or without specialized training (Bandura, 1977; Bandura, 1986; Bandura, 2000). Given Bandura's theory and the literature in a related healthcare field (e.g., nursing), it can be predicted that SLPs with a high level of self-efficacy, positive personal and professional reinforcement, and few negative consequences (i.e., patient crisis after service delivery, reprimand for low billable productivity, or public correction of wrongful practice standards) may demonstrate a lesser pursuit and acquisition of real knowledge. This can potentially lead to higher rates of risk taking which results in higher potential for adverse patient outcomes. Conversely, self-efficacy may indicate a motivation for seeking higher level or advanced training (see Appendix B). This prediction will be measured via a demographic survey, the KCT-TMV (a validated test of real knowledge that is based on 10 years of literature and EBP), a confidence rating of the responses to the knowledge questions, and an assessment of SLPs' self-efficacy (e.g., personal judgments as to belief in their ability to act and manage specific situations).

Literature Review Related to Key Variables and Concepts

Several key variables require discussion as it relates to the current study. Such variables include the required training of health care professionals (e.g., nursing and speech-language pathologists), the functional, and the psychological and emotional impact of a tracheostomy and use of MV, interdisciplinary approach to psychoemotional wellness. Furthermore, the discussion includes epidemiology, growth rates, costs, how appropriately trained professionals can decrease costs and the discrepancies in the literature as it pertains to EBP related to the tracheostomized and MV population. Finally, the matter of self-efficacy will be reviewed as it relates to these key variables.

Healthcare Professionals Required Training and Self-Efficacy

Healthcare providers have a vast array of curriculum expectations, required years of training, variances in clinical hour requirements, and various board and licensure exams. In addition to the infinite variations in training, once degree confirmation occurs and licensure exams are passed, healthcare practitioners are deemed skilled to treat with the expectation to engage in continuing education opportunities. The variation(s) in training across disciplines warrants discussion as tracheostomized and MV patients require services from many, if not all of the various healthcare providers (e.g., SLPs, physicians, nurses, physical therapists, and occupational therapists). However, of all healthcare providers, the nurses are at the forefront, meeting the physical, psychological, emotional, and spiritual aspects of the patients' needs. Similar to SLPs, registered nurses (RN) communicate and provide counseling to patients with acute and chronic illness. The diversity of skills for general nursing compared to the intensive training required to be a critical care nurse as well as the governing body's rules and regulations are the most consistent with SLPs. Therefore, nursing will be contrasted with SLPs in this discussion based on commonalities in basic training as well as the lack of self-efficacy and training literature for SLPs.

Nursing. Two main nursing organizations, the National League for Nursing (NLN) and the Commission on Collegiate Nursing Education (CCNE) or formally known as the American Association of Colleges of Nursing (AACN), govern nursing training programs. Despite having the two organizations, the nine core "Essentials" listed for the baccalaureate nursing curricular framework are consistent (AACN, 2008). These are listed in Appendix C. The nine nursing core "Essentials" meet the 2003 Institute of Medicine's recommendations for the required basic knowledge and skills for all healthcare professionals (AACN, 2008) and contain similar requirements of SLPs as outlined by ASHA (2014). However, of the nine nursing core "Essentials," five essential categories contain psychology and psychosocial training elements where ASHA does not require this same frequency of psychology training. In addition, the breadth of advocacy training, interpersonal communications, ethics, team building, spiritual care, and psychology is vastly different from SLPs. The nursing essentials and university curricula addresses these skills in the academic coursework as well as during the clinical experiences required for the degree.

Nursing literature continues to support post-graduation training is needed advance skills and stay current in the ongoing evolution of EBP. However, it can be speculated that the ethos of nursing training, a nurse may not know what they do not know and therefore, not seek answers or additional knowledge (Bradshaw, 1998). Literature from the United Kingdom Central Council for Nursing Midwifery and Health Visiting (UKCC) states while new nursing graduates meet the expectations of the academic and clinical degree requirements, these requirements are equal to "professionally competent and accountable at the minimum level of safety" (Bradshaw, 1998, p. 106). Furthermore, the role of nursing includes a culture of teamwork and mentorship between preceptors, experienced nurses, and other healthcare practitioners. The idea of life-long learning is prudent in nursing and is supported by the collaborative efforts of the NLN the AACN (AACN, 2008; NLN, 2015).

The nursing literature has evaluated factors such as personality, academic performance, perception (related to success and failure), self-efficacy, the relationship of self-efficacy and knowledge, academic outcomes, and attitudes (Andrew, 1998; Heslin & Klehe, 2006; McLaughlin et al., 2008; Multon, Brown, & Lent, 1991; Shinnick & Woo, 2014; Stanley & Pollard, 2013; Zimmerman, 2000). The results of these studies demonstrated diverse findings as it relates to self-efficacy. Participants with higher self-efficacy beliefs were more likely to achieve higher grades in school (Andrew, 1998; McLaughlin et al., 2008), and higher self-efficacy influenced methods and motivation to learn (Zimmerman, 2000). Additional findings demonstrated that clinical experience may increase confidence, yet, self-efficacy did not correlate with knowledge (Shinnick & Woo, 2014). In cases where advanced education and training was present, the recognition of deficits was also higher, therefore lower levels of self-efficacy were reported (Stanley & Pollard, 2013). These studies support the construct that self-efficacy is considerably dynamic and responsive to a reciprocality of behavior, cognition, environmental events, and personal factors and the presence of training may be a factor in an individual's ability to recognize knowledge limitations in a given situation.

It can be hypothesized that the frequency and intensity of psychology and psychosocial training may influence the interaction of behavior, cognition, environmental events, and personal factors for nursing students, which may transcend into factors related to self-efficacy and the pursuit of additional training when working with higher acuity of patient illness. This hypothesis warrants additional study in the comparison of nursing with various other healthcare providers as it relates to self-efficacy and the obtainment of knowledge and training. Nonetheless, the nursing literature regarding academic and continue educational experiences as they relate to self-efficacy and knowledge provide a solid reference in the study of SLPs.

Speech Language Pathologists. A SLP must complete a Master's degree (either Masters of Arts or Masters of Science) from an accredited program in Speech Language Pathology at minimum prior to entering the work force. ASHA and the Council on Academic Accreditation (CAA) in Audiology and Speech-Language Pathology establish the graduate program requirements. Presently, the requirements include general criteria such as “opportunities for students to acquire and demonstrate knowledge of the nature of speech, language, hearing, and communication disorders and differences, as well as swallowing disorders, including etiologies, characteristics, and anatomical/physiological, acoustic, psychological, developmental, linguistic, and cultural correlates” (ASHA, 2014, p. 14). Specific required areas collectively referred to as the “big nine” include articulation, fluency, voice and resonance, receptive and expressive language, hearing, swallowing, cognition, social communication and communication modalities (ASHA, 2014). The CAA continues to require graduate training programs to include opportunities for students to acquire knowledge and demonstrate skill in the general areas listed in Tables 1 & 2 as they relate to the above “big nine.” To clarify, “demonstration of knowledge and skill” can occur via written or oral exams, course work, or clinical application of skills.

Table 1.

CAA Required Demonstration of Knowledge

Demonstration of knowledge
Principles and methods of prevention, assessment, and intervention for people with communication and swallowing disorders across the life span, including consideration of anatomical/physiological, psychological, developmental, linguistic, and cultural correlates of the disorders
standards of ethical conduct
interaction and interdependence of speech, language, and hearing in the discipline of human communication sciences and disorders
processes used in research and the integration of research principles into evidence-based clinical practice
contemporary professional issues and advocacy
certification, specialty recognition, licensure, and other relevant professional credentials

(Council on Academic Accreditation in Audiology and Speech-Language Pathology of the American Speech-Language-Hearing Association, 2014)

Table 2.

CAA Required Demonstration of Skills

Demonstration of skills
oral and written or other forms of communication
prevention, evaluation, and intervention of communication disorders and swallowing disorders
interaction and personal qualities, including counseling, collaboration, ethical practice, and professional behavior
effective interaction with patients, families, professionals, and other individuals, as appropriate
delivery of services to culturally and linguistically diverse populations
application of the principles of evidence-based practice
self-evaluation of effectiveness of practice

(Council on Academic Accreditation in Audiology and Speech-Language Pathology of the American Speech-Language-Hearing Association, 2014)

In addition to these training requirements of the graduate programs, ASHA's (2014) Standard IV titled "knowledge outcomes," requires the demonstration of knowledge in the general categories of "communication and swallowing disorders and differences" (p. 3). These general categories related to communication and swallowing include etiology, anatomy/physiology, psychology, development, and language and cultural correlates in the general topics of articulation, fluency, voice, swallowing, cognition, pragmatics, and non-oral communication tools (ASHA, 2013). ASHA's (2014) Standard IV-B currently takes the position that "the applicant must have demonstrated knowledge of basic human communication and swallowing processes" yet does not make any reference to the vast diversity of the populations and the ongoing specialization required to treat various subgroups (e.g., tracheostomy or MV populations). However, Simpson and Page (2013) report that in 1995, ASHA acknowledged a need for clinical area specialty standards in the concentration areas of swallowing, fluency, and child language and began a program titled Clinical Specialty Recognition (CSR). The area standards were defined as follows.

> Neither parallel to nor subsumed within the scope of practice of another area of specialization; affects a definable population of consumers whose needs require a distinct body of knowledge, skills and experience; represents a distinct and definable body of knowledge and skills, grounded in basic and applied research, as well as in principles derived from professional practice; is one in which individual practitioners currently practice and/or are required for the delivery of services to consumers; has mechanisms for acquisition of the required knowledge, skills, and experience. (Simpson & Page, 2013, p. 8)

As of January 1, 2014, ASHA changed the title of Clinical Specialty Recognition to Clinical Specialty Certification (CSC) in an effort to recognize those professionals who demonstrated knowledge and skills beyond the certificate of clinical competence (Simpson & Page, 2013). The Council for Clinical Certification in Audiology and Speech Language Pathology (CFCC) and the Committee on Clinical Specialty Certification (CCSC) were established to regulate the specialty certification (Simpson & Page, 2013). While the current three-specialty certification groups (e.g., fluency, child language, and swallowing) are known in the professional community, only two of the three fall under the “big nine” and only one identifies an age group (e.g., child language).

The specific requirements of the specialty recognition are vague and do not specify age groups, diseases, severity, or complexity of populations that the specialists serve.

In regards to the practical hands on skills training for the degree and certificate in speech pathology, ASHA's (2014) Standard V-C indicates the applicant must complete a minimum of 400 clock hours of supervised clinical work within all-encompassing speech pathology services to meet the requirements with 25 of those hours as observational. Upon completion of the degree, the applicant for the certificate of competence must complete a CFY, which is defined as "no less than 36 weeks of full time professional experience or its part-time equivalent" with 80% of the responsibilities related to direct patient care contact (ASHA, 2014, p. 9). However, no specifics related to demonstration of skills are defined and once the CFY is successfully completed, the applicant is awarded their CCC's that refers to all-encompassing skills under the roles and responsibilities of a SLP. ASHA (2014) requires that practicing SLPs maintain the CCC's via 30 hours of professional development every 3 years, however no hands on training or mentorship programs are required. Professional development can include journal reviews, attending conferences, independent study, or online video reviews. In the tracheostomized and or MV population, an online video, journal review, or an isolated course will not address the complexities this population faces (e.g., the inconsistencies in clinical practice, terminology, medications), nor does it allow mentorship and guidance in efforts for SLPs to uphold the Hippocratic Oath.

In ASHA's (2001) scope of practice, SLPs are permitted to provide services ranging from screenings, to formalized testing, equipment selection and application, counseling, advocating, collaborating, and establishing a comprehensive plan of care. ASHA's (2001) Scope of Practice lists various approved elements of practice. ASHA does not require *specific* training regarding the "selecting, fitting, and establishing effective use of prosthetic or adaptive devices for communication, swallowing or other upper aerodigestive functions (e.g., tracheoesophageal prostheses, speaking valves, electrolarynges)" yet it is stated in the ASHA (2001) Scope of practice that SLPs have the ability to act in such ways (ASHA, 2001, p. 29). In addition, the ASHA (2001) Scope of Practice states SLPs can serve in "educating and counseling individuals, families, coworkers, educators, and other persons in the community regarding acceptance, adaptation, and decision making about communication, swallowing, or other aerodigestive concerns" (ASHA, 2001, p. 29), the standard curriculum does not require *specific* training in counseling. The lack of formalized training in counseling and invasive application of prosthetics creates a gap in knowledge and skills as it relates to this approved scope of practice.

Furthermore, the lack of the above-mentioned training can be considered a violation of the ASHA's (2010) Code of Ethics. Principal of Ethics II ; Rules of Ethics B states "individuals shall engage in only those aspects of the profession that are within the scope of their professional practice and competence, considering their level of education, training, and experience" (p. 3). In addition, Principal of Ethics III, Rules of Ethics A states "Individuals shall not misrepresent their credentials, competence, education, training, experience, or scholarly or research contributions" (ASHA, 2010, p. 3). SLPs currently working with the tracheostomized and or mechanically ventilated patient population do so under informal training and inconsistent standards of practice. Currently, there are no tests of knowledge that have been developed, validated, and utilized to demonstrate knowledge and skills as outlined by the ASHA standards neither for continuing educational courses nor for tracheostomy or MV. The present study will evaluate the amount, type, frequency and level of training practicing clinicians have, their perception of knowledge as compared to real knowledge, as well as the perceived limitations of specific training for the tracheostomized and ventilated populations.

As stated, ASHA's (2001) Scope of Practice includes the ability of SLPs to provide counseling to the clients they serve, however, specific training requirements and the scope of counseling is not defined. Course work in counseling is not required, but rather suggested in a graduate program under the standard IV-A "The applicant must have demonstrated knowledge of the biological sciences, physical sciences, statistics, and the social/behavioral sciences" (ASHA, 2014, p. 3). ASHA (2014) continues to state coursework in psychology is considered "acceptable" under Standard IV-A, however, sociology, anthropology or public heath courses will also meet the standard requirement. The lack of defined and required psychology or counseling in the graduate course requirements appears to create a limitation in the ability to meet the demonstration of knowledge and skills as defined by ASHA's (2014) standards. In addition, it appears to create inadequacy in the SLP's level of knowledge regarding the psychoemotional impact(s) of illness including but not limited to communication or swallowing disorders and the potential interventions or referrals available in efforts to support the patient's needs.

Based on the court ruling from University of California Regents v. Bakke, the court decided that each college or university is legally entitled to four essential freedoms based on academic grounds including “who may teach, what may be taught, how it shall be taught, and who may be admitted to study” (Milam, March 6, 2015). These allowances for diversity may result in vast differences in curriculum and requirements for a degree despite a governing body such as ASHA, CCNE, and NCN. These essential freedoms add to the compounding factors of knowledge and training variation in addition to all the factors associated with self-efficacy.

In summary, ASHA (2014) highlights a set of nine general categories of disorders and needed areas of training, however, graduate programs have the autonomy to interpret the ASHA (2014) standards and create a curriculum which may or may not include coursework in psychology, cardiopulmonary medicine, MV or tracheostomy. This occurs despite ASHA’s (2001) scope of practice document listing counseling, advocating, and referring to other health professionals as a required skills set. The lack of psychology coursework creates a gap in the ability of the SLP to demonstrate knowledge and skill in counseling. This may increase patient risk for harm if the SLP provides incompetent practice when counseling, advocating, and referring. Therefore, there is a contradiction between the expectations of ASHA’s scope of practice (2001), ASHA’s code of ethics (2010), and the Hippocratic Oath, as well as creating a gap in the expected course of training as directed by the Council of Academic Accreditation (Council on Academic Accreditation in Audiology and Speech-Language Pathology of the American Speech-Language-Hearing Association, 2014). In addition, Bandura’s (1977; Bandura, 1982)

SCT and the impact of self-efficacy on learning, the interaction of behavior, cognition, environmental events, and personal factors all warrant consideration when evaluating the impact of self-efficacy on SLPs implementation of diagnostics and treatment of critically ill (e.g., tracheostomized or mechanically ventilated) patient population(s).

Functional Impact of Trach-Vent

The functional impact and complications associated with tracheostomy and MV can occur during and after use and can have immediate or delayed presentations. The frequency of general complications has been found to be 3.2% for patients aged 18 and above for tracheostomy (Shah et al., 2012) however, due to the diverse challenges in capturing the MV population, specific rates of complications in MV is difficult to obtain. Early and late complications may include but are not limited to; pneumothorax, incisional hemorrhage, subcutaneous emphysema, stomal infection, tube displacement, air embolism, aspiration, dysphagia, increased risk of respiratory infection, pneumonia, tracheal stenosis, tracheomalacia, tracheoesophageal fistula, tracheal granulomas and tube obstruction (Bone, Davis, Zuidema, & Cameron, 1974; Cameron, Reynolds, & Zuidema, 1973; de Larminat et al., 1995; Ding & Logemann, 2005; Durbin, Perkins, & Moores, 2010; Leder et al., 2005; Stauffer & Silvestri, 1982). These are just a few of the medical complications; however, for purposes of this discussion, complications and functional impact will focus on the loss of verbal communication, dysphagia, and psychological and emotional effect of tracheostomy and MV on health outcomes.

Loss of communication. The anatomical and physiological changes associated with the presence of a tracheostomy tube or endotracheal tube prohibit the laryngeal valving system from generating vocal cord vibration or the sound source for speech. When the patient has an oral intubation tube (a.k.a., endotracheal tube), the tube is positioned between the vocal cords preventing closure and limits any normal adduction (a.k.a., coming together) movement. In the presence of a tracheostomy tube, the air moves in and out through the tracheostomy tube with avoidance of the upper airway and laryngeal anatomy. The majority of air will not flow above the tracheostomy tube due to laws of physics and the potential presence of a tracheal cuff e.g., a “balloon” located on the outer tracheostomy tube, supports tube position stability, and prevents air from entering the pharynx, oral, and nasal cavities. The presence of an endotracheal or tracheostomy tube results in an inability to achieve any natural voicing (a.k.a., phonation), therefore, communication must be modified to nonverbal modalities such as eye blink, head nods, thumbs up/down, picture boards, and technology based systems. These methods are considered augmentative alternative communication (AAC). Additional options for tracheostomized or MV patient(s) include adaptive equipment or prosthetics that enable speech in specific situations (Patak et al., 2006). Despite the use of AAC or prosthetics, an individual with a tracheostomy or on MV, requires the aid of another to provide these interventions to facilitate communication.

Dysphagia. Normal healthy swallowing involves an intricate coordination of timing, muscle contraction, strength, and respiratory control as previously described. The presence of an intubation tube or tracheostomy tube creates impedance on normal function due to the location and compression on the soft tissue of the head and neck resulting in dysphagia or difficulty swallowing. Placement of the intubation tube begins at the mouth, passes over the tongue pushing the epiglottis and tongue base forward (Pierce, 2007). The tube enters the larynx (a.k.a., voice box) and passes through the vocal cords preventing them from closing (Pierce, 2007). The tip of the intubation tube rests superiorly (a.k.a., above) to the carina or space above where the bronchus divides in right and left main stem (Pierce, 2007). The location and the pressure on the head and neck soft tissue associated with an endotracheal or tracheostomy tube creates a dynamic cascade of complications including but not limited to; dysphagia and aspiration (Barker, Martino, Reichardt, Hickey, & Ralph-Edwards, 2009; de Larminat et al., 1995; El Solh, Okada, Bhat, & Pietrantoni, 2003; Kwok, Davis, Cagle, Sue, & Kaups, 2013; Padovani, Moraes, de Medeiros, de Almeida, & de Andrade, 2008), lack of sensation (Skoretz et al., 2010; Smith, Logemann, Colangelo, Rademaker, & Pauloski, 1999), discoordination of breathing and swallowing, and diminished cough (Salam, Tilluckdharry, Amoateng-Adjepong, & Manthous, 2004; Smina et al., 2003).

Aspiration. Literature has repeatedly demonstrated the anatomical and physical changes associated with swallowing after endotracheal extubation or tracheostomy placement. Tolep, Getch, and Criner (1996) noted in patients aged 61 ± 15 years with prolonged MV via tracheostomy or endotracheal tube, 83% of patients demonstrated dysphagia of which 29% demonstrated aspiration. Deficits were additionally noted that increase the risk of aspiration include premature spillage (oral phase), and pharyngeal aspects including delay of swallow reflex, vallecular or pyriform sinus residual, or pharyngeal coating (Tolep et al., 1996). In cardiac related surgical patients who required MV or tracheostomy, the literature demonstrates the presence of dysphagia in 51% of the sample with 82.3% related to pharyngeal phase disorders which increases risk of aspiration (Barker et al., 2009). Pharyngeal phase disorders, as defined in Table 3 include any one or combination of deficits in the neuromuscular aspects of the swallow beginning at the base of tongue and extending to the superior aspects of the criopharyngeal sphincter (a muscle at the top of the esophagus). Considerations of multiple re-intubations and co-morbid events during hospitalization did not statistically alter the frequency of dysphagia however, severity of pharyngeal deficits was variable based on frequency of re-intubations and other illnesses or co-morbities (Barker et al., 2009).

Table 3

Pharyngeal Phase of the Swallow and Impact of Deficit

Normal pharyngeal neuromuscular movement	Impact of deficit
Elevation and retraction of the velum and closure of the velopharyngeal port	• Nasal penetration • Nasal regurgitation
Elevation and anterior movement of the hyoid and larynx	• Residue at the top of the larynx (voice box) • Penetration of material into the airway opening • Aspiration before the swallow • Reduced laryngeal closure
Laryngeal closure at three sphincters: true vocal folds, laryngeal entrance, and epiglottis closure	• Penetration of material into the airway opening • Aspiration during and after the swallow
Criopharyngeal relaxation	• Residue in the pyriform sinus (ipsilateral or bilateral) • Penetration and/or aspiration after the swallow
Tongue base ramping and retraction	• Residue at tongue base and pharynx (neck) region
Superior to inferior pharyngeal muscle contraction and constriction	• Residue in the pharynx (neck) region

(Logemann, 1998)

Endotracheal intubation. Systematic review demonstrates the greater the prolonged intubation the greater the incidence of dysphagia ranging from 3% to 62% including diagnostic subtypes (Ajemian, Nirmul, Anderson, Zirlen, & Kwasnik, 2001; El Solh et al., 2003; Leder, 2002; Leder, Cohn, et al., 1998; Smith et al., 1999). The frequency of aspiration in patients who required a traumatic intubation due to medical status was found at a rate of 80% when there swallowing was assessed after extubation or removal of the endotracheal tube (Leder, Cohn, et al., 1998). Of those with dysphagia, deficits were predominantly in the pharyngeal phase of the swallow. Smith et al. (1999) utilized a diverse group (ages 19-98, gender, multiple medical diagnoses, time of aspiration, etiology of aspiration) in the acute care setting to assess for prevalence of silent aspiration via use of videofluorscopy (a radiological study of the swallow function). Silent aspiration was noted in 59% of patients overall and consistent across all age groups (Smith et al., 1999). Gender differences were noted where men were more likely to aspirate silently than women 62% and 46% retrospectively (Smith et al., 1999). In contrast, fiberoptic endoscopy in these diverse groups and found 25-28% silently aspirated without statistically significant differences in age or gender (Ajemian et al., 2001). Further studies demonstrate the incidence of silent aspiration ranged 44-82% in those whose status post oral-tracheal intubation was greater than 48 hours (El Solh et al., 2003; Leder, 2002; Leder, Sasaki, & Burrell, 1998). Despite the range of aspiration frequency, the percentages are sizeable (25-82%) when considering the impact of aspiration on health outcomes such as pneumonia or fatality (Logemann, 1998). Due to the known impact of endotracheal intubation, and the variance in the incidence of aspiration (silent or overt) reflected in the literature, radiologic diagnostic procedures completed by trained clinicians are essential to obtain objective measures of the incidence of aspiration.

Tracheostomy. In the tracheostomy population, the presence of dysphagia and aspiration also occurs at a significant rate (Ding & Logemann, 2005; Seidl, Nusser-Müller-Busch, & Ernst, 2005). Various rates and frequency of aspiration has been noted in 50-87% of patients with the presence of tracheostomy (Bone et al., 1974; Cameron et al., 1973; Goldsmith, 2000; Muz, Mathog, Nelson, & Jones Jr, 1989; Tolep et al., 1996). A tracheostomy tube interferes with the elevation and anterior movement of hyolaryngeal musculature, laryngeal closure, and disrupts the closed respiratory system and properties of physics (Goldsmith, 2000). While the literature purports aspiration occurs due to the above deficits, it could be plausible that based on the complex process required for safe and effective swallowing, the underlying disease or rationale for tracheostomy placement influences frequency and severity of aspiration. For example, in the head and neck cancer population, aspiration occurred in 41% of the population with a tracheostomy tube present (cuff status not clarified) and removed with a cover or uncovered stoma (Leder et al., 2005). These findings suggest that the site of the surgical placement of the tracheostomy and the etiology for the tracheostomy placement is more of a factor in the potential of aspiration than the actual tracheostomy tube itself (Leder et al., 2005). Nonetheless, the presence of the tracheostomy tube and the underlying illness result in a higher frequency of aspiration and a greater need for comprehensive diagnostics and interventional services by knowledgeable and trained SLPs.

Psychological and Emotional Effect of Trach-Vent on Health Outcomes

The study of intensive care and critically ill patients has been on the rise over the past decade. Researchers have found significant psychological and emotional disorders resulting from acute illness with critical care admissions and life sustaining interventions (e.g., tracheostomy, MV, dialysis). These disorders include, but are not limited to anxiety (Davies, 2007; Myhren et al., 2010), depression (Hopkins, Key, Suchyta, Weaver, & Orme Jr, 2010; Jubran, Lawm, Kelly, et al., 2010; Myhren et al., 2010), sleep disorders (McKinley et al., 2012), post traumatic stress disorder (PTSD; Cuthbertson, Hull, Strachan, & Scott, 2004; Davydow, Gifford, Desai, Needham, & Bienvenu, 2008; Jubran, Lawm, Duffner, et al., 2010; Myhren et al., 2010), delirium (Balas et al., 2012; Bourne, 2008; Ely et al., 2001; Micek, Anand, Laible, Shannon, & Kollef, 2005; Spronk, Riekerk, Hofhuis, & Rommes, 2009), distress (Jablonski, 1994; Johnson & Sexton, 1989; Karlsson, Bergbom, & Forsberg, 2012; Rotondi et al., 2002; Samuelson, Lundberg, & Fridlund, 2007), and loss of autonomy (Jablonski, 1994; Johnson, St. John, & Moyle, 2006). Furthermore, research has found of intubated patients, “distress that patients experience in relation to impaired communication is hypothesized to have a deleterious effect on their emotional & physical condition, and may ultimately jeopardize their outcomes” (Menzel, 1998, p. 245). Therefore, it is essential to discuss the psychological and emotional impact of tracheostomy and or MV on health outcomes.

Increased illness or decline in function. Delirium is an acute onset of confusion, disorientation, fluctuating mental status, inattention and altered level of consciousness (Ely et al., 2001; Micek et al., 2005; Pun & Ely, 2007). Historically, terms such as intensive care unit (ICU) psychosis, ICU syndrome, acute confusional state, septic encephalopathy, acute encephalopathy or acute brain failure were used to describe behaviors associated with confusion and altered behavior (Pun & Ely, 2007). However, with increased knowledge of the disorder and the various psychomotor symptoms (hyperactive, hypoactive or mixed), the term delirium has been used and defined by American Psychiatric Association (APA) in the *Diagnostic and Statistical Manual of Mental Disorders* 5th ed.; DSM–5 (APA, 2013). It is recognized as a key factor in the health/recovery and the illness and mortality of those in the ICU with or without tracheostomy or MV (Ely et al., 2001; Immers, Schuurmans, & van de Bijl, 2005; Micek et al., 2005; Nouwen, Klijn, van den Broek, & Slooter, 2012; Pun & Ely, 2007; Salluh et al., 2010; Spronk et al., 2009).

Literature reports the presence of delirium in 11% - 87% of patients receiving MV (Immers et al., 2005; McNicoll, Pisani, Ely, Gifford, & Inouye, 2005; Pun & Ely, 2007; Spronk et al., 2009). The presence of delirium affects duration of MV, mortality, lifelong cognitive deficits, and emotional consequences (Bourne, 2008; Nouwen et al., 2012). The emotional consequences include but are not limited to depression, anxiety, and PTSD (Jubran, Lawm, Duffner, et al., 2010; Myhren et al., 2010; Nouwen et al., 2012; Rattray, Crocker, Jones, & Connaghan, 2010; Rattray & Hull, 2008; Scragg, Jones, & Fauvel, 2001).

Depression, anxiety, and PTSD. Given the loss of verbal communication secondary to the tracheostomy or MV, negative emotions and stress (e.g., anger, fear, depression, anxiety, PTSD, and loss of control/autonomy) may present in this patient population. Several studies attempted to identify factors related to these emotions (e.g., age, gender, marital status, employment status, and medical diagnosis), however; in all of these studies, the key factor related to the presence of anger, fear, depression, and anxiety was focal to the inability to verbally communicate and be understood and the connection to QoL (Girard et al., 2007; Hafsteindóttir, 1996; Karlsson, Bergbom, & Forsberg, 2011; Khalaila et al., 2011; Menzel, 1998; Myhren et al., 2010; Pandian et al., 2014; Patak, Gawlinski, Fung, Doering, & Berg, 2004). Even during periods of weaning attempts, 42% of patients were diagnosed with depressive disorders (Jubran, Lawm, Kelly, et al., 2010), three months after ventilator weaning 12% of patients presented with PTSD (Jubran, Lawm, Duffner, et al., 2010) and after six months, no significant reduction in anxiety and depression was noted despite medical recovery (Rattray et al., 2010). In the unpublished works of Baker-Rush (2009), the use of a one way speaking valve with the acutely tracheostomized and MV patient population demonstrated a decrease in anxiety and depression as measured by the Hospital Anxiety and Depression Scale (HADS). In addition to the reduction in anxiety and depression, patients reported the perception that the nursing staff was more patient and stayed in the room longer once the patient was able to verbalize needs (Baker-Rush, 2009).

Loss of control/autonomy. Patients perceive their loss of communication as a significant stressor and point of frustration. Literature has found that 90% of patients receiving mechanical ventilation by endotracheal tube were "bothered" (moderately or extremely) by the inability to verbally communicate (Khalaila et al., 2011). Using a phenomenological-hermeneutic approach, an analysis of verbal communication loss found patients reporting they felt forced to submit to others and a loss of independence as in the example “Weak in my body. And… (brief hesitation) … I felt like a child, you know, who doesn’t think too much, can’t do anything; I can’t pee by myself, poo by myself, I can’t do anything” (Karlsson et al., 2012, p. 10). The loss of verbal communication increased the dependency and loss of autonomy. Additional findings demonstrated the loss of independence as demonstrated by “Down there [ICU]::: you felt a bit like … a vegetable, not being able to manage yourself … and of course at home I’m …there I took after myself and manage everything… I wanted to go home again!” (Karlsson et al., 2012, p. 12).

The additional loss or inability to eat by mouth places additional stress on an individual and the natural hemostasis of the body. While eating is generally considered the purpose of nutrition, additional purposes are noted. These include but are not limited to socialization, saliva production, plaque control, and moisture and acid balance in the oral cavity (Humphrey & Williamson, 2001). Considering salivary function serves multiple purposes such as lubrication and protection, facilitation of material clearance, maintenance of dental health, provides antibacterial defense, and aids in taste and digestion (Humphrey & Williamson, 2001), the lack of airflow through the upper airway decreases neurological stimulation for saliva production when a tracheostomy or intubation tube is present. This can result in a reduction of saliva production and flow which increases the potential for complications related to lubrication, material clearance, dental health, levels of bacteria, and a disruption in taste and digestion. In addition, from an observational perspective, eating or the act of feeding and swallowing provides a sense of comfort and a sense of control for the patient. In addition, literature has noted dysphagia creates social and psychological negative outcomes such as reduction in pleasure associated with eating, increase in anxiety, change in eating habits, sense of isolation, and loss of self-esteem (Ekberg, Shaheen, Woisard, Wuttge-Hannig, & Ortega, 2002). Therefore, the inability to eat secondary to tracheostomy or MV adds additional disruption in an individual's normal oral hygiene patterns, and psychological state.

Interdisciplinary Approach to Psycho-Emotional Wellness

Medical interventions necessary for saving the life of a patient can cause pain or discomfort. In efforts to reduce pain, critical care practice has been the use of various analgesics and or sedatives (Kress, Pohlman, & Hall, 2002; Lillie, 2012; Rowe & Fletcher, 2008). In matters of the chronically critical ill patient populations, multiple comorbidities and physiological instability require intense pharmacological demands. These demands include the life sustaining medications as well as sedation medications for multiple purposes including but not limited to patient anxiety, patient-ventilatory poor synchronicity, emergent need, and patient restraint. The use of such sedation medications has been found to result in PTSD (Kress et al., 2003) and delirium (Bourne, 2008; Lillie, 2012). Furthermore, the use of MV, tracheostomy, or even an intensive care admission may bring additional acute and long-term psychological consequences including delusions, nightmares, hallucinations, depression, anxiety, and generalized fear (Guttormson, 2014; Kiekkas, Theodorakopoulou, Spyratos, & Baltopoulos, 2010; Rotondi et al., 2002). This refers back to the historical issues of ICU psychosis (a.k.a., ICU syndrome, acute confusional state, acute encephalopathy etc.).

In clinical practice, facilities may embrace multidisciplinary (e.g., disciplines evaluate and treat the patient independent of other services) or interdisciplinary (e.g., specific and synergistic roles that each discipline adds to decision making and patient centered care; collective action, collaboration, communication) approaches to patient care (Parker et al., 2010). While literature has demonstrated the positive impact of multidisciplinary involvement, the interdisciplinary approach and the concept of a medical "team" has demonstrated even greater gains in physical and psycho-emotional outcomes (de Mestral et al., 2011; Pandian et al., 2012; Parker et al., 2010; Parker et al., 2007; Perme & Chandrashekar, 2008; Perme & Chandrashekar, 2009). Yet, despite the "team," the registered nurse (RN) is the frontline to the patient and is most frequently communicating and supporting the patient through the critical illness. The RN can serve as a liaison between the patient and the medical team; however, in situations where the patient cannot communicate and sedation is present, factors of negative emotional effects are heightened and the need for additional communication specialists are required. It is in these situations that an interdisciplinary approach between the SLP and RN are essential in determining the optimal communication method for the patient, especially during a break in the delivery of sedation.

Evidence based standards for sedation in MV currently include a trial of a "sedation holiday" (e.g., the lifting or reduction in sedation administration allowing the patient to be in a wakeful state). The sedation holiday allows the interdisciplinary team, specifically the RN and doctor, to assess the patient's ability to maintain stability in respiratory function and allow for neurological assessment (Kress et al., 2002; Rowe &

Fletcher, 2008). While the rationale of the “holiday” is medically beneficial, it can create additional psychological distress and the nurses must be prepared to identify symptoms, support, and potentially counsel the patient (Jackson et al., 2010; Kress et al., 2003; Kress et al., 2002; Weinert & Sprenkle, 2008). Such complications can include delirium, (Bourne, 2008; Nouwen et al., 2012; Spronk et al., 2009), anxiety (Nouwen et al., 2012; Samuelson et al., 2007; Scragg et al., 2001), sleep disorders (McKinley et al., 2012; Nouwen et al., 2012), and PTSD (Kress et al., 2003; Weinert & Sprenkle, 2008). The ability to lift the sedation, provide multidisciplinary services, monitor overall health status, identify complications, and respond in a timely manner can reduced the negative psychological impact as well as reduce the duration of delirium, require fewer days of MV, and obtain improved functional outcomes (Gesin et al., 2012; Schweickert et al., 2009). Early identification of delirium, anxiety, stress can occur when the health care providers training includes the various symptoms and the potential complications.

Nursing training contains an academic curriculum and some form of practicum or internship in which psychology training is included. This is intended to provide a health profession student the opportunity to apply previously studied theory, content, or skills in various supervised environments toward the end of their academic training (Murdoch, Gregory, & Eggleton, 2015). In this aspect of the training, the healthcare professional can expand their skills in the psychology of illness. Murdoch et al. (2015) assessed the number of practicum or internship experience hours in mental health settings across several groups of healthcare providers (e.g., nurses, social work, physicians, masters in clinical psychology, doctorate in clinical psychology, counselor in psychology). Results indicated nursing professionals had an average of 21.24 practice hours (e.g., clinical hours) and 86.53 total hours (e.g., class time plus clinical hours) in a mental health based setting. These totals were relatively close to physicians, yet significantly lower than any psychology based training program (Murdoch et al., 2015). In contrast, the ASHA directed clinical practicum requirement for SLPs includes some form of a school based setting and a medical setting, yet experience and training in mental health issues are not required. In the school and medical settings, exposure to clinical psychologists, neuropsychologists, and other psychological professionals in patient care is not required. Therefore, from a training and preparation perspective, nursing training programs prepare students with a wider range of psychological training and clinical application than SLPs. This may aid in the early identification of the negative psycho-emotional impact of sedation holidays and critical care interventions, and may afford the nurse the insight to request additional allied health resources (e.g., speech language pathology) to facilitate the outcome of the patient.

The nurses input and referral to allied health professionals is simply the beginning of achieving the appropriate care of the psychological and emotional needs of the patient. As previously stated, the training of SLPs related to psychology in general and the psychological impact of critical illness is lacking in addition to the knowledge and skills of tracheostomy and MV diagnostics and treatment. The consideration of a mental health clinical practicum/internship and critical care placement may serve as a potential option toward advancing skills; however, the focus should be on teamwork for the holistic approach to patient care. As Parker et al. (2010) reports, the use of an interdisciplinary team approach allows for discipline specific professionals into a synergistic role for overall improved patient care. Furthermore, if the clinical practicum or fellowship year for the SLP includes learning as they practice, the required skills to identify early signs of negative psycho-emotional complications may not be established nor may the skills be adequate to function in an interdisciplinary role. This may place the patient at risk for psychological and emotional complications.

In summary, recognizing the complex needs of this patient population, the use of an interdisciplinary health care team is essential to address the physical, psychological, and emotional factors. Understanding and appreciating the significant amount of training and time required to be adequately trained and prepared to manage the psychological impact of critical illness may be the initial steps toward positive social change and advancement in the care of this patient population.

Epidemiology of Trach-Vent Population

Reporting the epidemiology of the tracheostomized and mechanically ventilated (a.k.a., organ supported) populations brings challenges in part due to the inconsistent terminology and methods of patient identification. Discrepancy in data may be due to inconsistent terminology of MV (invasive or noninvasive), inconsistent data collection for single patient re-intubations, multitude of etiologies, or billing or disease coding of possible etiologies. Due to these challenges, methods of obtaining the epidemiology are inconsistent and demonstrate variability to numbers as reflected in the literature. Some studies utilize retrospective analysis obtained from discharge data with a key focus on identifying specific codes based on the *International Classification of Diseases, 9th*

Revision (Carson, 2012; Wunsch et al., 2010; Zilberberg, de Wit, et al., 2008). Other studies obtained data via retrospective analysis in medical records seeking equipment use (Lone & Walsh, 2011). Yet others utilized used only discharge data and the *International Classification of Diseases, 9th revision* (ICD-9) codes, specifically the clinical modification procedure codes 96.70, 96.71 and 96.72 which reflects duration of required MV (Wunsch et al., 2010). However, these studies do not refer to multiple intubations on the same patient, noninvasive MV, or early tracheostomy in efforts to prevent use of MV. Despite the inconsistencies, the following is a comprehensive attempt to qualify the epidemiology of tracheostomy and MV in the United States. The data has been obtained from the current literature (despite the variations in data collection) and via the Healthcare Cost and Utilization Project, also known as H-CUP (Pfuntner, Wier, & Stocks, 2013).

Estimated Growth in the Trach-Vent Population

The estimated growth rate of tracheostomized and MV patient population is a significant concern as it relates to the training and self-efficacy of healthcare providers serving this population. As the volume and the complexities of the various disease and disorders associated with tracheostomy and MV increase, the training, knowledge, and proficiency in skill must also grow to meet the needs and volume of the population. However, it is due to the complexity of this population that the exact growth rate and volume of tracheostomized and MV patients cannot be determined.

The medical interventions of MV and tracheostomy are methods of life sustaining organ support in the event of respiratory deficits or airway compromise. The list of potential etiologies is vast and each etiology has a specific billing code such as a diagnostic related group (DRG) or the ICD-9 code. Most prevalent etiologies requiring tracheostomy or MV include the following: pneumonia, septic shock, trauma, gastrointestinal perforation, pancreatitis, cardiac arrest, myocardial infarction (MI), self-induced overdose, acute respiratory failure (ARF), neurological disease, chronic obstructive pulmonary disease (COPD), acute or chronic renal disease (ARD or CRD), diabetes mellitus (DM), and cerebrovascular disease (Carson, Cox, Holmes, Howard, & Carey, 2006; Esteban et al., 2013; Lone & Walsh, 2011). While each of these etiologies can be an isolated illness, many patients have co-etiology or co-morbidities, which may contribute to organ failure requiring MV or tracheostomy. Therefore, primary medical diagnosis and the corresponding medical/billing code may be "chosen" based on the more serious of the offending diseases. This variability in "primary" disease code may alter the potential tracking ability for epidemiology, research, utilization of services and required equipment. In addition, coding the various etiologies via medical diagnosis may not demonstrate a true reflection of MV or tracheostomy use as a patient's status and or disease may change from the initial diagnosis during the hospitalization. For example, the initial diagnosis may not require organ support; however, a secondary illness or medical complication may create organ failure and the need to implement MV or tracheostomy during the hospitalization. This results in a secondary medical code and may not capture the patient under medical/billing code identifiers alone; therefore, the true volume of patients requiring tracheostomy or MV may be an unrealistic account of the true volume.

Age factors additionally do not provide consistent calculations of tracheostomy or MV as MV and tracheostomy procedures are used with all age populations. Statistics have demonstrated specific age groups as having a greater prevalence as noted in studies from 1997 to 2010. Pfuntner et al. (2013) noted age groups of 45 and above had the greatest increase with a specific breakdown to include ages 45-64 growing at the greatest rate of 80%, ages 65-84 (37%) and ages 85+ (44%). Overall, H-CUP (2013) found all age groups had common use of MV and tracheostomy per hospital stays and procedures with the exception of ages 18-44. Additional statistics per the United States Census Bureau (2011) indicate the geriatric populations (those aged 60+) are 32,397,000 which equates to 20.5% of the United States population (World Health Organization [WHO], 2012). Census projects the geriatric populations will continue to grow at a rapid rate increasing to 36% of the US population by 2020 (Administration on Aging: U.S. Department of Human Services, 2011). Despite the age cluster patterns, patients in the ≥65 age group will comprise 50% of the MV and tracheostomy population due to the sheer volume within this age group based on projected geriatric volumes (Zilberberg, de Wit, et al., 2008). Therefore, knowledge in gerontology, pharmacology, & polypharmacy, impact of co-morbidities, tracheostomy, and MV are essential in efforts to provide EBP and provide improved health outcomes to this large growing geriatric population prior to 2020.

Presently, ASHA (2014) does not require any specific training in pharmacology, polypharmacy, impact of co-morbidities, tracheostomy, nor MV and only offers generalized training regarding communication across the lifespan. Professionals who have the motivation or desire to obtain additional training in these areas must seek out courses and continuing education outside the core curriculum proposed by ASHA, yet they can continue to practice with the tracheostomized or MV patient population despite the lack of training.

New forms of noninvasive mechanical ventilation (NIVM) have additionally altered the ability to reflect the true volume of mechanically ventilated patients in the United States. The current epidemiological literature does not account for new advances in medicine (e.g., use of noninvasive MV or early tracheostomy) in the projections or anticipated populations. NIMV refers to a form of MV that does not require any foreign object (e.g., endotracheal tube, tracheostomy, naso-tracheal tube) inserted into the body while providing pressure, volume, or flow support via noninvasive (e.g., oral-nasal mask or nasal mask) methods (Hess, 2004; Hess, 2011; Hess, 2012; Jiang, Kao, & Wang, 1999; Reissmann, Ranieri, Goldberg, & Gottfried, 2000). This medical advancement in treatment alters the ability to account for all the patients using some form of respiration or airway support, as it may not fall under the same procedural, medical, or equipment codes as invasive (endotracheal or naso-tracheal intubation). Schumaker and Hill (2006) highlight in Carson et al. (2006) that no data for non-invasive MV was recorded due to a lack of ICD-9 coding to support this modality of organ support. Few studies acknowledge the current practices of non-invasive MV and denote differences in data collection and application (Esteban et al., 2013; Schumaker & Hill, 2006).

Attempting to evaluate the epidemiology based on length of stay (LOS), procedures, or scores from the Acute Physiology and Chronic Health Evaluation

(APACHE) brings additional challenges. The APACHE tool provides an objective measure of the severity of disease estimating the potential prognosis before and during the application of medical interventions such as MV or tracheostomy (Jacobs et al., 2001; Knaus, 1989; Kollef et al., 1997). LOS does not measure treatments, etiology, or equipment use. The LOS can be determined by medical disease code or even insurance allowance, therefore, LOS is not a viable reflection of epidemiological numbers. Healthcare centers (e.g., hospitals) can complete procedures as outpatient or day surgery and may not require patient admission. While procedural statistics reflect 63% of patient hospital admissions involved various medical procedures, it does not indicate the specific procedure, complications, or outcomes (Pfuntner et al., 2013). However, H-CUP note the number of stays per procedure and hospitalization involving respiratory intubation and mechanical ventilation has increased from 919 to 1,638 (in thousands) between 1997 to 2010, which represents a 57% increase in use (Pfuntner et al., 2013). The matter of volume is based on procedures, however, it does not reflect patients who did not require the specific procedures identified, but did require MV or tracheostomy.

The APACHE tool allows healthcare practitioners to score a patient based on physiological variables allowing a prediction of mortality and potential need for organ support (Knaus et al., 1985). The tool utilizes variables such as age, the Glasgow Coma Scale (GCS), vitals (temperature, heart rate, respiratory rate), oxygenation (fraction of inspiratory oxygen concentration, partial pressure of oxygen in arterial blood, arterial pH), chemistry (sodium, potassium, creatinine, acute renal failure), and hematology (hematocrit, white blood cell count), and if the individual is organ system insufficient or immunocompromised (Knaus et al., 1985). The lower the score (lowest score = 0) the healthier the individual, the higher the score (high score = 71) the greater the mortality risk (Knaus et al., 1985). While the APACHE allows insight to the potential need for MV, it does not allow for an absolute that an individual will require MV or tracheostomy, therefore the APACHE is not a reliable unit of measure when attempting to collect volumes of MV and tracheostomy use, but it may serve helpful for prognostic indicators toward outcomes.

The complexities associated with attempting to obtain a valid number of patients with a need for tracheostomy or MV may require additional considerations for epidemiological statistics. Carson (2012) indicates patients who require organ support (e.g., tracheostomy or MV) can be classified under the general category of chronic critical illness (CCI). Further definition of CCI includes “a patient who has survived acute critical illness or injury but has not recovered to the point of liberation from life sustaining therapies” (Carson, 2012, pp. 848-849). According to Carson (2012) tracheostomy for prolonged mechanical ventilation (PMV) is one of the most common definitions of CCI, and the use of MV is a clinical hallmark of CCI. The statistics for CCI in 1997 were estimated at 88,000, however, the numbers have increased significantly to 24.2 per 100,000 as of 2002 (Carson, 2012). Future projections between 2000 and 2020 suggest prolonged acute mechanical ventilation (PAMV) numbers will continually increase to double with one third estimated to be CCI patients (Carson, 2012). Additional literature purports the projected growth to double with actual numbers estimated at 605,898 cases by 2020 (Zilberberg et al., 2012; Zilberberg, de Wit, et al., 2008).

Costs

The costs and mortality associated with intensive/critical care and the use of MV or tracheostomy consumes a significant amount of healthcare resources (Chelluri et al., 2003; Dasta et al., 2005; Jacobs et al., 2001; Wunsch et al., 2010). Total hospital costs range from $27.0 billion per year to projections of $60 billion, yet the numbers vary based on study designs (Wunsch et al., 2010; Zilberberg, de Wit, et al., 2008). Jacobs et al. (2001) noted the variations in costs utilizing descriptive and regression statistics excluding age, gender, and emergency admissions in the determinant variables to discover a 35.8% of variation. Additional statistics indicated a 10% increase in length of stay decreased hospital costs by 1.2% due to a reduction in service cost over time, however the costs remain considerable (Jacobs et al., 2001). Dasta et al. (2005) also found a pattern of cost decline as length of stay increased with an eventual level although the cost of MV was significantly higher than non-mechanically ventilated populations. Table 4 shows several studies that indicated a significant cost associated with ICU and MV regardless of mortality.

Table 4

Costs Associated With ICU and MV

Literature	Total Costs	Length of stay in ICU/Critical Care Unit (CCU)	Costs by days
Chelluri et al. (2003)	Hospital costs: median $56,100 ICU median: $19,500	Median 11.0 of which 8.6 days on MV	Mean daily cost for hospitalization: $26,600 Mean for ICU $10,800
Dasta et al. (2005)	Mean $31,574 ± $42,570	14.4 ± 15.8	Day 1: $10,794 Day2: $4,796 Day 3: $3,968 Mean incremental cost $1,522 per day
Wunsch et al. (2010)	$36,000 ± $41.500	14.1 ± 16.9	Did not specify

Tracheostomy and MV Trained Professionals Decrease Overall Costs

The literature has consistently demonstrated the increased costs associated with an admission to the CCU or ICU with costs increasing in the presence of MV or tracheostomy (Chelluri et al., 2003; Dasta et al., 2005; Jacobs et al., 2001; Schumaker & Hill, 2006). In addition, literature has demonstrated the positive impact of critical care teams and the reduction of length of stay, need for tracheostomy or MV, and overall mortality (Arora et al., 2008; de Mestral et al., 2011; Parker et al., 2010; Tobin & Santamaria, 2008). More recent literature demonstrates the positive impact of simulated training of medical and healthcare professionals regarding tracheostomy as it relates to providers comfort, knowledge of equipment, recognition of adverse reactions, and speaking valve physiology (Dorton et al., 2014; Lighthall & Barr, 2007). However, there has not been any research focal to the discipline of speech-language pathology that has demonstrated a cost savings due to tracheostomy and MV training. It can be speculated that if the SLP had specific and simulated training in core knowledge sets related to tracheostomy and MV (e.g., equipment, lab values, cardiopulmonary function, disease, psychological impact of CCI), communication with the multidisciplinary team and a more efficient care provision that knowledge and skills would increase. It can be further speculated that with this specific knowledge and skill, the SLP would serve as an additional resource in the team to aid in the reduction of complications or adverse events, expedite ancillary care referrals, and decrease negative psycho-emotional effects of ICU/CCU admissions for patients with a tracheostomy or MV. These speculations warrant additional evaluation in future studies.

Discrepancies in Literature

The science of medicine, or the foundation of what is referred to as “medical care” dates back in history to Ancient Egypt 3300BC (Ezri, Evron, Hadad, & Roth, 2005). This includes the identification of anatomy, disease, and various medical treatments. Literature related to general “tracheostomy use” can be appreciated from Hindu scripts beginning around 2000 BC and Egyptian documents around 1500 BC, however, applications related to human life saving methodology was noted in the literature beginning 1870 (Ezri et al., 2005). In contrast, the literature on the mechanically ventilated population in relatively new in the field of science and dates back to 1928 when Philip Drinker, an instructor at the Harvard School of Public Health, invented the "iron lung" due to the clinical need of patients diagnosed with poliomyelitis (Chen, Sternbach, Fromm, & Varon, 1998; Drinker & McKhann, 1929; Drinker & McKhann, 1986). While science and "medical" practice dates to BC, the use of tracheostomy and MV is relatively new in the field of healthcare. Literature from 1950 assessed timing, benefits, contraindications, risks, and mortality of tracheostomy and MV, yet there are considerable discrepancies in the literature (Cox et al., 2009; Esteban et al., 2013; Jaber et al., 2011; Lone & Walsh, 2011; Mahmood, Sadiq, & Manzoor, 2014; Morris, Whitmer, & McIntosh, 2013; Rattray et al., 2005; Shah et al., 2012; Stauffer & Silvestri, 1982; Tadie et al., 2010). These discrepancies can alter SLPs' understanding and knowledge of the population as it relates to timing and benefits of treatment, contraindications of interventions, risks, and overall mortality. Considering ASHA allows SLPs to complete self-study, literature reviews, and online literature based programs as methods of "demonstrating skill/training," the need to highlight the discrepancies as it relates to real knowledge and skill as well as the pursuit of knowledge and training is essential to competency and safety in the management of tracheostomized or MV patient populations. This current study will address the matter of real verses perceived knowledge, the pursuit of knowledge and the trends that influence the obtainment of knowledge and skill in efforts to provide positive social change.

Duration of use. The phrase or terms "duration of use" is generally related to a unit of time. However, in regards to MV, the duration or measure of time is inconsistent. The literature lacks a constant time parameter, yet uses various terms such as acute, short, long, prolonged, and chronic as it relates to the application of MV. Such variance can be clearly noted in the literature such as defining PMV as the application of mechanical ventilation for ≥21 days (Lone & Walsh, 2011; Scheinhorn, Chao, Stearn-Hassenpflug, & Wallace, 2001). Others use a duration of hours, such as ≥96 hours (Zilberberg et al., 2012; Zilberberg, de Wit, et al., 2008) or ≥46 hours (Chelluri et al., 2003), while others made no attempt to define prolonged ventilation (Kojicic et al., 2011; Quinnell, Pilsworth, Shneerson, & Smith, 2006). Some literature counts duration of MV based on behavioral descriptives such as time of intubation (undetermined quantifier such as hours, days, minutes) to the time of discontinuation of use, however, the data did not account for failed extubation (inability to ventilate without the use of a machine) requiring re-intubations (Kollef et al., 1997). Due to the inconsistencies, terms such as acute, short, long, prolonged, brief etc. are variable and dependent on each researcher's unique definition of duration; that is if they offer them in the research method.

Timing of tracheostomy (early vs late). Issues related to the timing of tracheostomy placement also play a significant role in accounting inconsistencies and are significant as it relates to the necessary knowledge and skills of the SLP. Historically, if unable to wean from oral or nasal intubation in 21 or more days, the patient would be considered in need of an elective tracheostomy (Griffiths, Barber, Morgan, & Young, 2005; Heffner, 1993; Marsh, Gillespie, & Baumgartner, 1989). This rationale was based on the potential medical complications associated with limited equipment options (e.g., metal tracheostomy tubes, high-pressure cuffed tracheostomy tubes) and medical knowledge (Griffiths et al., 2005; Heffner, 1993; Marsh et al., 1989). Presently, new equipment (e.g., low-pressure cuffed tracheostomy tubes, plastic and flexible tracheostomy tubes) decreases the historic complications (e.g., tracheal stenosis) associated with tracheostomy placement largely in part to the advancement in materials. Medical teams are considering new alternatives and becoming more aware of equipment options, which translate to increased patient timing options. If the SLP has the knowledge of the various advances in medical equipment, they may have the ability to identify appropriate equipment based on timing of the tracheostomy. However, the timing of tracheostomy placement continues to remain a complex decision that involves significant consideration of multiple factors. Medical teams have adopted the "anticipatory approach" to aid in determining the need for tracheostomy placement (Heffner, 1993, p. 7). Factors such as disease, age, comorbidities, medical stability during the first several days of MV, likelihood of weaning, and success at therapeutic trials of weaning are considered prior to the decision of transition to a tracheostomy (Griffiths et al., 2005; Heffner, 1993; Marsh et al., 1989). Griffiths et al. (2005) considered the extensive list of variables and completed a meta-analysis on the timing of tracheostomy. Of the 15,950 studies originally identified in the literature, only five studies between 1984 and 2004 were original, randomized controlled trials, or quasi-randomized, however the sample sizes were all small resulting in a comprehensive sample of n=406 (Griffiths et al., 2005). Table 5 lists the five studies, sample size within each study, ICU setting and the timing of tracheostomy placements.

Table 5

Meta-Analysis of Tracheostomy Timing

Study	Sample size (n=406)	ICU Setting	Timing of tracheostomy: Early	Timing of tracheostomy: Late
Bouderka et al. (2004)	62	Head injury unit	5-6 days after hospital admit	prolonged endotracheal intubation (* “prolonged” was not quantified)
Dunham and LaMonica (1984)	74	Trauma unit	3-4 days after translaryngeal intubation	14 days after translaryngeal intubation
Rodriguez et al. (1990)	106	Surgical unit	1-7 days after admitted to the ICU	8 or more days after admitted to the ICU
Rumbak et al. (2004)	120	Three medical units	0-2 days after the onset of MV	14-16 days after the onset of MV
Saffle, Morris, and Edelman (2002)	44	Burn unit	Next available operative day	14 days after burn injury

Upon evaluation of the effects of “early” versus “late” tracheostomy, Griffiths et al. (2005) noted timing did not demonstrate statistical significance for mortality or the risk for hospital acquired pneumonia. However, those patients who underwent early tracheostomy did demonstrate a lower duration of need for MV and a reduced duration in the ICU. While these two findings are significant for patient outcomes and institutional costs, caution is required as the matter of timing remains controversial and involves complex decision making of multiple patient factors in a case-by-case scenario. Again, if the SLP has the knowledge and skills related to the timing and use of various equipment as it relates to the disease or disorder, the SLP may facilitate improved patient outcomes and utilization of resources for both the patient and institution.

Current practice standards respect that "early tracheostomy placement" decreases the need for or duration of MV, length of ICU admission, and overall hospital length of stay. However, the terms "early" and "late" are inconsistent and vague (Arabi, Haddad, Shirawi, & Al Shimemeri, 2004; Durbin et al., 2010; Gomes, Andriolo, Saconato, Atallah, & Valente, 2012; Jiang et al., 1999; Koch et al., 2012). Table 6 demonstrates the variance in literature of when defining "early" verses "late" cohorts as reflected in the number of days prior to tracheostomy placement including those days beginning with emergent or planned endotracheal intubation.

Table 6

Early verses late: days prior to tracheostomy

Reference	Early	Standard	Late
Arabi et al. (2004)	0-7 days	*	> 7 days
Bösel et al. (2013)	1-3 days	7-14	*
Durbin et al. (2010)	3-5 days	*	> 5 days
Gomes et al. (2012)	2-10 days	*	> 10
Koch et al. (2012)	< 4 days (2.8 median)	*	> 6 days (8.1 median)
Young, Harrison, Cuthbertson, and Rowan (2013)	0-4 days	*	> 10

* No data provided

Inconsistencies in EBP across various etiologies. The discrepancies and inconsistent terminology (early verses late) are additionally noted within the various bodies of literature focal to etiology. Table 7 reflects the variations in use of early verses late based on several etiologies.

Table 7

Early Verse Late: Days Prior to Tracheostomy Based on Etiology

Etiology	Reference	Early	Standard	Late
Cardiovascular				
	Yavas et al. (2009)	<7 days	*	>7 days
	Devarajan et al. (2012)	< 10 days post op	*	14-28 days
	Trouillet et al. (2011)	6-8 days	*	13-15 days
Pulmonary				
	Durbin et al. (2010)	3-5 days	*	>5 days
	Terragni et al. (2010)	6-8 days	*	13-15 days
Neurological				
	Bösel et al. (2013)	1-3 days	7-14 days	*
	Bösel, Schiller, Hacke, and Steiner (2012)	1-3 days	*	7-14 days

* No data provided

These inconsistencies of “early” or “late” tracheostomy placement create variance in obtaining accurate numbers of patients receiving tracheostomy both in general populations and even in etiology specific populations. This adds additional challenges in obtaining accurate data collection for patients requiring tracheostomy. Despite the variances in the literature, in my 20 years of clinical experience in 10+ Chicagoland hospitals, personal observations demonstrate clinical practice continues to refer to the 21-day historical target and make adjustments on timing based on a case-by-case scenario.

In summary, the discrepancies in the literature in regards to the duration of use, timing of tracheostomy, and the variability of EBP across etiologies creates difficulty in defining a standard practice for the care of the tracheostomized and MV population. The need to have a foundation of core knowledge across core skills sets is essential in providing EBP and the ability to combine clinical decision with the current literature supported standards. Given the discrepancies, the lack of defined knowledge and skill requirements for SLPs, and the known physical and psychological complications associated with the presence of tracheostomy or MV, the concern for suboptimal patient care provision and outcomes remains prudent. If SLPs obtain the knowledge regarding disease, timing of tracheostomy placement, duration of use, and are trained on the variations of equipment and rationale for use, the SLP may add value to the interdisciplinary team as well as the patient health outcomes.

Self-Efficacy

The matter of self-efficacy as it pertains to SLPs, is limited in the literature. Therefore, RNs and nursing students were utilized to evaluate self-efficacy on skills, knowledge, and job performance.

Self-efficacy is task specific (Heslin & Klehe, 2006) and predicated on the cognitive beliefs related to four types of experiences including enactive attainment (based on prior experiences of the individual), vicarious experience (based on the observer and the outcome of the model), verbal persuasion (based on described experiences), and physiological or emotional states (Bandura, 1986). Due to the diversity of these four experiences, work tasks, and personal factors, Heslin and Klehe (2006) report that there is no single standardized measure of self-efficacy and therefore specific tools must be created to assess the specific task at hand. In the nursing literature, several tasks (e.g., treatment or management of congestive heart failure or pediatric pain) have been evaluated as they relate to self-efficacy. These include academic motivation and performance, self-regulation, learning effort, and knowledge. While patterns can be identified in the nursing literature, it must be clarified the studies utilized different self-efficacy assessment tools, yet each did extensive statistical analyses to ensure the tool was valid in assessing self-efficacy.

The concept of enactive attainment was noted in the nursing literature as it relates to self-efficacy in the ability to learn the biological and physical sciences (Andrew, 1998). Andrew (1998) utilized a researcher created tool to assess self-efficacy if the nursing student had a prior experience with a science prior to nursing training. Statistical significance was found between self-efficacy and academic performance where the higher the self-efficacy, the higher the academic performance (Andrew, 1998). McLaughlin et al. (2008) utilized a modified self-efficacy tool previously utilized for other populations to assess self-efficacy and academic performance. Results indicated statistical significance between high occupational self-efficacy (how confident one is about performing the responsibilities a job given training) and higher grades in nursing training. Furthermore, McLaughlin et al. (2008) speculated that resilience and self-efficacy promote the ability of nurses to view difficult tasks as challenges in which they strive to overcome. In contrast, those with low self-efficacy tend to focus on the failures and self-doubts (McLaughlin et al., 2008).

The nursing literature additionally assessed self-efficacy and the relationship with knowledge in various diseases, disorders, or situations. Stanley and Pollard (2013) utilized the *Pediatric Nurses' Knowledge and Attitudes Survey Regarding Pain* (PNKAS-Shriners Revision) and the *Nurses' Self-Efficacy in Managing Children's Pain* to evaluate the level of knowledge and self-efficacy as well as level of self-efficacy and experience. The results indicated no statistical relationship. However, there was a statistical relationship between experience and knowledge (Stanley & Pollard, 2013). Shinnick and Woo (2014) utilized a modified self-efficacy tool to assess for a relationship between self-efficacy and knowledge given simulation training. Results demonstrated no statistical significance between knowledge and self-efficacy yet a positive correlation with confidence with experience (Shinnick & Woo, 2014).

Zimmerman (2000) reviewed various literature related to the general population of students, self-efficacy and academic effort, emotionality, academic motivation, and self-regulation. In his analysis, positive self-efficacy was consistently predictive of academic effort and self-regulation (e.g., goal setting or self-evaluation) which supports the construct of enactive attainment. In addition, Zimmerman (2000) discovered a positive relationship between self-efficacy and academic motivation which included a student's choice of activities, persistence, and emotional reactions. This supports Banduras (1977; 1986) construct of physiological states in which the individual's ability to reduce stress, anxiety, and depression in a given situation result in a higher level of self-efficacy.

Self-efficacy in the nursing literature demonstrates the need for specific self-efficacy testing tools as well as the need to consider the various experiences as proposed by Bandura (1977; Bandura, 1986). Due to the lack of research in the United States speech pathology community, this current study proposes to fill the gap in the literature related to self-efficacy, real knowledge, confidence and the obtainment of training/knowledge focal to SLPs and tracheotomy and MV. It can be hypothesized that SLPs will share similar results found in the nursing literature related to self-efficacy and experience, and will share the importance of enactive attainment and physiological states as it relates to self-efficacy. This current study will utilize a demographic survey to assess the impact of experience on self-efficacy, confidence, and knowledge, as well as utilize a qualitative survey to look for themes or phenomenon associated with the obtainment of training and pursuit of knowledge.

Summary and Conclusions

Training of SLPs in the diagnosis and management of tracheostomy and mechanically ventilated patient populations and the impact of self-efficacy is vastly under studied. The SCT proposed by Bandura (1986) is frequently utilized in various healthcare provider studies and is clearly a solid foundation in the understanding of the phenomenon and the motivation of knowledge and skill acquisition for SLPs as it relates to the tracheostomized and MV population. While literature does demonstrate the impact of positive self-efficacy on education and job satisfaction in other healthcare providers, there are variations between the groups and therefore limitations in generalizability to SLPs. This current study will fill the gap in the literature by assessing knowledge and skills, level of self-efficacy, confidence as it relates to having or obtaining training specifically in the discipline of speech-language pathology and focal to the complications associated with tracheostomy and MV.

Understanding the complex dynamics of physical and psychoemotional impact of tracheostomy and MV is essential in the role of a SLP in the interdisciplinary healthcare team. With the rapid growth rate and under estimated epidemiology of the tracheostomized and MV population, it is essential for healthcare provision and cost control that training and skills keep up with the patient population as projected in the literature (Zilberberg et al., 2012; Zilberberg, Luippold, et al., 2008). In addition, appropriately trained professionals, the use of literature based standards, clinical decisional skills, and self-efficacy may increase patient outcomes, maximize utilization of resources, and reduce facility and patient care costs. The vast discrepancies in the literature and the lack of formalized and regulated education for SLPs in regards to tracheostomy and MV results in a significant gap in the literature that may jeopardize quality patient care, patient safety, and overall patient health outcomes (physical and emotional). This study will utilize a mixed methods approach to assess the real knowledge of SLPs via a validated online skills assessment, a rating of self-efficacy and confidence, as well as collect and analyze the themes associated with the obtainment of education in the area of tracheostomy and MV.

Chapter 3: Research Method

Introduction

The literature indicates a growing need for specialized training in tracheostomy and MV due to the projected growth rate in cases within the next quarter century along with the costs associated with the multiple comorbidities that impact outcomes with this population. The literature highlights the need to train nurses and physicians and refers to the impact of self-efficacy on learning and the pursuit of lifelong learning. However, no literature discusses the role of self-efficacy in SLPs. SLPs are the considered the experts in areas of communication, swallowing, and voice, and these elements are considered of significant value to patients in the ICU/CCU (Jackson et al., 2014; Pandian et al., 2014). To date, there have been no studies completed on the level of real knowledge, training, self-efficacy, confidence, and trends associated with the obtainment of knowledge as it relates to communication, swallowing, and voice in the tracheostomized and mechanically ventilated populations. This study employed a mixed methods approach. I selected mixed methods as ideal due to the two RQs with different focuses, allowing for an increased understanding of both the phenomenon and the relationship between specific variables. The demographic survey was based on the work of Ward et al. (2012) and Ward et al. (2008). I developed the knowledge and skill aspects of the skill survey based on evidence-based best practice as indicated in the past 10 years of literature. A self-rating of SLP confidence associated with the knowledge and skills responses was combined with a modified self-efficacy assessment developed by Spek et al. (2013).

The qualitative data resulted from an online survey of practicing SLPs in efforts to explore and describe the phenomenon associated with obtaining or not obtaining training after academic coursework and the pursuit of specialized training for the diagnosis and treatment of tracheostomized and mechanically ventilated patient populations in the areas of communication and swallowing. I developed the KCT-TMV because to my knowledge there are no assessment tools that focus on the various skill and knowledge sets related to tracheostomized and mechanically ventilated patient populations. In addition, the qualitative survey created for this study was focused on the phenomenon associated with SLPs pursuing or not pursuing and obtaining or not obtaining specialized training for this complex patient population. The combination of these two assessments provided a comprehensive evaluation of the demographics of the SLP community across the continental United States, the real knowledge of the population, their self-efficacy, and any additional variables that may impact the pursuit of specialized training for the tracheostomized and mechanically ventilated patient populations. This chapter discusses the setting, research design and rationale, role of the researcher, methodology, instrumentation, the procedures for the pilot study, recruitment, participation, data collection, the data analysis plan, threats to validity, and issues of trustworthiness.

Setting

Study 1 was divided into an expert panel review and a pilot of the KCT-TMV. In the expert panel review, participants included experts (e.g., intensivists, pulmonologists, otolaryngologists, critical care nurses, and advanced practice nurses). The setting for the expert panel review may have included a doctor's office, clinic, hospital, rehabilitation center, or college campus where the participants completed a task value ranking on a paper copy of the knowledge and skills assessment. Upon the form's completion, the participants mailed the responses back to me in a self-addressed and stamped envelope. The expert panel response forms are stored in a locked cabinet when not in use. The pilot occurred via online survey where the participants (e.g., experts; including intensivists, pulmonologists, otolaryngologists, critical care nurses, and advanced practice nurses; practicing SLPs, and graduate students in communication sciences and disorders) completed the surveys in their workplace, home, office or any location where they had access to an online system. The location of where the online assessment was completed was irrelevant to the study as all questions were online and did not require a specific environment. However, within the environment of the participant's choice, they were not permitted to use external aids to answer any aspect of the KCT-TMV.

Aspects of study 2 occurred via online survey through a third party survey system (Survey Monkey). Participants completed the surveys at their workplace, home, office, or at any location, that afforded them access to an electronic device. The location as to where the participant completed the survey was irrelevant as all survey stimulus are online and do not require a specific environment for survey completion. A statement was provided in the survey instructions that the environment may be variable (e.g., home, office, and so forth); however, participants had to compete the survey independent of any other participant, professional, or outside resource in an effort to maintain the validity and reliability of the findings. Should participants have wished to withdraw at any time, they had an exit option throughout the duration of the survey. However, once responses were finalized and submitted, the participant's responses were collected and could not be removed from the data set. An established time allowance was built into the survey in an effort to prevent participants from looking up references or answers to the knowledge and skills stimulus during the course of their participation. The narrative survey (qualitative survey) additionally occurred online due to the geographical, time, and financial challenges that would be imposed on me if I had to travel to 20 participants across various locations within the four quadrants of the United States. The first five participants who volunteered within each of the four geographical locations who respond to each question in its entirety, for a total of 20, were included in the qualitative analysis. In addition, by continuing the use of an online format, anonymity was maintained and the participants typed in their responses. This format reduced the potential for error rates in the process of transcription as well as potentially increasing the willingness to participate in the qualitative aspect of the study.

Research Design and Rationale

This two-part study focuses on the following questions:

Study 1: Knowledge and Confidence Test for SLPs (KCT-TMV)

RQ1,quantitative: To what degree does the type and amount of tracheostomy and mechanical ventilation training differ for expert versus SLP versus. student (independent variable) and real knowledge (dependent variable) as measured by a dichotomous skills assessment?

Study 2: SLP Self-Efficacy

RQ2, quantitative: To what degree does the type and amount of tracheostomy and MV training for SLPs as measured by demographics (independent variable) influence self-efficacy (i.e., confidence; dependent variable), real knowledge (dependent variable), and task value (dependent value) as measured by new skills assessment?

$H_0$2: The type and amount of tracheostomy and MV training for SLPs has no influence on self-efficacy, perceived skills sets, and real knowledge.

H_a2: The type and amount of tracheostomy and MV training for SLPs has an influence on self-efficacy, perceived skills sets, and real knowledge.

RQ3, qualitative: What factors do SLPs perceive to influence the obtainment of specific training for tracheostomized and mechanically ventilated population?

Mixed Methods

RQ4: How do self-efficacy, confidence, qualitative factors reported to influence training, and real knowledge, as measured by a demographic survey and a validated real knowledge questionnaire, relate?

A mixed method approach allows the researcher to identify both the relationship between specific variables (e.g., independent variable of training, and dependent variables real knowledge, confidence, task value, and self-efficacy) and the qualitative factors related to SLPs obtaining training. A sequential explanatory design was utilized with an equal emphasis in efforts to explain and interpret relationships between variables. The sequential steps allowed for a separate data collection and separate analyses followed by a comprehensive analysis. Creswell (2013) purports this form of methodology allows the second set of data (e.g., qualitative) to build on the initial set (e.g., quantitative) data to demonstrate that each component is separate, yet connected. This aided in identifying compounding variables and identified a triadic give-and-take between the variables (e.g., demographics, real knowledge, self-efficacy, confidence and phenomenon associated with obtaining specialized training) as proposed by Banduras (1986) theory.

Role of the Researcher

My role in this study was one of an observer for both quantitative and qualitative aspects. I am a SLP, a member of ASHA, a licensed practitioner, and a known expert in the practice of tracheostomized and MV populations, therefore full disclosure of profession, name, and professional association to all participants will occur in the recruitment letter and consent form. The sample was an anonymous and randomized pool therefore a relationship of supervisory, mentor-student, or indicating any form of researcher power over any participant was removed. My bias was mediated via the randomized and anonymous aspects of the study's design. At no time will any participant be identified by name or professional identification number (e.g., ASHA member number or professional licensure number). I made a statement of intent to publish in efforts to disseminate the results of the study to all participants and ASHA members via publication and engage in clinical skills discussion through the venue of the ASHA SIG community upon completion of the entire study in efforts to limit any bias.

Methodology

The initial study contained an expert panel review and a knowledge and skills assessment validation. Various experts reviewed a hard copy of the knowledge questions within each of the skill sets based on a 4-point Likert scale (1= not important, 2 = somewhat important, 3= quite important, and 4= very important). Of the original eight stimuli in each skill set, those with a score below 0.75 were deleted in efforts to ensure content validity. Upon completion of the expert panel review and revisions of the knowledge questions to include only those with a score of 0.75 and above, a pilot was completed online with a sample of 25 experts, 25 practicing SLPs, and 25 graduate students to ensure a statistical difference between the three groups. The specific details of the pilot are discussed in later sections within this chapter.

The second study was a mixed methods study with equal focus on quantitative and qualitative elements. The quantitative elements were evaluated if the type and degree of training influences self-efficacy, confidence, real knowledge, and task value ratings related to the diagnosis and treatment of the tracheostomized and mechanically ventilated population. This was measured via the KCT-TMV, which includes a demographic survey, a knowledge assessment, participant self-rating of confidence, self-efficacy assessment, and a task value rating. Statistical analyses of the data included regressions including the demographic variables and measures of reliability (e.g., Cronbach's alpha). The qualitative element evaluated the various factors that influence the obtainment of specialized training for tracheostomized and mechanically ventilated populations.

Analysis consisted of an assessment of trends or phenomenon. All aspects of the study were approved by the Walden University IRB, approval number 07-07-15-0286263.

Participants included speech language pathologists currently practicing and licensed in their respective state of employment and a successful completion of the Certified Fellowship Year (CFY; a supervised practice term defined by a nine-month period of active practice under the direct supervision of a licensed SLP). Correlations and a side-by-side comparison of qualitative and quantitative results were completed in efforts to address the qualitative and qualitative research questions rather than merging or combining data.

Participant Selection Logic

Purposeful sampling of the participants were conducted through the 186,000 speech language pathologists registered with the ASHA (2016d). An email blast through the ASHA website and all ASHA Community SIGs, student groups, and "SLP Healthcare" were utilized to aid in participant recruitment. Proportionate stratified sampling was warranted due to the multiple geographic regions within the participant population (Trochim, 2006). The sample was clustered based on the demographic survey results for geographic region, years in practice, highest degree earned, and setting. Power analysis completed utilizing 0.05 alpha, 0.25 medium effect size, and a statistical power of 0.80, from http://www.math.yorku.ca/SCS/Online/power/ specified 360 total participants (90 within each geographical group) however, in efforts to account for potential dropout rates, the sample size was increased to 400. A goal of approximate equal distribution across all four geographic regions results in the potential for ongoing sampling efforts to obtain groups of at least 90.

Within the design of the KCT-TMV, participants were asked if they are willing to participate in the qualitative aspects of the study. Qualitative sample size included five volunteers within each of the four geographical regions for 20 participants. At the end of the KCT-TMV, participants were asked if they would be willing to complete an online questionnaire. A link took them anonymously to the qualitative survey where they typed in their responses to 10 questions. See appendix I. All aspects of the online surveys (e.g., demographics, KCT-TMV, and qualitative surveys) were linked to each participant in efforts to complete a comprehensive analysis of the data.

The qualitative sample consisted of participants who completed the quantitative skills assessment (KCT-TMV) within each region. The initial five from each geographic region were included in the study. Upon the completion of the fifth survey in a given region, that aspect of the qualitative study will be closed to future participants and the link to the qualitative survey will be disabled. A notice specifying rationale for survey closure will display on the Survey Monkey screen to those participants who were willing to participate as well as a thank you for their willingness to participate.

Participants were known to meet the criteria based on the recruitment methods (e.g., only through the ASHA group community) and screened via the demographic survey results. Based on the analysis of the demographic data in a front loaded software system, participants may be withdrawn or not included if they do not meet the assigned study criteria. The survey of demographic data has been created and modified from the work of Manley et al. (1999), Ward et al. (2008), and Ward et al. (2012). Refer to Appendix E. Should data analysis of the demographic survey indicate participant(s) did not meet the criteria, the quantifiable aspects (e.g., skills assessment) will not be provided to the participant, and they were excused from any further aspects of the study. Additional participants were sought until the sample size within each geographical region is obtained via repeated announcements on the ASHA SIGs and ASHA community online.

Instrumentation

The quantitative surveys were divided into multiple parts: a demographic survey, a skills assessment with an embedded self-rating of confidence, task value rating, and a self-efficacy assessment. The instrumentation for the demographic quantitative aspects were modified from the original work of Manley et al. (1999), Ward et al. (2008), and Ward et al. (2012). The skills assessment tool is a self-designed skills and knowledge assessment based on EBP as noted in the past ten years of the medical, respiratory, speech pathology, and psychology literature. The tool was developed due to a lack of evidence based competency assessments for SLPs focal to tracheostomized and mechanically ventilated patient populations. The skill-based assessment of real knowledge focal to diagnosis and treatment of tracheostomized and mechanically ventilated patients includes a dichotomous scale. The test tool contains an equal distribution of core skills including anatomy and physiology of the respiratory and cardiac systems, cardiopulmonary and MV terminology, lab values, tracheostomy and ventilator equipment, disease and acute illness, and psychological aspects. The test tool contains 24 questions; four questions within each of the six skill sets. The participant rated their level of agreement based on the statement provided demonstrating level of knowledge. Within the knowledge assessment, a series of additional questions using a Likert scale include a self-rating of confidence related to each skill set, a task value rating, and direct self-efficacy questions was provided. Refer to Appendix E for the demographic survey and the KCT-TMV.

The qualitative online survey was newly developed in efforts to collect data on the influential factors associated with SLPs and specific training as it relates to the tracheostomized and mechanically ventilated patient population. The test was created due to a lack of current published tools assessing the possible influential factors. The questions were developed based on epidemiology of tracheostomized and MV populations, changes in healthcare practice and regulations, changes in employer benefits/support, and my observations over 20 years of clinical practice.

Procedures for Pilot Studies

An expert panel review and pilot study was completed for the KCT-TMV. The purpose of the expert panel review was to determine content validity. The purpose of the pilot study was to determine the content and construct validity, establish appropriate time allotment for skills assessment completion, and to reduce any threats to the study's overall validity. I worked collaboratively with healthcare facilities and academic settings to ensure institutional review board (IRB) approval for participant recruitment. Advertisement of expert panel review and pilot study occurred through the healthcare and academic online community announcements (e.g., internet and intranet), fliers, and direct letters to the specific expert departments/offices. A copy of the flier is provided in Appendix G.

Participants of the pilot were grouped into three categories; experts, SLPs, and students. Each group will consist of 25 participants based on a power analysis (given a 3x1-power analysis for an ANOVA utilizing 0.05 alpha, 0.25 medium effect size, and a statistical power of 0.80). Group 1 consisted of experts as defined as professionals practicing in otolaryngology, critical care nursing, advanced practice nursing, critical care medicine, and pulmonology. Group 2 was comprised of speech language pathologists as defined as non-CFY, licensed, employed, and actively working professionals. Finally, group 3 was defined as graduate students in the first or second year of graduate training in the field of communication sciences and disorders, otherwise known as speech language pathology. IRB approval was submitted to various healthcare and academic settings in the state of Illinois allowing for randomized participant recruitment. It was planned that the pilot data collection would continue until a minimum of 25 participants in each group are obtained.

The participants were asked to complete the demographic survey in efforts to appropriately group them into one of the three categories (e.g., experts, SLPs, and students). If the participants qualify, they were asked via written notice online to remove all electronics (e.g., cell phones, tablets, laptops, books, or journals) from view prior to completing the skills assessment. Online instructions were provided prior to the onset of the skills assessment to ensure understanding of the instructions. Each of the participants completed the skills assessment to assess for various skill levels, accuracy of test stimuli wording, and statistical significance between the three groups. Scores of task value ratings were calculated between the three groups (e.g., experts, SLPs, and graduate students) to establish an understanding of perceived skill value as it relates to the diagnosis and treatment of tracheostomized and mechanically ventilated patient populations.

Upon completion of a successful determination of content and construct validity, an additional data assessment of duration required to complete the online skills assessment was completed through the Survey Monkey online tools. The focus of the second step of the pilot was to determine the average length of time required to complete the skills assessment. The results from this analysis justified the time limit on the formal administration of online knowledge and skills assessment (KCT-TMV). The longest duration required to complete the skills survey was used as the determined cut off time allotment for the skills assessment on the main study's KCT-TMV aspect of the online survey.

Procedures for Recruitment, Participation, and Data Collection

Recruitment for the pilot was completed in conjunction with northwest suburban Illinois healthcare facilities and local state colleges. I contacted their respective IRBs and obtained permissions to complete a pilot survey of the demographic and skills assessment, as well as the follow up questions as they relate to confidence and self-efficacy. Participants were provided an informed consent in the recruitment literature as well as the first screen during the online pilot. The informed consent disclosed the nature of the study, brief background toward the tracheostomized and MV population, procedures for the surveys, voluntary nature of the study, risks and benefits, privacy, my contact information, the Walden University IRB contact information, the respective stakeholders IRB contact information if required by the stakeholder, and a statement regarding payment for participation. At the end of the consent form, a statement was provided indicating that should the participant click to proceed with the study, it demonstrated his/her consent to participate in the study. Refer to Appendix F for a sample of the consent form.

The main study also included a consent form that disclosed the following: the nature of the study, brief background toward the tracheostomized and MV population, procedures for the surveys, voluntary nature of the study, risks and benefits, privacy, my contact information, the Walden University IRB contact information, the respective stakeholders IRB contact information if required by the stakeholder, and a statement regarding payment for participation. At the end of the consent form, a statement was provided indicating that should the participant click to proceed with the study, it demonstrated his/her consent to participate in the study. Upon completion of the demographic survey and skills assessment, participants were respectfully thanked and informed of the intent to publish the results of the study. A link was provided to the participants requesting participation in a follow up survey regarding the phenomenon they perceive as influencing their pursuit of education as it relates to the tracheostomized and or MV populations. The Survey Monkey program offered a choice stated as “yes” or “no” to the participation in the qualitative survey. Should the participant decline the narrative survey, they were thanked for their time and participation in the study, and the survey ended.

Participants had an exit icon consistently present on screen throughout the survey in which they could exit at any time. If the participant agreed to continue with the qualitative survey, they were redirected on the screen to a repeated statement from the original consent re-enforcing that I would not have any knowledge of their identification or ability to determine their identification. They were be encouraged to respond honestly in the open-ended 10-item questionnaire. A statement was provided restating the confidentiality of their responses and the purpose of the study. A statement was provided indicating that should the participant click to proceed with the study, it demonstrated his/her consent to participate in the study. Refer to Appendix K for a sample of the survey consent form. The exit icon was consistently on the screen throughout the survey allowing them the option to exit the survey at any time. However, should the participant complete the survey and submit their responses, their responses would ~~were~~ not be able to be removed from the data set. In addition, the participants were notified that should they choose to exit the survey before completing it, they were not able to access the survey again.

Data was collected via a third party online survey company (Survey Monkey). The data was directly downloaded to SPSS for the purposes of my analysis. I signed up with Survey Monkey as a member and obtained a secured sign-in and password. The sign in and password was stored in a locked cabinet within my home office. The key to the file cabinet was stored in a separate location within my home and without labels or identification of the file cabinet.

The pilot studies were required in efforts to demonstrate the test tools (e.g. demographic survey, skills assessment, and narrative survey) face, content, and construct validity. In addition, the pilot afforded me the opportunity to ascertain if additional key elements have been overlooked, appropriateness of stimuli wording, and the value placed on the various skills sets. Using an expert panel review and the pilot study, it was determined if the test tool and stimuli were appropriately detailed to assess the real knowledge of practicing SLPs as it relates to the tracheostomized and MV populations. In addition, the pilot allowed for content and language revisions should validity be suboptimal.

Data Analysis Plan

The data analysis plan was divided into two specific sections based on the two-part nature of this study. Study one involved the expert panel review, KCT-TMV pilot and validation, while study two consisted of the demographic survey, a knowledge assessment, participant self-rating of confidence, task value rating, and self-efficacy assessment.

Study 1 consisted of an expert panel review and a knowledge and skills assessment validation. Various experts reviewed the knowledge questions within each of the skill sets based on a 4-point Likert scale (1= not important, 2 = somewhat important, 3= quite important, and 4= very important). Of the original stimuli in each skill set, those with a score of below 0.75 below were deleted in efforts to ensure content validity. Upon completion of the expert panel review and revisions of the knowledge questions with a score of 0.75 and above, it was planned that the pilot would contain 25 different experts, 25 practicing SLPs, and 25 graduate students. Statistical analysis using an ANOVA with post hoc testing and reliability via Cronbach's alpha was completed via SPSS software (version 21) to determine a statistical difference between the three groups (e.g., experts, SLPs, and graduate students in the school of communication sciences and disorders). The specific details of the pilot were discussed in prior sections within this chapter.

The second study was a mixed methods study with equal focus on quantitative and qualitative elements. The quantitative elements evaluated if the type and degree of training influences self-efficacy, confidence, real knowledge, and task value ratings related to the diagnosis and treatment of the tracheostomized and or mechanically ventilated population. Data was coded and inputted into SPSS software (version 21) for analysis. Statistical analysis involved regressions including the demographic variables. The qualitative element evaluated the various factors that influenced the obtainment of specialized training for tracheostomized and mechanically ventilated populations. Various factors were coded and inputted in to SPSS for the analysis of trends or phenomenon. The mixed methods analysis utilized correlations via SPSS software (version 21) to assess for any relationships between the variables.

Threats to Validity

A panel of four experts in the following possible medical specialties; otolaryngology, critical care nursing (including advanced practice nursing), critical care medicine, and pulmonology completed an expert panel review of the stimulus questions in efforts to demonstrate content validity. The pilot study was completed to test for statistical significance between experts, working SLPs, and graduate students in communication sciences and disorders (a.k.a., speech language pathology). The original plan of the pilot study was with a set of 25 participants within each group (e.g., experts, practicing SLPs, and students) in efforts to ensure content validity. Additional demographic data of gender, age, years in practice, and discipline was collected to aid in data analysis.

Upon determination of the validity of the test tool as demonstrated by the presence of statistical significance between the three groups, a secondary assessment focal to time to complete the skills assessment and face validation was completed. Within the Survey Monkey software, a unit of time measurement was enabled to establish a time criteria for the online survey allowance related to the knowledge and skills aspects of the KCT-TMV. This additional evaluation will determine the average and maximum time allowance required to complete the skills assessment and was used as a guide in establishing timelines for the formal online surveys. These steps in validating the test tool was essential in reducing the potential of participants seeking outside resources or looking up materials while participating in the skills assessment as well as ensuring the face validity of the survey tool.

Issues in Trustworthiness

In study 2, the matters of credibility, transferability, and dependability have been considered and addressed. Triangulation was utilized with the scores of the demographic survey, KCT-TMV, self-efficacy assessment and the qualitative survey in efforts to overcome any weakness that are inherent in a single method study (Creswell, 2009). Specifically, methodological triangulation allowed for mixing the two types of data (e.g., quantitative and qualitative surveys) and analyzing the data through different angles. In the qualitative survey, data was collected until saturation was reached. The qualitative survey was designed to allow the participants to type in their responses removing any potential transcription errors. A qualitative codebook was also used to maintain consistent definitions of codes in efforts to demonstrate reliability (Creswell, 2009; Creswell, 2013).

Ethical Procedures

All aspects of the study occurred via online survey through a third party survey system (e.g., Survey Monkey). It was imperative to complete the quantitative survey in an anonymous format as the analysis of knowledge/skills and competence was a key factor in the study and per ASHA's (2010) Principal of Ethics II ; Rules of Ethics B states "individuals shall engage in only those aspects of the profession that are within the scope of their professional practice and competence, considering their level of education, training, and experience" (p. 3). Considering the demographic survey identifies the presence or absence of training and experience, and the skills assessment demonstrates level of real verses perceived knowledge, if the participant was identifiable, and the survey demonstrated less than competent skills, I am obligated to report to ASHA. This created a significant risk for the participant and researcher. Therefore, the setting required anonymity for both the participant and the researcher in efforts to obtain the data, maintain confidence, and uphold the Rules of Ethics for both parties.

In efforts to protect the identity of the participants, a randomized sequential exploratory strategy created protection for the participant and researcher in which all-identifiable information from the demographic and skills assessment was blocked from the researcher. The qualitative data collection focused only on the phenomena associated with the obtainment or lack thereof related to skills and training in the area of tracheostomy and MV. The Walden University IRB approved all aspects of the study (#07-07-15-0286263).

Summary

The purpose of this study was to determine the impact of self–efficacy on the real verses perceived knowledge of practicing SLPs and the themes/phenomenon regarding the obtainment of the necessary knowledge for tracheostomized and mechanically ventilated population. A newly developed test tool was developed and validated for content, construct, and criterion-related validity, as well as reviewed by an expert panel to ensure no key element was overlooked. A pilot was essential in this study to ensure the validity of the overall study. Significant steps were taken to ensure test reliability and validity as previously described.

Upon successful results from the pilot, the formal online study provided additional insights to the real verses perceived knowledge of practicing SLPs, the impact of self-efficacy, and the phenomenon associated with gaining additional knowledge as it relates to the diagnosis and treatment of the tracheostomized and MV populations. Chapter 4 includes the analysis of the participant demographics, the data collection and analysis of study 1 and 2, as well as the evidence of trustworthiness. Chapter 5 includes the interpretation of the findings, study limitations, recommendations, and implications for future research.

Chapter 4: Results

Introduction

Medically complex patient populations are on the rise (Zilberberg et al., 2012; Zilberberg, de Wit, et al., 2008). The medical interventions may include life-sustaining measures such as a placement of a tracheostomy and or the need for MV. For patients having a tracheostomy or MV, speech pathology services are vital, considering that communication, swallowing/eating, and safety are priorities in the tracheostomized and or MV patient populations (Pandian et al., 2014). As communication and swallowing are rated as significant QoL factors (Ekberg et al., 2002; Nussbaum, 2007; Pandian, Thompson, Feller-Kopman, & Mirski, 2015) in the tracheostomized and mechanically ventilated patient population, the current practices of SLPs including training, knowledge, and the relationship of self-efficacy as it influences patient care provisions and outcomes warrants investigation. No survey tools or tests of knowledge related to tracheostomy and MV for SLPs has been published to date. The current study addressed this gap by creating and validating a test tool that assesses the real knowledge of practicing SLPs in the United States, their self-ratings of self-efficacy (the personal belief towards the ability to act and create a desired result), their perceived knowledge, and analysis of trends associated with therapists providing care to tracheostomized and mechanically ventilated patient populations.

This two-part study contained multiple purposes. The validation of the test tool (KCT-TMV) was important to maintain reliability and validity of the results in study 2. The validation of the KCT-TMV would result in the first validated knowledge and skills test tool for SLPs related to tracheostomy and MV. In addition, once validated, the KCT-TMV offers a knowledge, confidence, and self-efficacy test that can be utilized in clinical practice to demonstrate SLPs real knowledge, level of self-efficacy, and level of confidence in the skill areas of tracheostomy and MV and provide a method for employers to identify areas of needed ongoing training or clinical support. The research question for the validation portion of the study was:

> RQ1, quantitative: To what degree does the type and amount of tracheostomy and MV training differ for expert versus. SLP versus. student (independent variable) and real knowledge (dependent variable) as measured by a dichotomous skills assessment (KCT-TMV)?

The national study, or study 2, was a mixed methods study with multiple purposes that required quantitative and qualitative methods. The quantitative aspects of the study were designed to assess the real knowledge, confidence, and self-efficacy of practicing SLPs in the United States, and obtain a task value rating of knowledge and skill in six distinct skill sets developed and validated in the KCT-TMV (i.e., anatomy and physiology, terminology, lab values, equipment, disease and illness, and psychological issues). The research question for this aspect of the study was as follows:

> RQ2, quantitative: To what degree does the type and amount of tracheostomized and MV training for SLPs as measured by demographics (independent variable) influence self-efficacy (i.e., confidence; dependent variable), real knowledge (dependent variable), and task value (dependent value) as measured by new skills assessment?

$H_0$2: The type and amount of tracheostomized and MV training for SLPs has no influence on self-efficacy, perceived skills sets, and real knowledge.

H_a2: The type and amount of tracheostomized and MV training for SLPs has an influence on self-efficacy, perceived skills sets, and real knowledge.

The qualitative aspects of the national study were designed to evaluate the obtainment of training during and after graduate school as well as the pursuit of specialized education related to tracheostomized and mechanically ventilated patient populations in the areas of communication and swallowing. The research question for this aspect of the study was as follows:

RQ3, qualitative: What factors do SLPs perceive to influence the obtainment of specific training for tracheostomized and mechanically ventilated population?

Finally, the purpose of the final research question was to evaluate factors related to obtaining training and knowledge in the areas of tracheostomy and MV. The research question for this mixed methods aspect of the study was as follows:

RQ4: How do self-efficacy, confidence, qualitative factors reported to influence training, and real knowledge, as measured by a demographic survey and a validated real knowledge questionnaire, relate?

In this chapter, I describe how the pilot and national study were conducted, discuss all changes of procedures and rationale for such changes, and provide the results of both studies, descriptive statistics of the participants' demographics, data analysis, and the evidence of trustworthiness. Due to the complex nature of the information, the chapter will begin with a discussion of the expert panel review and rationale for stimulus items utilized in the pilot. I then discuss the pilot/validation study including demographics, setting, data collection, results, data analysis, and relationship to the research question. Following that, I discuss the national study in its entirety (i.e., demographics, setting, data collection, results, data analysis, and relationship to the research question). The chapter concludes with the triangulation analysis and relationship to the mixed methods research question. Due to the complexity of this study and the multiple sets of data and data analysis, the headings are labeled with “expert panel review,” “pilot,” and “national study” preceding the respective section (e.g., Expert Panel Review: Demographics, Pilot: Demographics). The chapter concludes with an overall summary of all aspects of the study (i.e., expert panel, pilot, and main study).

Expert Panel Review

An expert panel review was completed in order to ensure adequate wording, verify skill set importance, and establish content validity of the survey questions for the national study. The expert panel was provided with eight questions within six skill sets. Those questions with a score of 0.75 or top scoring were retained and utilized in the pilot and national study. Refer to Appendix L for specific scores for each question item.

Expert Panel Review: Demographics

The expert panel review ran a total of five months beginning May 2015 and ending September 2015. The KCT-TMV knowledge and skills assessment was provided to a group of medical practitioners including intensivists, otolaryngologists, pulmonologists, and neonatologists for review. Seven intensivists, 20 otolaryngologists, seven pulmonologists, and two neonatologists were requested to participate in the expert panel review for 36 possible participants. The demographic and KCT-TMV survey was hand delivered to the various doctors' offices for review and feedback. Of the 36 surveys, six surveys were completed (three otolaryngologists, two pulmonologists, one neonatologist/intensivist) and returned via mail. All of the participants held a medical degree and five of the six participants were male. Ages of the participants ranged from 31-60 years with three of the six participants aged 51-60. The participants included a diverse number of years in practice ranging from 6-26 years or more with an equal distribution of younger practicing physicians (e.g., 6-15 years) and advanced years of experience (e.g., 21- 26 or more). Four of the physicians worked 1-10 hours per week with the tracheostomized and or mechanically ventilated population, while the remaining two reported 21-30 hours per week. The participants indicated treating patients in acute care, subacute rehabilitation centers, and outpatient settings, with the greatest frequency in acute care. Three of the six participants reported treating across the life span (i.e., neonatal through geriatric), while two of the participants reported treating only adult to geriatric.

The six skill set areas of the KCT-TMV included anatomy and physiology of the respiratory system, cardiopulmonary and MV terminology, lab values, tracheostomy and MV equipment, disease and acute illness, and psychological aspects. Participants were requested to rate various statements on a Likert scale ranging from “not important to important” as well as an overall task value rating of the skill set (e.g., in the diagnosis and treatment of tracheostomized or MV patient populations, the understanding of cardiopulmonary and MV terminology is: not important at all, somewhat important, absolutely important). Some of the participants added additional comments related to the stimulus statements, which did influence the decision related to the use of the stimulus question in the subsequent KCT-TMV surveys. A detailed display of the participant feedback is noted in Appendix L.

In skill set one, anatomy and physiology of the respiratory and cardiac systems, only one of the eight questions scored above 0.75. Two questions scored 0.50; however, per the review feedback, one of those had questionable wording. Therefore, the remaining three questions used in the KCT-TMV scored a 0.5 (no wording challenge), 0.33, and 0.33 respectively.

Skill set two comprised stimulus related to cardiopulmonary and MV terminology. Of the eight questions, four questions scored 0.83, three with 0.67, and one with 0.60. Experts indicated wording challenges in three of the eight questions that held scores of 0.60 and 0.67. Therefore, the four stimulus items retained included the nonchallenged three 0.83 scored questions and one unchallenged 0.67 question.

Skill set three involved lab values. The results indicated that only one question met the 0.75 criteria; however, three additional questions scored at 0.67, and one scored at 0.50. I made the determination to eliminate the question with 0.67 score and utilize the 0.50 question based on the practical application, the intricate chemistry of patient comorbidities, my clinical experience, and clinical discussions with physicians in clinical practice. In addition, the experts indicated the question with the 0.50 score had a greater importance than the question with the 0.67 score.

In skill set four, tracheostomy and ventilator equipment, the experts unanimously agreed with three of the eight questions with a resultant score of 1.0, four questions scored 0.83, and one question scored 0.67. Therefore, seven of the eight questions scored above the criteria for inclusion (0.75); however, final determination of stimulus inclusion was based on quality of stimulus wording as indicated by expert written feedback and my clinical discretion.

Disease and acute illness composed skill set five. Of the eight stimulus questions, several experts did not respond to four of the questions resulting in scores ranging from 0.0 – 0.66. The lack of responses influenced the decision not to retain the question in the KCT-TMV. Therefore, the questions retained for the KCT-TMV were determined by inclusion criteria, rating of importance, consistency in the literature supporting evidence-based practice standards, and my clinical discretion.

The skill set six involved psychological aspects of tracheostomy and or MV. In this skill set, four comments were made indicating the experts' lack of knowledge regarding the psychological aspects of health in this patient population. Scores ranged from 0.20 -0.83 despite the comments of not truly knowing psychological aspects. Of the eight questions, one met the inclusion criteria (i.e., 0.75) at a score of 0.83, one at 0.67, and two at 0.40. The decision of question inclusion for the KCT-TMV was based on inclusion criteria, experts questioning wording, reports of the experts' general knowledge of this skill set, and my clinical and professional knowledge in this area.

Based on the results of the expert panel Likert responses, free texted comments, and my knowledge of speech pathology, four statements within each skill set were retained for the KCT-TMV. These statements were used as foundations to the dichotomous format of the KCT-TMV stimulus in which the pilot participants will respond with one of three options: “agree,” “disagree,” or “I do not know.”

The task value rating was inconsistently completed. Table 8 indicates results based on the task value-rating question. The number indicated in the chart reflects the number of experts who marked the respective level of importance.

Table 8

Expert Panel Review of Importance

Task	No response	Not important	Somewhat important	Absolutely important	N
Skill set 1: Anatomy and physiology of the respiratory and cardiac systems	n = 1 (17%)		n = 1 (17%)	n = 4 (66%)	6
Skill set 2: Cardiopulmonary and mechanical ventilation terminology	n = 3 (50%)		n = 1 (17%)	n = 2 (33%)	6
Skill set 3: Lab Values	n = 2 (33%)		n = 1 (17%)	n = 3 (50%)	6
Skill set 4: tracheostomy and ventilator equipment	n = 2 (33%)			n = 4 (66%)	6
Skill set 5 Disease and Acute Illness	n = 2 (33%)			n = 4 (66%)	6
Skill set 6: Psychological aspects	n = 2 (33%)		n = 1 (17%)	n = 3 (50%)	6

While inconsistent responses from the expert participants are reflected in the data, of the responses obtained, it was overwhelming that all six skill sets were identified as important in the diagnosis and treatment of the tracheostomized and MV populations. Therefore, all six skill sets were retained for the KCT-TMV.

Expert Panel Review: Conclusion

The data collected from the expert panel indicated diversity in skills and knowledge across medical practitioners, which coincides with the findings in the literature review. In addition, it was apparent that specialists (e.g., pulmonologists) referred to other specialists (e.g., otolaryngologists) on specific skill areas and maintained expertise in their respective area of study. Lastly, the experts' hand written comments and rating of importance related to psychological factors of the tracheostomized and or MV patient population indicated a lack of insight and consideration. The physicians wrote comments such as "I don't know" and "maybe" on four of the eight questions (50%), however three of four experts (75%) indicated that the understanding of psychological aspects of the tracheostomized and or MV patient population is "absolutely important."

Pilot Study

The pilot study was conducted to determine the validity and reliability of the KCT-TMV for speech-language pathologists in the United States. The research question was:

> RQ1, quantitative: To what degree does the type and amount of tracheostomized and MV training differ for expert versus. SLP versus. student (independent variable) and real knowledge (dependent variable) as measured by a dichotomous skills assessment?

The pilot study ran from October 28, 2015 to May 4, 2016 with multiple requests for flier dissemination in my local area consisting of two healthcare organizations, two universities, and several physician offices. Four recruitment announcements (the initial and three repeated requests) were sent to each stakeholder and various physician offices associated with the stakeholders medical healthcare entities.

Pilot Study: Setting

The pilot was completed online through Survey Monkey at any location in which the participant had internet access. Of the 46 surveys submitted, eight participants did not complete the survey in its entirety and therefore were not included in the data analyses. The survey was designed to allow each computer (identified via technical identifier) to be used once. If a participant completed the survey on a specific device, additional potential participants would not be allowed to participate in the study based on the technological (i.e., computer) identifier.

Pilot Study: Demographics

The raw pilot sample data contained 46 participants; 13 (34.2%) experts, 16 (42.1%) SLPs, and 8 (21.1%) students. Upon review of the raw data, one participant did not respond to demographic stimuli that aided in grouping by inclusion criteria for expert, SLP, or student and seven participants did not complete the study in its entirety therefore, these participants were removed from the data set. This resulted in a total participant sample size of 38.

Initially, the pilot was intended to examine the groups by students, practicing SLPs, and experts (defined as otolaryngologists, pulmonologists, intensivists, critical care nurse, advance practice nurse) and complete a one-way analysis of variance. However, upon analysis of the data, grouping the participants by these terms did not clearly indicate exposure or training to the tracheostomized or MV group or setting in which they worked. Therefore, analysis was completed assessing the impact of training on knowledge. A Chi-Square test of independence with continuity correction indicated a clear and significant association between those participating in professional training in tracheostomy and MV and those who do not, x^2 (1, n = 37) = 5.46, p = .019, eta squared = .45. The difference in the mean scores between the groups was quite large (Cohen, 1988). Therefore, the data was recoded and analyzed with the term "expert" to define those with tracheostomy and MV training and "non-expert" for those participants with no training. Therefore, the research question was modified to reflect this decision.

> RQ2, quantitative: To what degree does the amount of tracheostomy and MV training differ for expert versus nonexpert (independent variable) and real knowledge (dependent variable) as measured by a dichotomous skills assessment?

Demographics for the sample of "expert" vs "non-expert" indicated 13 (34.2%) were experts and 25 (65.8%) were non-experts. Participants were from the continental United States. Age of the participants included 21-30 (n =11, 28.9%), 31-40 (n =10; 26.3%), 41-50 (n =9; 23.7%), 51-60 (n =7, 18.4%) and 61 and above (n =1, 2.6%) with all participants being female (n =38, 100%).

The participants all had higher education with 14 completing bachelors, 16 completing masters, 3 completing doctoral level degrees, and 5 indicating "nursing degree" or advanced practice nurse degree. Of the participants, 20 (52.6%) reported having no contact and 18 (47.4%) reported some contact with tracheostomy or MV patients during an average work week. Of those with some contact, 11 (28.9%) had 1-10 hours, 0 (0%) had 11-20 hours, 4 (10.5%) had 21-30 hours and three (7.9%) had 40 hours per week of direct contact with tracheostomy or MV patient populations. Many participants worked in multiple settings (Table 9) and across multiple groups the life span (Table 10).

Table 9

Pilot Settings

Setting	n (%)	Expert (%)	Non-Expert (%)
Acute Hospital	22 (48%)	12 (55%)	10 (31%)
Acute Rehabilitation	5 (11%)	0 (0%)	5 (16%)
Long Term Acute Care Hospital	0 (0%)	0 (0%)	0 (0%)
Subacute Rehabilitation	1 (2%)	0 (0%)	1 (3%)
Outpatient	5 (11%)	1 (20%)	4 (13%)
School	2 (4%)	0 (0%)	2 (6%)
Home Health	1 (2%)	0 (0%)	1 (3%)
Academic/University	3 (7%)	0 (0%)	3 (9%)
Other	7 (15%)	1 (14%)	6 (19%)
Total	46 (100 %)	14 (100%)	32 (100%)

Note. N =38

Table 10

Pilot Population Served

Age served	n (%)	Expert	Non-expert
Neonatal	0 (0%)	0 (0%)	0 (0%)
Pediatric (ages 0-3)	2 (5.3%)	1 (50%)	1 (50%)
Adolescent (ages 3.1-18)	7 (18.4%)	1 (14%)	6 (86%)
Adult (18.1-64)	26 (68.4%)	12 (46%)	14 (54%)
Geriatric (>64)	23 (60.5%)	10 (43%)	13 (37%)
Total	58 (100%)	24 (100%)	34 (100%)

Note. $N = 58$

Pilot Study: Data Collection

The recruitment announcements originated on October 28, 2015 to the stakeholders (e.g., physician offices, healthcare organizations, and universities) followed by three reminders (Nov, Feb, March). Due to a lack of response, multiple change of procedure requests were implemented in efforts to increase participants. The changes of procedures are listed in Appendix K. On March 26, 2016, social media was employed including reminder announcements and direct messaging through April 20, 2016. Recruitment emails and postings included invitations to participate and requests for snowball recruitment. In addition to including social media, direct emails to members of my business email list were sent on March 26, 2016. The email blast requested prior mentees of my tracheostomy and MV training to not to participate in the study, but rather pass along the recruitment announcement to other potential participants.

The pilot and national study sequence was modified from sequential to concurrent on Jan 4, 2016 due to the lack of participant involvement and the preliminary data showing trends in the correct hypothesized direction. Reminders were posted to the national websites and social media formats in January, February, and March 2016. All data was recorded via Survey Monkey, downloaded to SPSS v21, saved on external data flash drives, and secured in my home.

Pilot Study: Data Analysis

The duration of time required to complete the survey by each participant additionally assessed. Individual response times were recorded via Survey Monkey, assessed in Excel, and verified via hand calculations. Those participants who withdrew or terminated the survey were not included in the study data. The survey duration ranged from 5.30-58.11 minutes (*M* = 12.65). The duration of 58.11 minutes was an outlier and suggested the participant may have looked up answers or utilized resources. In removing this outlier, the duration range was 5.03- 36.51 minutes (*M* = 11.27).

Participants for whom the data was incomplete or unclear were individually analyzed for inconsistencies or for responses given in narrative aspects (e.g., “other” responses) of the survey tool. In cases where demographics were narratively provided rather than selected from the multiple-choice options, the data was examined, coded according to the multiple-choice options, and entered by hand into SPSS v21. In cases where the participant did not complete the survey or the responses were unclear, the participant was removed from the data set resulting in a removal of eight participants (N= 38).

Knowledge and training of tracheostomy and MV was investigated using Pearson product correlation coefficient. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. There was a strong positive correlation between the level of terminology knowledge score and training, $r = .573$, $n = 37$, $p < .0001$; lab value knowledge score and training, $r = .706$, $n = 37$, $p < .0001$, and psychological knowledge score and training, $r = .336$, $n = 36$, $p < .045$. Based on this analysis, there is a high level of confidence in the results indicating that as training in tracheostomy and MV increased, so did knowledge. More importantly, the level of shared variance or coefficient of determination (Table 11) and sample size warrant attention. Ultimately, the key factor in determining expert or not was the presence of training.

Table 11

Coefficient of Determination

Skill Set / Knowledge	n	Pearson Correlation	Shared Variance
Anatomy and Physiology	35	-0.068	0.4%
Knowledge			
Terminology	37	0.573 **	33%
Lab Values	37	0.706**	50%
Equipment	37	0.152	2%
Disease	37	0.277	8%
Psychological factors	36	0.336 *	11%

Note. ** significant at $p < .01$, * significant at $p < .05$

Pilot Study: Results

The validation study of the Knowledge and Confidence Test for SLPs (KCT-TMV) proposed the following research question:

RQ1, quantitative: To what degree does the amount of tracheostomy and MV training differ for expert versus nonexpert (independent variable) and real knowledge (dependent variable) as measured by a dichotomous skills assessment?

As previously stated, a Chi-Square test of independence with continuity correction indicated a clear and significant association between those participating in professional training in tracheostomy and MV and those who do not, x^2 (1, *n* = 37) = 5.46, *p* = .019, eta squared = .45. The difference in the mean scores between the groups was large (Cohen, 1988). In addition, a Chi-Squared test of independence indicated a significant association between those having direct hours per week with the tracheostomized and or MV populations and those without any direct contact, x^2 (1, n= 38) = 13.38, *p* = .0001, eta = .649. The difference in the mean scores between the groups was large (Cohen, 1988). This continues to support the concept that "training" under the guidance of other trained professionals will aid knowledge in specific skills sets.

After regrouping to those with professional training (i.e., expert) compared to those without professional training (i.e., nonexpert), an independent samples *t*test was conducted to compare the knowledge of expert compared to nonexpert across all six-skill sets. There was a significant difference in scores for four of the six skills sets. In the anatomy and physiology skill set, experts (*M* = 6.27, *SD* = 1.10) did not score differently than non-expert (*M* = 6.26, *SD* =.98; *t* (36) = .037, *ns*). The magnitude of the difference in the means (means difference = .013, 95% *CI*) was small (eta squared .000). Due to the lack of difference between experts and nonexperts, the data was examined to determine if the participants responses would be different than chance through an one-sample *t*test. There was statistical significance in scores of participants (M = 6.256, SD = .992) and chance (M = 4.0, SD = 0; t (38) = 14.19, p = .000 one tailed). The magnitude of the differences in the means = 2.256, 95% *CI*: 1.934 to 2.598. Considering that anatomy and physiology is foundational to other skill sets, input from the expert panel indicated importance, and the participant responses were better than chance, the anatomy and physiology skills stimuli were retained in the main study and used in the data analyses. However, given the lack of difference between the experts and nonexperts, the results are interpreted with caution.

In addition, experts (M = 6.69, SD = .48) did not score differently than nonexpert in regards to psychological factors (M = 6.17, SD =.1.14; t (34) = 1.936, ns). The magnitude of the difference in the means (means difference = .518, 95% *CI*) was moderate (eta squared .099). Further statistical analyses were conducted to assess if psychological skill set participant responses were different than chance. A one-sample *t*test was completed. There was statistical significance in scores of participants (M = 6.35, SD = .949) and chance (M = 4.0, SD = 0; t (36) = 15.069, p = .000 one tailed). The magnitude of the differences in the means = 2.35, 95% *CI*: 2.0349 to 2.6678. Based on the evidence from the expert panel, the reported lack of psychological knowledge from the experts, and statistical findings, the psychological skills set was retained in the main study and utilized in the data analyses. However, results are interpreted with caution.

The remaining four skill sets demonstrated statistical significance. In the terminology skill set, experts (*M* = 6.23, *SD* = .599) scored higher than nonexperts (*M* = 5.12, *SD* = 1.01; *t* (36) = 3.623, *p* = .001, two-tailed; equal variance assumed). The magnitude of the difference in the means (means difference = 1.11, 95% *CI*) was large (eta squared .267). In the lab value skill set, experts (*M* = 7.38, *SD* = .65) scored higher than nonexperts (*M* = 5.0, *SD* = 1.5; *t* (35.271) = 6.812, *p* = .000, two-tailed; equal variances not assumed). The magnitude of the difference in the means (means difference = 2.38, 95% *CI*) was large (eta squared .5631). In the equipment skill set, experts (*M* = 6.384, *SD* = .767) scored higher than nonexpert (*M* = 5.64, *SD* = 1.15; *t* (36) = 2.097, *p* = .043, two-tailed; equal variances assumed). The magnitude of the difference in the means (means difference = .744, 95% *CI*) was moderate (eta squared .108). In the disease skill set, nonexpert (*M* = 6.76, *SD* = .926) scored higher than experts (*M* = 6.615, *SD* = 1.445; *t* (36) = 3.62, *p* = .001, two-tailed; equal variances assumed). The magnitude of the difference in the means (means difference = -1.249, 95% *CI*) was large (eta squared .2675).

In summary, the statistical results indicate that four of the six skill sets (e.g., terminology, lab values, equipment, and disease) showed a difference in knowledge between an expert and a non-expert. These results validate the KCT-TMV test tool for four skill sets and demonstrate that the amount of tracheostomized and MV knowledge does differ for expert vs. nonexpert based on amount of training. The anatomy and physiology skill set and the psychological factors skill set showed no statistical significance in the pilot and was questionable in the expert panel. However, recognizing that anatomy and physiology is foundational to more complex knowledge and skills, considerations for redevelopment of stimulus items and skill set inclusion in future versions of the KCT-TMV is warranted. In addition, future study of expert training in the area of psychology warrants consideration.

Pilot Study: Evidence of Trustworthiness

Consideration was placed on ensuring credibility, transferability, dependability, and confirmability in the pilot study. Procedures were designed and implemented for recruitment through regional stakeholders and professional social media sites ensuring participants would meet inclusion criteria.

In efforts to ensure each participant would meet inclusion criteria and that participants were students, SLPs, or experts, specific demographic questions were used including degree earned and profession to ensure adequate group classification for each participant. The data was reviewed in SPSS and checked to consistency and credibility. The inclusion criteria were clearly stated on recruitment fliers and within the online survey consent form to ensure participants were notified and meeting the criteria.

In efforts to ensure each participant would complete the survey only once, the online Survey Monkey survey system was designed to identify each computer via technical identifier and limit each computer to a one-time connection to the survey. This was established in efforts to limit multiple attempts and reduce learning of the stimulus or knowledge of the questions.

All data was emailed and reviewed by my chair, Dr. Lee Stadtlander, to assess for accuracy and consistency. All materials were recorded and reviewed by Dr. Stadtlander to ensure confirmability of data and results.

Main Study

Ads for the main study went live on the ASHA website on Jan 4, 2016 in the following special interest groups (SIGs): 2: Neurophysiology and Neurogenic Speech and Language Disorders, 10: Issues in Higher Education, 13: Swallowing and Swallowing Disorders (Dysphagia), 15: Gerontology, SLP Healthcare, and Research reaching a total of 26,148 ASHA members. Reminders for study participation were posted to the above stated SIGs February 5, 2016, and March 26, 2016. Due to the lack of participants, a change of procedures dated Jan 5, 2016 was submitted requesting IRB permission for allowing members of ASHA's special interest groups originally contacted for recruitment to pass along the survey link to other speech language pathologists in the United States in efforts to diversify the population sample. Approval for this change was received on January 20, 2016. In addition, on March 12, 2016 a charge of request was submitted in efforts to utilize social media, snowball recruitment, and additional online ASHA communities. Approval for this change was received on March 25, 2016. The study was closed on May 4, 2016 with 236 participants.

The main study research questions included the following:

RQ2, quantitative: To what degree does the type and amount of tracheostomy and MV training for SLPs as measured by demographics (independent variable) influence self-efficacy (i.e., confidence; dependent variable), real knowledge (dependent variable), and task value (dependent value) as measured by the new skills assessment, KCT-TMV?

$H_0$2: The type and amount of tracheostomy and MV training for SLPs has no influence on self-efficacy, perceived skills sets, and real knowledge.

H_a2: The type and amount of tracheostomy and MV training for SLPs has an influence on self-efficacy, perceived skills sets, and real knowledge.

RQ3, qualitative: What factors do SLPs perceive to influence the obtainment of specific training for tracheostomized and mechanically ventilated population?

RQ4, mixed methods: How do self-efficacy, confidence, qualitative factors reported to influence training, and real knowledge, as measured by a demographic survey and the KCT-TMV, a validated real knowledge questionnaire, relate?

Main Study: Setting

The setting of this study was at any location in which the participant had access to an online system. If a participant completed the study at their place of employment, time constraints (e.g., work breaks or lunch breaks) may have influenced ability to complete the survey requiring “drop out” or participants may have skipped questions or guessed in efforts to complete the study.

Main Study: Demographics

The participant sample of the national study included 231 participants. Geographical representation included the Southeast (n = 47, 20.3%), Southwest (*n* = 58, 25.1%), Northeast (*n* = 102, 44.2%), and the Northwest (*n* = 24, 10.4%) quadrant of the country. Age of the participants included 21-30 (*n* = 62, 26.8%), 31-40 (*n* = 65; 28.1%), 41-50 (*n* = 56; 24.2%), 51-60 (*n* = 34, 14.7%) and 61 and above (*n* = 13, 5.6%) with predominantly female participants; 219 (94.8%) female and male 12 (5.2%).

The participants all had higher education. Table 12 indicates the distribution by degree. Upon data review, two participants did not indicate their degree; therefore, they are reflected under missing response.

Table 12

Main Study: Highest Degree Earned

Setting	n	%
Master of Arts	82	35
Master of Science	134	58
Doctorate	11	6
Missing response	2	1
Totals	229	100

Note. N =229

The number of years in clinical practice ranged from zero to 26 or more. More than half of the participants had been in clinical practice for 10 years or less; 0- 5 years (*n* = 73; 31.6%), 6 – 10 years (*n* = 47; 20.3%), 11 -15 years (*n* = 24; 10.4%), 16 - 20 years (*n* = 27, 11.7%), 21 – 25 years (*n* = 26; 11.3%), and 26 or more years (*n* = 33, 14.3%). Of the participants, 63(27.3%) reported having no contact with tracheostomized or mechanically ventilated patient populations. Of those with direct patient contact, the numbers of hours per week ranged from minimal (e.g., 1 hour) to full time (e.g., 40 hours per week). See Table 13.

Table 13:

Main Study: Hours Per Week With Direct Tracheostomy and or MV Patient Contact

Hours per week	n	%
0	63	27.3
1 – 10	123	53.2
11 – 20	21	9.1
21 – 30	9	3.9
31 – 40	15	6.5
Total	231	100

Note. *N* =231

Many participants worked in multiple settings (Table 14) and across multiple groups across the life span (Table 15).

Table 14

Main Study: Setting

Setting	n	%
Acute Hospital	117	50.6
Acute Rehabilitation	58	25.1
Long Term Acute Care Hospital	40	17.3
Subacute Rehabilitation	53	22.9
Outpatient	61	26.4
School	17	7.4
Home Health	22	9.5
Academic/University	17	7.4
Total	*	*

Note. N =231. * Due to SLPs reporting treating patients in multiple settings, the totals and percentages exceed the total number of participants

Table 15

Main Study: Population Served

Age served	n	%
Neonatal	19	8.2
Pediatric (ages 0-3)	41	17.7
Adolescent (ages 3.1-18)	68	29.4
Adult (18.1-64)	201	87.0
Geriatric (>64)	202	87.4
	*	*

Note. *N* = 231. * Due to SLPS reporting treating patients across the life span, the totals and percentages exceed the total number of participants

For the qualitative aspects of the study, all participants completed the quantitative aspects prior to attempting the qualitative survey. More participants than anticipated completed the qualitative survey. Data was recorded in the same fashion as the quantative data methods in Survey Monkey.

Table 16 reflects the participant sample for each of the respective questions. Many participants did not respond to all of the qualitative questions and therefore the sample sizes are variable across the question stimuli.

Table 16

Main Study Qualitative Survey Participant Sample

Question	N (%)
What motivates you to work with tracheostomy and ventilator patients?	94 (40.7%)
What areas of knowledge do you feel you need to improve to treat tracheostomy and mechanically ventilated patients?	100 (43.3%)
What type of education opportunities are the most appealing to you and why?	95 (41.1%)
What prohibits you from gaining additional education on tracheostomy and mechanical ventilation?	94 (40.7%)
How does your employer support your obtainment of knowledge for tracheostomy and mechanical ventilation management?	95 (41.1%)
How do you define evidence-based practice?	101 (43.7%)
How do you know your knowledge and skills are adequate for treating tracheostomized and mechanically ventilated patients?	96 (41.6%)
What healthcare changes have you noticed that influences your ability to provide evidence-based practice to tracheostomized and mechanically ventilated patients?	116 (50.2%)
What healthcare changes have you noticed that influences your ability to obtain additional education for tracheostomy and mechanical ventilation patients?	123 (53.2%)
What trends, if any, have you noticed concerning tracheostomy and mechanically ventilated patients within the past 1 - 5 years?	117 (50.6%)

Note. % is out of total respondents

Main Study: Data Collection

Data collection for the national study began on January 4, 2016 through the ASHA online community. Additional reminders were posted within the ASHA online community monthly for three months ending on March 26, 2016. Additional participant announcements were completed through social media outlets (e.g., ASHA Facebook page, Linked In, MLBR Seminars & Consulting Email) beginning March 26, 2016 through April 2016.

Main Study: Data Analysis

Participants completed all six of the skill sets of the KCT-TMV in the national online survey due to the concurrent nature of the pilot and national study. Based on the results of the pilot and the determination of a lack of skill set validity, the anatomy and physiology skill set, which did not reach statistical significance, has been removed from the data analysis for the national study. In contrast, the psychological skill set stimuli were retained and analyzed based on the evidence from the expert panel, the lack of reported psychological knowledge from the experts, and statistical findings indicating a difference in scores compared to chance. However, results were interpreted with caution.

In the quantitative aspects of the study, those participants that completed all stimulus items in the KCT-TMV were retained. Participants who dropped out of the study at any point in the survey were not included in the data analysis resulting in a total of 229.

In the scoring of the KCT-TMV, both wrong responses and responses of “I don’t know” were considered incorrect. This determination was made based on the concept if the participant was unsure, then they did not obtain the knowledge necessary to correctly answer the question.

Within the demographic variables, questions related to the presence of formal tracheostomy training and competency and formal MV training and competency program at the SLPs' place of work were coded with "yes," "no," and "I don't know." Those respondents who indicated with "I don't know" were removed and analysis was completed via a t-Test.

Questions related to self-efficacy included a Likert scale in which the participant indicated if the statement /stimuli were accurate as it pertained to their respective feelings of skill. In SPSS (v21), four of the 10 questions related to self-efficacy were reversed to maintain uniformity of direction related to rating. This was consistent with the original survey (Spek et al., 2013). Cronbach's α was used to assess for internal consistency of the self-efficacy stimuli. The KCT-TMV self-efficacy portion had good internal consistency with a Cronbach's alpha coefficient = 0.914 as compared to 0.83 in the original survey (Spek et al., 2013). Data analysis included regressions for each demographic variable, knowledge scores, and ratings of confidence and self-efficacy.

The qualitative data analysis was completed in which themes were identified across all responses obtained for each stimulus/question. In efforts to be consistent with theme identification, rules were established. The rules were if a participant responded with a list, the first item in the list was used to place response in a theme category. If the participant provided a narrative response, the gestalt of the response was utilized to identify the theme category. The themes were then provided with a random number (no value associated with the number assigned) and scored in SPSS.

Finally, correlations and ANOVAs were completed for the mixed methods aspect of the study in which confidence, ratings of self-efficacy and qualitative factors influence training and real knowledge. The following discussion includes the results of the analyses.

Main Study: Results

The demographic variables, the level of knowledge, self-efficacy, and confidence were analyzed via t-tests, analysis of variance (ANOVA), regressions, Chi-square, and correlations. Demographic variables included geography, age, gender, degree, years of clinical practice/experience, direct patient contact hours per week with the tracheostomized and or MV populations, setting, populations served, presence of formal training and competency programs, training in and after graduate school, and types of professional training. Results are as follows.

Demographics and knowledge. Given demographics of geography, age, degree, and years in clinical practice, training during graduate training school, no difference between groups was noted across all six skill sets; anatomy and physiology, terminology, lab values, equipment, disease/illness or psychological knowledge. However, statistical significance was noted in several remaining demographics including gender, hours per week of direct clinical contact with tracheostomized and or MV patients, populations served, setting, and various professional training modalities. The specific statistical results are listed below in text and tables.

Gender. Males (n = 9, M = 4.67, SD = .50) and females (n = 185, M = 5.46, SD = .86) scored differently regarding knowledge of tracheostomy and mechanical ventilation where females scored higher. The mean difference was significant t (10.496) = 4.474, p = .001, two-tailed, d = .09. Due to the small sample of male participants, reliability of this finding is questionable. No statistical difference was found in knowledge skills related to anatomy and physiology, terminology, lab values, disease, and psychological factors.

Hours per week. Groups of hours per week included Group 1: 0 hours, Group 2: 1-10 hours, Group 3: 11-20 hours, Group 4: 21-30 hours, and Group 5: 31-40 hours per week. SLPS working 31-40 hours per week (n = 13, M = 6.769, SD = .599) scored higher on terminology knowledge than SLPs with 1-10 hours per week (n = 109, M = 6.156, SD = .735) with the tracheostomized and or MV population (F (4, 199) = 2.675, p = .033, d = .05). However, in contrast, SLPs with zero hours per week (n= 51, M = 5.686, SD = .905) scored higher than SLPS working 11-20 hours per week (n= 17, M = 4.94, SD = .658) when referring to equipment knowledge (F (4, 194) = 3.460, p = .009, d = .068). No statistical difference was noted between the groups in regards to anatomy and physiology, lab value, disease and illness, and psychological factors given hours per week with the tracheostomized and or MV population.

Further analysis was completed in which participants were grouped by either having direct clinical contact for 1-40 hours per week as compared to SLPs without any direct contact. As shown in Table 17, SLPs with some direct tracheostomy and or MV patient contact (n = 143, M = 5.3357, SD = .838) scored lower in knowledge of equipment as compared to SLPs with no direct contact (n = 51 *M* = 5.686, *SD* = .905) with this population *t* (192) = 2.51, *p* = .013, *d* = .031. No statistical difference was noted between the groups in regards to anatomy and physiology, terminology, lab value, disease and illness, and psychological factors given hours per week with the tracheostomized and or MV population.

Table 17

Main Study: Demographics and Knowledge

	Anatomy & Physiology	Terminology	Lab Values	Equipment	Disease & Illness	Psychological Factors
Gender	-	-	-	*p* = .001	-	-
Hours per week with trach/MV pts	-	*p* = .033	-	*p* = .009	-	-
Yes / No direct clinical contact	-	-	-	*p* = .013	-	-

$p < .05$

Populations served. Of the various populations served including neonatal, pediatric, adolescent, adult, and geriatric; SLPs working with neonatal or geriatric did not score differently in all skill sets as compared to SLPs not working with these populations. However, as referred to in Table 18, statistical significance was noted with SLPs working with pediatrics, adolescents, and adults. SLPs working with pediatric populations (n = 34, *M* = 5.059, *SD* = .8856) scored lower with equipment as compared to those not working with pediatric populations (n = 160, *M* = 5.506, *SD* = .846). The mean difference was significant *t* (192) = 2.776, *p* = .006, two-tailed, equal variances assumed, *d* = .04. Results indicate that SLPs who work with pediatrics have a lesser knowledge of equipment related to tracheostomy and MV. No statistical (ns) difference was found in knowledge skills related to terminology, lab values, disease, and psychological factors.

SLPs working with pediatric populations (n = 35, M = 4.88, SD = .631) scored lower with anatomy and physiology as compared to those not working with pediatric populations (n = 169, M = 5.106, SD = .598). The mean difference was significant t (202) = 1.969, p = .050, two-tailed, equal variances assumed, d = .018. Results indicate that SLPs who work with pediatrics have a lesser knowledge of anatomy and physiology related to tracheostomy and MV. Results are interpreted with caution based on the results of the validation study.

SLPs working with adolescents (n = 59; M = 5.15, SD = .906) scored lower than SLPs not working with adolescents (n = 135; *M* = 5.548, *SD* = .826,) regarding equipment knowledge (*t* (192) = -2.979, *p* = .003, two-tailed, *d* = .044). Results indicate that SLPs who work with adolescents have lesser knowledge of equipment related to tracheostomy and MV. No statistical (ns) difference was found in knowledge skills related to anatomy and physiology, terminology, lab values, disease & illness, and psychological factors.

SLPs not working with adult populations (n= 22; M = 6.00, SD = .00) scored lower than those working with adult populations (n = 171; M = 6.099, SD = .468) regarding knowledge of lab values (*t* (170) = 2.775, *p* = .006; two-tailed, *d* = .04). Results indicate that SLPs who work with adults have greater knowledge of lab values related to tracheostomy and MV. No statistical (ns) difference was found in knowledge skills related to anatomy and physiology, terminology, equipment, disease and illness, and psychological factors.

Table 18

Population served and Knowledge

	Anatomy & physiology	Terminology	Lab values	Equipment	Disease & illness	Psycho-logical factors
Neonatal	-	-	-	-	-	-
Pediatric	*p* = .050	-	-	*p* = .006	-	-
Adolescent	-	-	-	*p* = .003	-	-
Adult	-	-	*p* = .006	-	-	-
Geriatric	-	-	-	-	-	-

Note. *p* = <.05

Clinical settings. Clinical settings included acute care, acute rehabilitation, long-term acute care hospital (LTACH), outpatient (OP), subacute nursing facility (SNF), home health (HH), schools, and academia/universities. Of these various settings, no statistical significance was found for SLPs working in HH and Academic settings across all five-skill sets; however, as referenced in Table 19, statistical significance was noted for acute care, acute rehabilitation, LTACH, OP, SNF, and schools. SLPs working in acute care (n = 92, *M* = 6.60, *SD* = .826) had a higher score than those not working in acute care (n = 95, *M* = 6.3684, *SD* = .745) in knowledge related to psychological factors. The mean difference was significant *t* (185) = -1.996, *p* = .047, two-tailed, *d* = .021. No statistical difference was found in knowledge skills related to anatomy and physiology, terminology, lab values, equipment, and disease.

SLPs working in acute rehab (n = 48, M = 5.1875, SD = .8667) scored lower on equipment knowledge as compared to those not working in acute rehabilitation (n = 146, M = 5.5068, SD = .856) settings. The mean difference was significant; t (192) = 2.233, p = .027, two-tailed, d = .03. No statistical difference was found in knowledge skills related to anatomy and physiology, terminology, lab values, disease, and psychological factors.

SLPs working in a LTACH (n = 34, M = 6.50, SD = .663) had a better score on terminology knowledge as compared to those not working in LTACHs (n = 165, M = 6.20, SD = .74). The mean difference was significant t (197) = -2.183, p = .03, d = .024. No statistical (ns) difference as found in knowledge skills related to anatomy and physiology, lab values, equipment, disease, and psychological factors.

SLPs working in outpatient settings (n = 54, M = 6.43, SD = .74) had a better score in terminology knowledge than those not working in outpatient settings (n = 145, M = 6.19, SD = .73). The mean difference was significant t (197) = -2.058, p = .041, two-tailed, d = .021. No statistical (ns) difference was found in knowledge skills related to anatomy and physiology, lab values, equipment, disease, and psychological factors.

SLPs working in subacute nursing facilities (n = 41, M = 6.1951, SD = .7148) had a lower score related to knowledge of psychological factors as compared to SLPs not working in subacute centers (n = 146, M = 6.56, SD = .796). The mean difference was significant t (185) = 2.661, p = .008, two-tailed, d = .04. In addition, SLPs working subacute nursing facilities (n= 45, M = 4.866, SD = .457) had a lower score related to knowledge of anatomy and physiology as compared to SLPs not working in subacute centers (n = 159, M = 5.125, SD = .633). The mean difference was significant t (202) = 2.558, p = .011, two-tailed, d = .06. Results are interpreted with caution based on the results of the validation study as well as the chi-square analyses of anatomy and physiology knowledge and chance. No statistical difference was found in knowledge skills related to terminology, lab values, equipment, and disease.

SLPs working in the school (n = 14, *M* =6.0, *SD* = .00) scored lower than those not in school (n = 180, *M* = 6.09, *SD* = .46). The means difference was significant *t* (179) = 2.772, *p* = .006, two-tailed; equal variances not assumed, *d* = .04. No statistical (ns) difference was found in knowledge skills related to anatomy and physiology, terminology, equipment, disease, and psychological factors.

Table 19

Setting and Knowledge

	Anatomy & physiology	Terminology	Lab values	Equipment	Disease & illness	Psycho-logical factors
Acute care	-	-	-	-	-	*p* = .047
Acute rehabilitation	-	-	-	*p* = .027	-	-
Long term acute care hospital (LTACH)	-	*p* = .03	-	-	-	-
Outpatient (OP)	-	*p* = .041	-	-	-	-
Subacute nursing facility (SNF)	*p* = .011	-	-	-	-	*p* = .008
Home health (HH)	-	-	-	-	-	-
School	-	-	*p* = .006	-	-	-
Academic	-	-	-	-	-	-

Note. p < .05

Types of professional training. Professional training can occur through many modalities. The question was posed to participants to respond to the types of training in which they participate, in efforts to advance their knowledge and skills. Analysis included the following professional advancement methods in areas specific to tracheostomy and MV: Multidisciplinary forums/in-services at the respective work place, speech language pathology only forums/in-services at the work place, ASHA sponsored courses, non-ASHA sponsored courses, SIGs, teleconferences/webinars, self-directed learning with peer support, or member of a critical care delivery group. In addition, analyses incorporated those participants who did not participate in professional skill advancement in the tracheostomy and MV populations. No significance was noted in speech pathology only forums / in-services at the work place, ASHA sponsored courses, SIGs, teleconferences, and those who are not currently participating in training for the tracheostomy and or MV populations.

As shown to in Table 20, SLPs who reported no involvement in multidisciplinary forums (n = 105, M = 5.15, SD = .533) scored higher than those SLPs who indicated involvement with multidisciplinary training (n = 99, M = 4.97, SD = .669) in skills related to anatomy and physiology (t (202) = 2.042, p = .042, two-tailed; d = .020). Results are interpreted with caution based on the results of the validation study as well as the analyses associated with knowledge of anatomy and physiology related to chance. However, they did not score differently across terminology, lab values, equipment, disease and illness, and psychological factors.

Statistical difference was noted in non-ASHA sponsored trainings, self-directed training, and training through a critical care delivery group. SLPs who reported no involvement in non-ASHA sponsored CE courses (n = 133, M =6.259, SD = .757) scored higher than those SLPs who indicated training in non-ASHA sponsored trainings (n = 54, M = 6.57, SD = .791) in skills related to psychological factors (t (185) = 2.476, p = .014, two-tailed; d = .032). However, they did not score differently across anatomy and physiology, terminology, lab values, equipment, and disease and illness.

SLPs who reported no self-directed training (n = 58, *M* = 6.4138, *SD* = .6222) scored higher than those SLPs who completed self-directed training (n = 141, *M* = 6.184, *SD* = .770) in skills related to terminology (*t* (197) = 2.012, *p* = .046, two-tailed; *d* = .02). However, they did not score differently across anatomy and physiology, lab values, disease and illness, and psychological factors. In addition, SLPs involved in self-directed training (n = 143, *M* = 5.125, *SD* = .648) scored higher than SLPs not participating in self-directed training (n = 61, *M* = 4.93, *SD* = .478) in skills related to anatomy and physiology of tracheostomy and MV (*t* (151.56) = -2.34, *p* = .021, two-tailed; *d* = .026). Results related to anatomy and physiology are interpreted with caution based on the results of the validation study as well as the analyses associated with knowledge of anatomy and physiology related to chance.

SLPs who were not involved in a critical care (CC) delivery group (n = 158, *M* = 5.50, *SD* = .857) scored higher as compared to SLPs who were involved with a CCU delivery group (n = 36, *M* = 5.111, *SD* = .854) in skills related to equipment (*t* (52.30) = 2.463, *p* = .017, two-tailed, *d* = .03). In addition, those involved in the CC care delivery group (n = 38, *M* = 5.26, *SD* = .644) scored higher as compared to those not involved in a critical care delivery group (n = 166, *M* = 5.02, *SD* = .592) in skills related to anatomy and physiology (*t* (52.258) = -2.093, *p* = .041, two-tailed, *d* = .023. These results indicate those SLPs who participate in critical care delivery groups score better in skills related to equipment and anatomy and physiology of tracheostomy and MV patient populations. However, results related to anatomy and physiology are interpreted with caution based on the results of the validation study as well as the analyses associated with knowledge of anatomy and physiology related to chance. No statistical difference was noted in terminology, lab value, disease and illness, and psychological factor knowledge.

Table 20

Main Study: Professional Training and Knowledge

	Anatomy & physiology	Terminology	Lab values	Equipment	Disease & illness	Psychological factors
Multi-disciplinary forums/in-services at my work	*p = .042*	-	-	-	-	-
Speech pathology only forums/in-services	-	-	-	-	-	-
ASHA sponsored	-	-	-	-	-	-
Non- ASHA sponsored	-	-	-	-	-	p = .014
SIG	-	-	-	-	-	-
Tele-conference	-	-	-	-	-	-
Self-Directed	*p = .021*	p = .046	-	-	-	-
CC delivery group	*p = .041*	-	-	p = .015	-	-
Not participating	-	-	-	-	-	-

$p < .05$

Self-efficacy and professional training. A multiple linear regression was calculated to predict self-efficacy based on involvement in one of eight professional training modalities. As shown in Table 21, multidisciplinary in-services at work, participation in teleconferences, and training with a critical care delivery group were significant predictors of self-efficacy; *F* (8, 173) = 12.715, $p < .0001$), with an R^2 of .370. Participants' predicted self-efficacy is equal to .241 for critical care delivery group training, .215 multidisciplinary in-services at work, and .202 for teleconferences. The explanation of variance was 5% critical care delivery group training, for 4% for multidisciplinary in-services at work, and 3% for participation in teleconferences.

Table 21

Main Study: Self-Efficacy and Professional Training Modalities

Professional training modalities	Significance	Percentage of variance
Multidisciplinary in-services at work	$p = .002$	4%
Speech Pathology only in-services at work	ns	-
ASHA sponsored	ns	-
Non-ASHA sponsored	ns	-
SIG	ns	-
Teleconference	$p = .003$	3%
Self-Directed	ns	-
Critical Care Delivery Group	$p = .000$	5%

Note. $p < .05$

Task value rating, confidence, and knowledge across skill sets. Participants provided a self-rating of importance and knowledge skill confidence across the various skill sets (i.e., anatomy and physiology, terminology, lab values, equipment, disease and illness, and psychological factors) as it relates to the treatment and management of the tracheostomized and or MV populations. No statistical significance was noted for task value or self-reported level of confidence in any of the skills sets.

Main Study: Qualitative Data Results

Participants were asked open-ended questions and allowed to freely type in their responses. In the following pages, the specific questions, themes, sample size, percentages, a description of themes, and examples of participant responses are provided.

Motivation. The question "What motivates you to work with tracheotomy and ventilator patients?" was posed. Results of responses are as listed in Table 22.

Table 22

Main Study: Qualitative: Motivation

Theme	n	Percentage
Quality of Life (QoL)	40	30.3%
SLP desire for challenging and interesting work	39	29.5%
SLP job responsibility	17	12.9%
Patients' needs	11	8.3%
Team collaboration & professional learning opportunity	11	8.3%
NA – Participant indicated that they are currently not working with this population	10	7.6%
Forced to work with this patient population	4	3.0%
Totals	N = 132	100%

Participants defined or referred to QoL as facilitating communication, speech, or swallowing, reducing anxiety, and overall patient care outcomes/survival. Examples of such responses include "The ability to help [pateints] restore swallowing function and verbal communication," "To be able to provide an improved quality of life in regards to communication and dysphagia management in this patient population," and "Ability to provide a voice for my patients so they can communicate."

The theme of patients' needs included statements reflecting a level of medical need such as "I don't have any special motivation. They are patients just like anyone else who has a communication or swallowing disorder" and "They need treatment just like any other type of patient."

The theme of "forced" referred to indications of demand from the employer or medical entity for the SLP to evaluate and or treat this patient population. Examples of such statements included "only do it if forced to," and "It's not really an interest-I see the patients when I have to."

Team collaboration and professional learning included responses that indicated team involvement, growth in learning, and desire for professional development. Examples of such responses included "Gaining medical knowledge, working with the team," and "The inspire me to learn. I love to interact with the patients and the medical team." Statements indicating desire, enjoyment, and challenge defined the theme of "SLP desire for challenging and interesting work." Examples of these statements included "I enjoy working in an environment that involves constant critical thinking. I find it rewarding to assist in the restoration of communication/swallowing in what may be considered ""difficult"" cases," "I enjoy the medically complex patients," and "Technical problem solving, long standing interest in physics and physiology, effects on communication, and swallowing."

The theme of job responsibility was defined by participant responses which included phrasing such as “part of my job” or populations [SLPs] serve. Examples of such comments include “they are part of a comprehensive hospital program,” It's just part of a caseload and it requires a high level of skill,” and “Part of my job. I like the tangible results that often accompany providing speaking calves and getting people back on diets.” Lastly, the theme of NA included responses that indicated the participant did not work with this population, they did not know, or participants indicated limited contact and did not comment directly to the question. Examples of such responses included “I do not feel motivated to do so at this time,” “Do not have these patients in the [SNIF seting],” and “I don't.”

Further analyses of motivation based on participants drive revealed three dominant themes to include patient drive, SLP driven, and forced. Table 23 indicates the breakdown of responses.

Table 23

Main Study: Qualitative: Motivation by Drive

Theme	n	%
SLP driven	67	55%
Patient driven	51	42%
Forced to treat	4	3%
Total	N = 122	100%

Note. * Participants who responded NA were not included in this analysis

Patient driven theme was defined as factors related to quality of life and the patient's needs, while SLP driven motivations included team collaboration, professional learning opportunity, job responsibility, and the SLP desire for challenging and interesting work. Forced remained consistent as those participants who indicated demand from the employer or medical entity to evaluate and or treat this patient population.

Lacking knowledge and areas to improve. The question was "What areas of knowledge do you feel you need to improve to treat tracheostomy and mechanically ventilated patients?" Results are listed in Table 24.

Table 24

Main Study: Qualitative: Lacking Knowledge and Areas to Improve

Theme	n	Percentage
Ventilation / the "vent"	36	27.7%
"Everything"	26	20.0%
Anatomy and physiology	15	11.5%
Lab values	14	10.8%
Treatment methods	10	7.7%
Disease/ disorders	8	6.2%
Equipment and diagnostic instrumentation	6	4.6%
Terminology	3	2.3%
Other (e.g., "none," SLP role, team building, or response did not address the question)	12	11%
Total	N = 130	100%

The themes identified for knowledge areas lacking were clearly indicated by key terms such as ventilation, the vent, lab values, disease, and so on. Examples of the various themed responses are as follows: The vent: “Mechanical ventilation - machine settings and how they work; the respiratory decision making process for progression of settings/extubation/decannulation,” and “Function of vents.” The theme of “everything” was determined by the participant including the word “everything” in their response.

Anatomy and physiology responses included “Physiological,” “Anatomy,” and “More knowledge about the respiratory system from the RTs.” Equipment and diagnostic information included comments such as “The reliability of FEES results vs. MBS,” where “FEES” stands for fiberoptic endoscopic examination of swallowing and “MBS” stands for the modified barium swallow study. Additional comments included “update on new equipment,” and “Basic and more in depth knowledge of different equipment used with [trache] care, differences between acute care and long term care of patient with [trache].”

The theme of lab values included any reference to any lab test or result such as respiratory or blood values. Examples of the responses included “blood gases; critical illnesses,” “lab values and cardiac function,” and “In depth knowledge of labs.” Disease and illness, the sixth theme, was used when the participants response stated “disease or illness” in their response or stated a specific disease (e.g., dysphagia). Some examples of responses included “knowing more about medical diagnoses,” “Dysphagia with trach/vent patients” and “Cardiopulmonary issues.”

Terminology theme included participants stating a desire to learn more "terminology" as represented by statements such as "Medical terminology and education re: cardiopulmonary system," and "Terminology of the equipment itself." The theme of treatment methods included statements related to treatment planning, goals, suctioning, weaning, and problem solving. Examples of such responses include "Approaches to improve Swallowing, positioning," "Being able to suction patient myself," and

> I feel I need more info/training on cases on when and when not to use PMV on a vent patient. I have worked at different hospitals and have found different measures and standards of practice. I would also like more training on really when it is [snd] is not contraindicated to feed on the vent. Supervisors will tell me some SLPs are more liberal, while others more conservative in what they are willing to do. I am still left wondering what is BEST to do."

Lastly, the theme titled "other" was utilized for responses such as "none," SLP role", "team building," or a response did not address the question.

Educational opportunities. Participants were asked to provide their perspective based on "What types of educational opportunities are the most appealing and why?" Responses are listed in Table 25.

Table 25

Main Study: Qualitative: Educational Opportunities

Theme	n	Percentage
Online or webinars	47	35.1%
Live seminars or conferences	30	22.4%
Hands on training	21	15.7%
Peer training, in-services, or on the job training	16	11.9%
Self-study	3	2.2%
“Any”	5	3.7%
Other	12	9.0%
Total	N = 134	100%

The responses for educational opportunities were delineated as hands on, peer training, in services at work, on the job training, live seminars/conferences, online, self-study. The category of “other” included descriptors that could not classified in an educational category such as (e.g., “flexible,” “CEU,” a description of the learning complexity, or “ASHA course”).

The rationale for the educational opportunity was also clearly stated. For example, a large number of participants indicated a desire for online educational opportunities due to limited resources (e.g., time and money for travel or days off work) and convenience (e.g., “online education, time is precious,” “webinars as no need to travel and they are less costly; reading articles”). However in contrast, other participants indicated a desire for live seminars and conferences due to the ability to interact with the presenter or ask questions (e.g., “in-person CEU courses because I tend to retain more information than self-paced online courses” and “Live presentations with hands on opportunities. They allow Q&A, interchange of ideas, hands on experience”).

The participants, who indicated a desire for peer training, in-services, or on the job training, provided various rationales including “direct inservices; hands-on practice” and “education from members of the team I work with like respiratory therapists. That way you also understand their knowledge base in communication and swallowing and can collaborate together.” Additional comments indicated feelings of support with their medical team members to benefit their patients such as

> I have found peer-to-peer education and training the most effective. I have been blessed to [have been] allowed to accompany my total laryngectomy patients to see SLPs who specialize in voice disorders. During these opportunities I'm allowed to learn issues directly related to my [patients] needs. Otherwise, I prefer in person continuing education programs over online training . I find it easier to learn and have more opportunities to ask questions.

Prohibits training. Participants were asked, “What prohibits you from gaining additional education on tracheostomy and mechanical ventilation?” Responses grouped by basic/limited courses, work schedule/demands, limited resources, “nothing,” limited knowledge of educational opportunities, SLP limits courses based on populations served, and other (e.g., “competing priorities,” “no need,” and “no interest”). Results are shown in Table 26.

Table 26

Main Study: Qualitative: Prohibits Training

Theme	n	Percentage
Limited resources (e.g., time or money)	72	52.9%
SLP limits training/education to only the populations they serve	21	15.4%
Basic or limited courses available	14	10.3%
Nothing	13	9.6%
Work schedule/demands	8	5.9%
Limited knowledge of educational opportunities	2	1.5%
Other	6	4.4%
Total	N = 136	100%

There was an overwhelming response related to limited resources (e.g., time or money) such as “Cost and time,” “Time and money. Availability of new courses,” and “Cost of training and time.” Additional comments noted was related to basic or limited courses available as demonstrated by statements such as “There are not a lot of CEU's regarding trachs/vents,” “Lack of opportunity. CEUs are great, but this is really a hands-on topic,” and “I haven't heard of very many classes and what I have seen gives redundant information (trach possibly anchors the larynx, importance of PMV, silent aspiration etc.) not much specific to treatment.”

Employer support of training. Participants were asked “How does your employer support your obtainment of knowledge for tracheostomy and mechanical ventilation management?” Responses included descriptors of types of support, level of support, or the absence of support. Seven themes were identified and the results are listed in Table 27.

Table 27

Main Study: Qualitative: Employer Support of Training

Theme	n	Percentage
No support	43	32.6%
Get resources (time or time)	30	22.7%
Encourage, require, provide mentorship, interdisciplinary training or onsite CEU's	20	15.2%
"Yes" however the response did not indicate how the support was provided	17	12.9%
Minimal or partial support	16	12.1%
Provide incentives for advanced professional training (e.g., clinical ladder, lead SLP)	1	0.8%
Other (e.g., "I don't know" or " I am sure they would")	5	3.8%
Total	N = 132	100%

The theme, "No support," was defined by no financial or time based resources (e.g., "Doesn't financially due to budget," and "employer does not support CEU [fincancial] or time.") or a statement indicating a lack of support (e.g., "They don't"). Minimal or partial support was based on an indication that the employer wanted the SLP to learn, however would not contribute resources (e.g., "they want us to learn (of course), but will not financially support," or "We have some inservices. Time and money remain barriers.").

The theme of “Yes” was determined on responses where the participants indicated that the employer did support training, however, the response did not indicate how the support was provided (e.g., “very much so,” “Support my requests,” and “complete support”). Participant responses that indicated various types of encouragement, training on site, or interdisciplinary teamwork were placed in the theme titled “Encourage, require, provide mentorship, interdisciplinary training or onsite CEU’s.” Examples of such responses included “Online CEUs through medbridge,” and “we are a ASHA CE provider; department provides monthly CE.”

The theme of “get resources” was based on responses where the participant indicated the employer provided a form of resource (e.g., time or money) in efforts to support SLP training. Such comments included “Paying for CE opportunities,” “it would be part of my use of professional development funds I am alloted annually and I decide what content I need to obtain knowledge in not my employer,” and “They help pay for continuing education.”

The theme of “incentives” was based on a professional ladder or advancement in the work place based on education and training such as:

> They don't allow time for education, however they encourage education outside of work. They provide an incentive program called Clinical Ladder. If an employee achieves a certain amount of points they will be provided 4% differential in their pay. You achieve points through providing inservices, going above the required CEU for your license, participating in committees, etc.

Lastly, the theme of "other" included responses that indicated a lack of knowing if support was available to them (e.g., "Uncertain," and "I don't know"). Overall, results demonstrate that one third of participants do not receive support for training and education.

Evidence-based practice. The question of "How do you define evidence-based practice?" was asked with the understanding that ASHA has provided advanced training and resources on the subject and has an entire web based training module on the subject matter. The themes were based on the three-part goal provided by ASHA (2016c) which reads "The goal of EBP is the integration of: (a) clinical expertise/expert opinion, (b) external scientific evidence, and (c) client/patient/caregiver perspectives to provide high-quality services reflecting the interests, values, needs, and choices of the individuals we serve" (para 1). Themes were based on inclusion of the three elements of the ASHA (2016c) EBP goal. Results are provided in Table 28.

Table 28

Main Study: Qualitative: EBP

Theme	n	Percentage
Research or scientific evidence	63	49.2%
All three elements	24	18.8%
None of the ASHA defined elements	19	14.8%
Clinical expertise / expert opinion AND Research or scientific evidence	18	14.1%
Research or scientific evidence AND Client/Patient/Caregiver perspectives	2	1.6%
Clinical expertise / expert opinion AND Client/Patient/Caregiver perspectives	1	0.8%
Clinical expertise / expert opinion	1	0.8%
Client/Patient/Caregiver perspectives	0	0%
Total	N = 128	100%

Examples of responses for “research / scientific evidence” included “Practice that has been researched and found to be efficacious through sound research techniques” and “Based on research.” In contrast, the theme of “all three elements” included a response that addressed research, clinical expertise, and the patient/client/caregiver perspectives (e.g., “the integration of clinical experience with research and patient preferences in the clinical management of patients” and “When you consider current research, clinical experience, and patient goals in clinical decision making.”

The remaining themes were determined based on the specific elements stated. Examples include “The provision of [eval] and [tx] informed by research studies and/or expert clinical observation” was classified under the “Clinical expertise / expert opinion AND Research or scientific evidence” theme. While a statement such as “clinical application of knowledge and skill gained from [educatio nand] applied to individual cases on a customized basis using comprehensive history, interview and interdisciplinary info sharing” was classified under “Clinical expertise / expert opinion.”

Recognizing skills and knowledge. Recognizing if skills and knowledge are adequate to evaluate and treat the tracheostomized and or MV patient population are essential in providing safe and effective treatments. Therefore, participants were asked, "How do you know your knowledge and skills are adequate for treating tracheostomized and mechanically ventilated patients? Results are listed in Table 29.

Table 29

Main Study: Qualitative: Knowing Skills Are Adequate

Theme	n	Percentage
"I don't" / They are not adequate	47	35.3%
Self-reported or feelings of confidence or comfort with the population	23	17.3%
Competencies and trainings	18	13.5%
Patient outcomes	15	11.3%
Interdisciplinary collaboration / mentorship and approval of treatments and diagnostics by medical team members	15	11.3%
Years of experience	7	5.3%
Practice is consistent with research, ASHA, and SIGs	5	3.8%
Other	3	2.3
Total	N = 133	100%

The themes were clearly delineated. Over one third of the participants indicated either their skills are less than adequate or they were unsure (e.g., "right now I know I don't. With more education/training and experience, I would feel more confident," "I don't believe it is currently adequate, I try to educate myself on a daily basis," and "I don't feel they are in many ways."

Other participants indicated that their skills and knowledge are adequate based on their feelings, confidence or comfort in treating this population as indicated by comments such as "My confidence level," "when you feel confident in your ability to safely and effectively diagnose/treat," and "Clinician comfort, experience, and knowledge." Several participants indicated knowledge of skills based on trainings and competencies as indicated by statements such as "[Continous] competency training," and "Passed hospital competency."

Yet others based their level of knowledge and skills on the patients' outcomes (e.g., "working on the team and success of patients" and "Track record of positive outcomes for my patients achieving PO nutrition and decannulation." A smaller group of participants indicated that knowledge and skills were judged to be adequate based on the length of their professional practice (e.g., "Did it for 20 years in acute care," and "I worked with them for 11 years and was very confident").

Others held the test of adequate knowledge and skills based on comparing their decisions against research, ASHA discussions, and the SIG's (e.g., "Comparing with research, outcomes, discussions with doctors," and "I stay current on published research. My methods seem to be consistent with other clinicians who post on the SIG 13 [lidtserv]"). The theme of "interdisciplinary collaboration / mentorship/ approval of treatment and diagnostics" was defined based on comments such as:

> I rely on excellent clinicians via professional networking to help guide me in treatment of this population, of which I have treated only six patients in 18 months. The unit rarely refers these patients for SLP evaluation and treatment. I have never had a mechanically ventilated patient

and "Positive feedback from pulmonologist and respiratory therapist." The final theme or category was "other" which included responses that either did not answer the question (e.g., “because”) or that did not fit into the above-mentioned themes (e.g., “background knowledge and impact on pt management”).

Healthcare changes: EBP. Additional questions were related to healthcare changes. One question asked was “What healthcare changes have you noticed that influences your ability to provide evidence-based practice to tracheostomized and mechanically ventilated patients?” Results are shown in Table 30.

Table 30

Main Study: Qualitative: Healthcare Changes Related to EBP

Theme	n	Percentage
None (e.g., nothing to say or not aware of changes)	25	22.1%
Decreased reimbursement & allowed time with patients	22	19.5%
NA – Participant reported not currently working with this population	16	14.2%
Productivity and documentation expectations (e.g., “unrealistic” and or “higher”)	11	9.7%
Increased collaboration	10	8.8%
Decreased patient’s length of stay (LOS)	9	8.0%
Referral changes (e.g., increase in acute, subacute and LTACH)	8	7.1%
Increased research opportunities	4	3.5%
Increased diversity & severity of disease / illness	4	3.5%
Disagreement with best practices	4	3.5%
Total	N = 113	100%

Over 20% of responses had nothing to say or reported that they were not aware of any changes and 14% indicated that they are working with the tracheostomized/MV population. The remaining participants indicated a noticeable increase in medical team collaboration (e.g., “More of a collaborative team approach than there used to be!” and “Medical rounds with entire care team”) and an increase in patient referrals (e.g., “referrals increased,” and “We see more vented pts and treatment starts earlier. We are called in to try the PMSV earlier than years ago. Pts may be too ill”). In addition, participants indicated a noticeable change in LOS where the patients are swiftly discharged to secondary centers and or home (e.g., “Shorter length of stays, increased census” and “Shortened length of stay”) whereas in the past, patients remained in the hospitals for longer periods of time.

An increase in research opportunities was reported (e.g., “In the past 5-ish years [There] is more research on the various respiratory diseases and their effects on swallowing as well as the effects of prolonged trach and prolonged intubation on swallowing”) as well as an increase in disease/illness (e.g., “more ICU Pts, sicker Pts in LTAC” and “Sicker patients”). “Disagreement with best practices” theme included comments such as “That SNF facilities would be ""forced"" to accept these patients so that they don't lose referrals from hospitals even though they are ill equipped to handle them” and “I don't feel like the group of staff (at two different facilities) are as knowledgeable so they aren't able to advocate as much for their patients.”

Healthcare changes: Ability. A second question related to healthcare changes was “What healthcare changes have you noticed that influences your ability to obtain additional education for tracheostomy and mechanical ventilation patients?" Results are shown in Table 31.

Table 31

Main Study: Qualitative: Healthcare Changes Influencing Training

Theme	n	Percentage
Limited resources (e.g., time, training opportunities, money)	28	26.9%
None	26	25.0%
"I don't know" / NA	20	19.2%
Productivity demands	10	9.6%
Online courses / technological resources	7	6.7%
Mandates (e.g., educational, regulatory)	5	4.8%
Other ("same as above" or "as previously stated")	4	3.8%
Patients length of stay (LOS)	3	2.9%
Territoriality	1	1.0%
Total	N = 104	100%

Consistent with prior responses, the theme of limited resources (e.g., time or money) was found to be the greatest in volume with the categories of "None" and "I don't know" as the next two leading groups. The theme of "productivity demands" was defined by responses related to the direction from the employer for the SLP to increase the billing volume as many aspects of speech pathology cannot be directly billed due to healthcare changes. Therefore, productivity demands limit the SLP from completing the essential aspects of the job (e.g., training to staff or seeking training themselves) as these are considered non-billable actions. Examples of such statements included “productivity demands and pressure from mgmt to treat Pts more, bill with little time to educate and update self to current standards for trach/vent practice” and “Push for higher reimbursements and productivities.”

The theme of online courses and technological resources included comments that referred to the ability to obtain resources (e.g., training for SLPs, educational materials found online, or involvement of electronic medical record keeping methods). Examples of these responses included “Increased educational videos are available, if one is knowledgeable about the sources” and “It is easier now than it was 10-15 years ago because of the increased use of technology to deliver and variety of educational resources through many different mediums.”

Similar to prior responses, the matter of LOS was again restated with comments such as “Hospitals are discharging more patients and earlier than in the past to SNFs. I would like to be proficient in treating patients with these needs” and “length of stay.” The theme of “mandates” included responses that referred to licensure requirements or mandatory education (e.g., “mandatory education” and “My state requires our continued education hours to be completed in a live setting which limits my ability to use pre-recorded training.”

Only one response indicated a sense of professional territoriality (e.g., “Territoriality. RTs and MDs [do t] always want to [collaborafd]”). Lastly, the theme of other included responses that could not be categorized such as ‘see above” or “same as above.”

Trends. Lastly, participants were asked “What trends, if any, have you noticed concerning tracheostomy and mechanically ventilated patients within the past 1-5 years?” Response themes are shown in Table 32.

Table 32

Main Study: Qualitative: Trends

Theme	n	Percentage
I don’t know / NA / No trends / unable to comment	36	33.3%
Changes in standard practice (e.g., can include reduced time with patients, productivity demands, faster/slower trach placement, disagreement with best practice, SLP expected to treat without training)	29	26.9%
Changes in collaboration, research, and ambulation	12	11.1%
Length of stay changes (e.g., faster discharge)	10	9.3%
Change in referral rates	9	8.3%
Changes in equipment	4	3.7%
Increased illness, disease, and obesity	3	2.8%
Increased patient survival rates	3	2.8%
Increase in secondary issues due to tracheostomy placement (e.g., complications, need for home care support)	2	1.9%
Increase in secondary issues due to tracheostomy placement (e.g., complications, need for home care support)	2	1.9%
	N = 108	100%

A third of the responses indicated a lack of knowledge or awareness toward any trends related to the evaluation and treatment of tracheostomized and or MV patient populations as indicated by statements such as “I don’t know,” “none/none noticed” and “unknown.” However, the theme of “changes in standard practice” included a diverse set of responses all centered around changes in the diagnosis or treatment of this patient population. The responses may include reduced time with patients, productivity demands, faster/slower trach placement, disagreement with best practice, SLP expected to treat without training. Examples included changes related to how soon SLPs are involved (e.g., “quicker bedsides post extubation; less use of inline speaking valves” and “goals for faster decannulation and quicker return to oral diet”). While other changes were noted in the timing of tracheostomy placement and or weaning (e.g., “Quick to ventilate and trach, even the frail elderly, without regard for the complications and longstanding effects” and “weaning earlier as patient is able, delaying intubation via other measures, e.g. bipap/cpap, [trachesotomy] within 10 days if long term vent support is anticipated”). It is important to note that the changes in standard practice included comments that were opposing (e.g., weaning faster or weaning slower) as noted in the following responses; “tendency to leave on a track and vent longer without trying to assist people to get off them if they can. [not] many people are educated with trach and vent work” and “weaning faster.”

Changes in collaboration, research, and ambulation. This theme included responses such as “More collaboration in general between disciplines and respect from the physicians regarding the contribution of SLPs; providing a patient with even mild vent support sooner in an acute illness." A "Change in referral rates" included opposing volume statements such as "Increasing caseload" and "We are being consulted less often" yet, the underlying theme was a change in referral rates from the perspective of the practicing SLP. Responses that mentioned equipment were categorized in the "changes in equipment." Examples of such responses included "Better [trac] tubes, ability to use FEES to asses swallowing" and "Smaller and more compact [equiptment]."

Additional themes specific to the patient's acuity included "increased patient survival rates," "increased illness, disease, and obesity" and "length of stay." Responses under the "increased patient survival rates" included "In general, people are living longer and there's an increase in obesity. More medically complex patients are surviving complex medical procedures and challenging clinicians in the trenches to be prepared to manage ultra complex cases" while responses related to disease and illness included "Maybe seeing sicker patients in rehab that used to stay in the hospital longer."

Statements speaking to the LOS were highlighting the speed in which patients are discharged from an acute care facility and transferred to various other levels of care (e.g., acute rehab hospital, long-term acute care facility, subacute facility). Examples of such responses include "Availability propria discharge facilities to care for mechanically ventilated patients" and "They are being discharged earlier to both acute and subacute rehab, some with poor management and understanding of trache and vent patients."

The matter of complications or secondary issues was an additional patient centered theme. Responses included "There are more community-based trach issues" and "family and patient education is lacking, not enough influence on treatment decisions about patient quality of life from entire medical team." Overall, the matter of trends did provide two key findings, the bulk of responses indicated changes in standard practice (although still unregulated) and a lack of knowledge or awareness of trends.

Main Study: Triangulation

A one-way analysis of variance (ANOVA) was conducted between the total self-efficacy scores and the coded qualitative data, correlations with self-efficacy and knowledge, correlations with self-efficacy and confidence, and a chi square with confidence and knowledge scores. Results are as follows:

Self-efficacy and qualitative responses: Of the 10 qualitative questions, only four demonstrated statistical significance (e.g., motivation, areas of lacking knowledge, employer support, and knowing if skills were adequate) with self-efficacy. The remaining factors (types of educational opportunities, factors that prohibit training, definition of EBP, healthcare changes and EBP, healthcare changes and training, and trends) did not demonstrate statistical significance.

***Motivation*.** Participants were asked "What motivates you to work with tracheostomy and ventilator patients?" Seven themes were identified (theme 1= QoL, theme 2= patients' needs, theme 3 = forced to work with this population, theme 4 = team collaboration and professional learning opportunity, theme 5= SLP desire for challenging and interesting work, theme 6 = SLP job responsibility, theme 7 = participant indicated they are not currently working with this population). There was a statistically significant difference at the $p < .05$ level in motivation scores for the seven themes: $F(6, 129) = 6.153$, $p = .005$, violation of homogeneity. Despite reaching statistical significance, the actual difference in the mean scores between the groups was quite small as indicated by eta squared .23.

Post-hoc comparisons using the Tukey HSD test indicated that SLPs who were motivated to work with tracheostomized and or MV patients based on QoL (*M* = 25.0, *SD*= 3.80) scored differently than those who were motivated by team collaboration and professional learning opportunities (*M* = 19.45, *SD* = 7.216), as well as those not working with this patient population (*M* = 16.11, *SD* = 3.407). The theme of QoL did not differ significantly from theme 2, patients' needs (*M* = 24, *SD*= 4.71), theme 3, forced (*M* = 19.0, *SD*= 8.12), theme 5, SLP desire for challenging and interesting work (*M* = 23.729, *SD* = 4.24), or theme 6, SLP job responsibility (*M* = 23.76, *SD* = 5.55). Additionally, theme 7: SLPs indicating they currently do not work with this patient population, scored differently than theme 6: SLP job responsibility, theme 5: SLP desire for challenging and interesting work, theme 2: patients' needs, and theme 1: QoL. Results are shown in Table 33.

Table 33

Main Study: Self-Efficacy and Motivations

Group	Motivations	M	SD
1	Quality of life	25.0	3.80
2	Patients' needs	24.0	4.71
3	Forced to work with this population	19.0	8.12
4	Team collaboration and professional learning opportunity	19.45	7.216
5	SLP desire for challenging and interesting work	23.73	4.24
6	SLP job responsibility	23.76	5.55
7	Participant indicated not currently working with this population	16.11	3.40

Areas of improvement. Participants were asked "What areas of knowledge do you feel you need to improve to treat tracheostomy and mechanically ventilated patients?" Nine themes were identified (theme 1 = the vent, theme 2= "everything", theme 3 = anatomy and physiology (A&P), theme 4 = equipment and diagnostic instrumentation, theme 5= lab values, theme 6 = disease and disorders, theme 7 =terminology, theme 8 = treatment methods, theme 9 = other). There was a statistically significant difference at the $p < .05$ level in lacking knowledge areas for the nine themes: F (8, 127) = 10.401, p = .000. Despite reaching statistical significance, the actual difference in the mean scores between the groups was large as indicated by eta squared .413.

Post-hoc comparisons using the Tukey HSD test, indicated that SLPs who stated needing training/lacking knowledge in "everything" (*M* = 17.08, *SD*= 3.90) scored differently than those who reported lacking knowledge in specific skill sets; the vent (*M* = 24.88, *SD* = 3.34), anatomy and physiology (*M* = 24.33, *SD* = 2.82), equipment and diagnostic instrumentation (*M* = 24.16, *SD* = 4.91), lab values (*M*= 26.23, *SD* = 4.83), disease and disorders (*M*= 22.75, *SD* = 6.81), treatment methods (*M* = 24.70, *SD* = 3.86), and other (*M*= 26.66, *SD* = 4.47). Theme 7, "other," did not differ significantly from any of the themes. Results are shown in Table 34.

Table 34

Main Study: Self-Efficacy and Lacking Knowledge Areas

Group	Lacking knowledge area	M	SD
1	The “vent”	24.88	3.34
2	“Everything”	17.08	3.9
3	Anatomy and physiology	24.33	2.82
4	Equipment and diagnostic instrumentation	24.16	4.91
5	Lab values	26.23	4.83
6	Disease and disorders	22.75	6.81
7	Terminology	19.33	4.04
8	Treatment methods	24.70	3.86
9	Other	26.66	4.47

Employer support. Participants were asked, “How does your employer support your obtainment of knowledge for tracheostomy and mechanical ventilation management?” Six themes were identified (theme 1= no support, theme 2 = minimal or partial support, theme 3 = “yes,” however how support was provided was lacking, theme 4 = encourage, require, provide mentorship, interdisciplinary training or onsite CEU’s, theme 5 = get resources, theme 6 = provide incentives for advanced professional training, and other). There was a statistically significant difference at the $p < .05$ level in employer support scores for the six themes: F (6, 130) = 3.095, $p = .007$. Despite reaching statistical significance, the actual difference in the mean scores between the themes was medium as indicated by eta squared, .131. Post Hoc tests could not be completed due to small sample sizes within some of the groups. Results are shown in Table 35.

Table 35

Main Study: Self-Efficacy and Levels of Employer Support

Group	Level of employer support	M	SD
1	No support	21.73	5.70
2	Minimal / partial support	21.44	4.13
3	"Yes," however how support was provided was lacking	22.82	5.63
4	Encourage, require, provide mentorship, interdisciplinary training or onsite CEU's	26.3	3.85
5	Get resources	24.83	4.26
6	Provide incentives for advanced professional training	25	-
7	Other	20.40	5.94

Adequate knowledge. Participants were provided with the question "How do you know your knowledge and skills are adequate for treating tracheostomized and mechanically ventilated patients?" Of the 130 responses, eight themes were identified. The themes included theme 1 = "I don't," theme 2 = Self-reported or feelings of confidence or comfort with the patient population, theme 3 = competencies and trainings, theme 4 = patient outcomes, theme 5 = years of experience, theme 6 = practice consistent with research, ASHA, and SIGs, theme 7 = interdisciplinary collaboration / mentorship and approval of treatment and diagnostic practices, theme 8 = other).

There was a statistically significant difference at the $p < .05$ level in knowing is skills were adequate in treating the tracheostomized and or MV population for the eight groups: F (7, 130) = 4.72, p = .000. Despite reaching statistical significance, the actual difference in the mean scores between the groups was large as indicated by eta squared .213. Post-hoc comparisons using the Tukey HSD test indicated that SLPs who indicated "I don't" (M = 20.91, SD= 5.32) scored differently than those who reported through competencies and trainings (M = 25.72, SD = 4.49) and patient outcomes (M = 26.866, *SD* = 2.77). Group 1 did not differ significantly from any of the groups. Results are shown in Table 36.

Table 36

Main Study: Self-Efficacy and Knowledge That Skills Are Adequate

Group	Knowledge that skills are adequate	M	SD
1	"I don't"	20.91	5.32
2	Self-reported or feelings of confidence or comfort with the patient population	22.31	5.13
3	competencies and trainings	25.72	4.49
4	patient outcomes	26.87	2.77
5	years of experience	26.29	2.21
6	practice consistent with research, ASHA, and SIGs,	24.60	3.05
7	interdisciplinary collaboration / mentorship and approval of treatment and diagnostic practices	24.60	3.42
8	Other	25.0	1.41

Correlations with self-efficacy and knowledge. Analyses of self-efficacy and knowledge scores for anatomy and physiology, terminology, lab values, equipment, disease and illness, and psychological factors did not reach statistical significance.

Correlations with self-efficacy and confidence. The relationship between self-efficacy and confidence of the six skill sets was investigated using Pearson product correlation coefficient. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. See Table 37.

There was a positive large correlation between self-efficacy and confidence as it relates to anatomy and physiology, $r = .548$, n = 182, $p = .000$, 30% of variance demonstrating high levels of self-efficacy with high levels of confidence.

In regards to self-efficacy and confidence as it relates to terminology, there was a large, positive correlation between the two variables, $r = .633$, $n = 181$, $p < .000$, 40% of variance demonstrating high levels of self-efficacy with high confidence as it relates to knowledge of terminology. Furthermore, lab value confidence and self-efficacy indicated a medium, positive correlation between the two variables, $r = .414$, $n = 182$, $p < .000$, 17% variance indicating high levels of self-efficacy with high levels of confidence of knowledge related to lab values.

In regards to self-efficacy and confidence as it relates to tracheostomy and MV equipment, there was a large, positive correlation between the two variables, $r = .685$, $n = 182$, $p < .000$, 46.9% of variance with high levels of self-efficacy with high levels of confidence related to knowledge of equipment. In regards to self-efficacy and confidence as it relates to disease and illness, there was a medium, positive correlation between the two variables, $r = .385$, $n = 182$, $p < .000$, 14.8% of variance with high levels of self-efficacy with high levels of confidence related to knowledge of disease and illness.

In regards to self-efficacy and confidence as it relates to psychological factors, there was a large, positive correlation between the two variables, $r =.655$, $n = 181$, $p < .000$, 42.9% of variance with high levels of self-efficacy with high levels of confidence with knowledge of psychological factors.

Table 37

Main Study: Correlation of Self-Efficacy and Confidence Across the Skills Sets

Confidence in the various skill sets	*r*	*p*	N	% of shared variance	*M*	*SD*
Anatomy & Physiology	.548	.000	182	30%	2.18	.553
Terminology	.633	.000	181	40%	1.80	.533
Lab values	.414	.000	182	17%	1.51	.557
Equipment	.685	.000	182	46.9%	1.80	.561
Disease and illness	.385	.000	182	14.8%	2.145	.478
Psychological factors	.655	.000	181	42.9%	1.8847	.6234

Chi square with confidence and knowledge. Analyses of confidence and knowledge scores for anatomy and physiology, terminology, lab values, equipment, disease and illness, and psychological factors did not demonstrate statistical significance in any of the knowledge skill sets.

Main Study: Evidence of Trustworthiness

Consideration was placed on ensuring credibility, transferability, dependability, and confirmability for the national/main study. Procedures were designed and implemented for recruitment through the ASHA web sites, professional social media sites, professional emails, and via snowball recruitment, ensuring participants would meet inclusion criteria.

In efforts to ensure each participant would meet inclusion criteria and that participants were SLPs in the United States, specific demographic questions were used including degree earned, geographic region, and years in practice to ensure each participant met the inclusion criteria. The data was reviewed in SPSS and checked to consistency and credibility. The inclusion criteria were clearly stated on recruitment announcements and within the online survey consent form to ensure participants were notified and meeting the criteria.

In efforts to ensure each participant would complete the survey only once, the online Survey Monkey survey system was designed to identify each computer via technical identifier and limit each computer to a one-time connection to the survey. This was established in efforts to limit multiple attempts and reduce learning of the stimulus or knowledge of the questions.

All data was emailed and reviewed by Dr. Lee Stadtlander to assess for accuracy and consistency. All materials were recorded and reviewed by Dr. Stadtlander to ensure confirmability of data and results.

Triangulation was utilized with the scores of the demographic survey, KCT-TMV, self-efficacy assessment and the qualitative survey. This allowed overcoming any weakness that was inherent in a single method study.

Summary

The expert panel: Expert panel members (e.g., intensivist, pulmonologists, neonatologists, and otolaryngologists) rated all six skill sets and were “somewhat” to “absolutely important” about the diagnosis and treatment of tracheostomized and or MV patient populations. The diversity in medical specialties indicated differences in skills and knowledge across all six-skill sets (anatomy and physiology, terminology, lab values, equipment, disease and illness and psychological factors). An unexpected finding of the expert panel was the lack of training or knowledge related to psychological factors related to the tracheostomized and or MV patient populations. Nonetheless, the experts’ collective responses on the preliminary KCT-TMV aided in the identification of four of the original eight stimulus items within each of the sets for use in the validation study of the KCT-TMV.

The pilot: The results of the pilot reached statistical significance between professionals with advanced training and those professionals with lesser training across five of the six skills sets (e.g., terminology, lab values, tracheostomy and MV equipment, disease and illness, and psychological aspects). Thus supporting the social learning theory (Bandura, 1977) of the greater the education the greater the knowledge.

The main study evaluated if the type of professional training has an influence on self-efficacy, confidence, and real knowledge as measured by the KCT-TMV in addition to assessing the impact of various demographics. The demographic of gender was found to be significant with females performing higher than males (although this finding is questionable due to the small number of males). Additional demographics that reached significance included clinical setting, populations served, hours per week, and direct clinical contact with the tracheostomized and or MV patient populations and knowledge across the skill sets. However other demographics, such as geography, age, degree, years in practice, formal training for trach and or MV at the work place, number of courses for tracheostomy and or MV in graduate school, and number of continuing educational courses after graduate school did not demonstrate statistical significance.

Specific types of professional training and knowledge as well as training and self-efficacy demonstrated statistical significance. However, training did not have an influence on confidence. Professional training modalities of multidisciplinary in-services at work, teleconferences, and critical care delivery group trainings indicated the greatest influence on self-efficacy. In contrast, non-ASHA sponsored training demonstrated greater knowledge in the skills of psychological factors, self-directed learning influences terminology knowledge and critical care delivery group trainings influenced equipment knowledge. No significance was noted with task value ratings, confidence and knowledge across all skill sets as well as no significance was found with confidence and knowledge.

In regards to self-efficacy, statistical significance was present between self-efficacy and the qualitative responses related to motivation, areas of lacking knowledge, employer support, and knowing if clinical skills are adequate for the diagnosis and treatment of the tracheostomized and or MV patient populations. No difference was found with educational opportunities, factor prohibiting training, definition of EBP, healthcare changes and EBP, healthcare changes and training, and trends in healthcare associated with this patient population. Furthermore, self-efficacy and confidence were significant across all skill sets while self-efficacy and knowledge demonstrated no significance.

The qualitative findings were multifactorial. The factors that SLPs perceive to influence their obtainment of training focal to the tracheostomized or mechanically ventilated patient population covered a wide range of areas. Participants indicated that the patient's quality of life in the speech pathologist desires for challenging and interesting work for the top motivations for working with this population.

When looking at motivational drive, SLPs were driven by more self-fulfilling reasons rather than patient driven reasons for working with the tracheostomized and or mechanically ventilated patient populations. Concerning knowledge areas lacking, the ventilator or the “vent” was the greatest area of lacking knowledge reported by the participants followed by “everything.” Online training or webinars were rated as the most appealing form of education due to the convenience, costs, and time although life seminars and hands-on training were also listed as appealing. Limited resources (e.g., time and money) were listed as the key factor in the prohibition of training. Furthermore, a third of the participants indicated that they have no support from their employer for training.

In regards to evidence-based practice (EBP), almost half of the participants defined EBP by research or scientific evidence alone, and a greater amount of the participants were unable to define evidence-based practice based on the ASHA defined elements. Furthermore, SLPs reported being unsure if their knowledge and skills were adequate in treating the tracheostomized and or MV patient populations. Less than a quarter of the sample was involved in competencies, trainings, and interdisciplinary collaboration. Healthcare changes influencing the provision of EBP included reduced reimbursement and allowed diagnostic and treatment time with patients, while healthcare changes influencing training were focal to limited resources (e.g., time and money). The most notable trends identified with this patient population included changes in standard practice and the lack of consistency in care of the tracheostomized and or MV patient population.

Chapter 5 will interpret the findings, provide limitations of the study, discuss recommendations and implications of this study, as well as potential for social change. In addition, the discussion will include how the current findings relates to the social learning theory (Bandura, 1977), current literature as well as how the study adds to the current body of literature.

Chapter 5: Discussion, Conclusion, and Recommendations

Introduction

In this chapter, I discuss findings from the expert panel, pilot study, and main study. This chapter also includes the overall study's limitations, recommendations, implications, potential for social change, and how the study relates to the social learning theory (Bandura, 1977). In addition, I discuss how this study relates to the current literature and how the study adds to the current body of literature.

The purpose of the present study was to assess the knowledge of practicing SLPs in the United States, their self-efficacy, and their perceived knowledge, as well as analysis of trends associated with SLPs providing care to tracheostomized and or MV patient populations. The study assessed the knowledge skills via a validated skills assessment of working SLPs in four regional areas of the United States. In addition, the study obtained phenomenological data as to why working SLPs do and do not seek formalized training in the area of tracheostomy and MV.

Key findings related to the demographics included that females scored better than males on the knowledge and skills assessment; however, due to the small number of males who participated in the study, these results are questionable. In addition, demographics that demonstrated an influence on knowledge across the skills sets included clinical settings, populations served, hours per week, and direct clinical contact with the tracheostomized and or mechanically ventilated patient populations. In contrast, geography, age, degree, years in practice, formal training for tracheostomy and MV at the work place, number of courses for tracheostomy and MV in graduate school, and number of continuing educational courses after graduate school did not influence knowledge.

Professional training, self-efficacy, and confidence demonstrated differences and indicated that professional training modalities of multidisciplinary in-services at work, teleconferences, and critical care delivery group trainings resulted in the greatest influence on self-efficacy. However, professional training modalities did not influence confidence across all skill sets. Furthermore, the type of professional training did indicate differences in various skill sets where training via non-ASHA sponsored settings demonstrated greater knowledge acquisition in psychological factors, self-directed learning demonstrated greater knowledge in terminology, and involvement with a critical care delivery group training demonstrated greater knowledge in equipment.

Additional analyses of self-efficacy and confidence indicated that SLPs with high self-efficacy also had high confidence across all skill sets. In contrast, those with high self-efficacy did not demonstrate high knowledge in the skill sets.

The results of the qualitative analyses related to trends associated with the diagnosis and treatment of tracheostomized and MV patient populations demonstrated differences between self-efficacy and SLP motivation, employer support, knowing if clinical skills are adequate, and areas of lacking knowledge. In regard to motivation, SLPs were driven more by self-fulfilling reasons than patient reasons, yet those who indicated the patients' QoL was their motivation to work with this population demonstrated higher self-efficacy. In addition, SLPs who indicated employer support of training demonstrated higher self-efficacy. In contrast, those who reported not knowing if skills were adequate and those participants who indicated the area of lack knowledge included the ventilator specifically followed by “everything”; however, those who indicated lacking knowledge in “everything” demonstrated lower self-efficacy.

Trends associated with the obtainment of training indicated that limited resources (e.g., time and money) resulted in a barrier. Therefore, online training or webinars were rated as the most appealing form of education; however, results of the knowledge assessment did not indicate a difference in knowledge scores based on online training.

In the matter of EBP, despite the definition and guide posted by ASHA (2016c), and the required understanding of EBP as a component under the Code of Ethics (ASHA, 2016b), almost half of the participants regarded EBP as a research matter only and did not include the other two key elements. Furthermore, participants reported being unsure if their knowledge and skills were adequate in treating the tracheostomized and mechanically ventilated patient populations, and fewer than a quarter of the sample were involved in competencies, trainings, and interdisciplinary collaboration; yet many reported continuing to provide direct patient services.

Lastly, trends associated with healthcare changes and the impact on EBP included reduced reimbursement and limited diagnostic and treatment time with patients, while healthcare changes influencing training were focal to limited resources (e.g., time and money). However, the most concerning trend reported was the changes in standard practice and the lack of consistency in care of the tracheostomized and or mechanically ventilated patient population.

The present study involves three separate yet intertwined studies. For the sake of clarity, this chapter will address the interpretation of the findings, limitations, and recommendations for the expert panel, pilot, and main study as separate. However, the implications for social change, overall conclusions, and recommendations for future research will include a comprehensive perspective encompassing all aspects of the expert panel, pilot, and main study.

Interpretation of the Findings

Expert Panel

The expert panel provided insights into the perspectives of practicing medical specialists (e.g., otolaryngologists, intensivists, pulmonologists, and neonatologists) regarding the importance of various knowledge and skills sets in the management of tracheostomized and or mechanically ventilated patient populations. While the experts indicated all skill sets within the KCT-TMV were important and task value rating was high, discrepancies in knowledge and agreement with medical information were present. The various experts would defer medical questions specific to various systems (e.g., pulmonary or head and neck) to the medical specialists in that specific area. However, the participant must have the awareness of knowledge lacking in order for to seek out other specialists or experts. This finding supports the SCT (Bandura, 1986) in which informative, motivational, and reinforcement functions drive the specific outcomes of an individual's actions or desires for training and knowledge. For example, specialists in pulmonology may choose to not seek or gain training in psychological factors as the motivation or reinforcement of such training may not be apparent to their personal benefit in pulmonary medicine. In contrast, pulmonologists may increase their motivation function for additional training in cardiopulmonary terminology and or anatomy and physiology if they perceive it to be beneficial toward the specific outcomes of their actions.

Current research of medical practitioners indicates a lack of consistency related to terminology (Chelluri et al., 2003; Griffiths et al., 2005), equipment (Griffiths et al., 2005; Heffner, 1993; Heffner, 2003), and disease (Bösel et al., 2012; Devarajan et al., 2012; Durbin et al., 2010) as it relates to tracheostomy and MV. The current study makes it apparent that psychological factors may be another subject in which consistency and knowledge are lacking as participants in the expert panel indicated a lack of knowledge or consistency related to psychological factors associated with tracheostomy and MV.

An unexpected finding of the expert panel was related to the experts' lack of awareness of the psychological effects of the medical interventions or an intensive care/critical care admission. Experts appeared to lack awareness of matters related to patients having anxiety or depression at the time of hospitalization as well as years after the illness. The psychoemotional impact of tracheostomy MV may impact patient health outcomes more than what is currently known. Researchers have discovered psychoemotional deficits related to anxiety (Baker-Rush, 2009; Hopkins et al., 2010; Tate, Dabbs, Hoffman, Milbrandt, & Happ, 2012), communication loss (Carroll, 2007; Hafsteindóttir, 1996), distress/stress (Kiekkas et al., 2010; Rotondi et al., 2002; Samuelson et al., 2007), loss of control (Guttormson, 2014; Johnson et al., 2006) and PTSD (Cuthbertson et al., 2004; Jubran, Lawm, Duffner, et al., 2010; Myhren et al., 2010). Therefore, additional study of psychoemotional factors in the ICU/CCU for tracheostomized and or mechanically ventilated patient populations as compared to other patient populations in the ICU/CCU may be beneficial. It may provide insight toward the differences of psychoemotional needs and desires of the tracheostomized and mechanically ventilated patient populations. Once this information can be ascertained, additional and specific training may be offered to healthcare providers treating this patient population in efforts to promote positive health outcomes.

Furthermore, experts appeared to lack awareness of matters related to patients having anxiety and or depression at the time of hospitalization. As indicated by the literature, during the acute phase of the illness (i.e., hospitalization) a loss of communication and the onset of delirium due to medical interventions (e.g., tracheostomy and or MV) compound the potential psychological effects. These include anxiety, depression, and fear (see Hafsteindóttir, 1996; Karlsson et al., 2011; Milbrandt et al., 2004; Nouwen et al., 2012; Spronk et al., 2009; Tate et al., 2012).

Years after the hospitalization, additional negative emotional consequences include PTSD (Girard et al., 2007; Jubran, Lawm, Duffner, et al., 2010), anxiety and depression (Hopkins et al., 2010; Myhren et al., 2010; Samuelson et al., 2007; Wunsch et al., 2014), and sleep disorders (McKinley et al., 2012). Therefore, it appears that the tracheostomized or mechanically ventilated population may be under-managed psychologically during the acute stage resulting in adverse outcomes or possibly long term psychological complications. Physicians' understandings of the psychological impact of tracheostomy and MV warrants further investigation based on these findings and current psychological literature. The role of the physician and understanding psychological factors is revisited in the recommendations section of this chapter.

The patient's hierarchy of needs (Maslow, 1943a) was considered as not important or somewhat important on a four point Likert scale in 80% of the experts' responses. The literature has shown that patients present with emotional effects of an intensive care admission, including subjective and objective features (Rattray et al., 2005). Jackson et al. (2014) utilized the hierarchy of needs (Maslow, 1943a) as a method for understanding the needs of patients admitted to the ICU/CCU. Using the "ABCDE's" (i.e., awakening trials, breathing trials, coordination and choice, delirium monitoring, and early mobility/exercise and environment) in the ICU, Jackson et al. (2014) alleged that it may afford the medical team to approach the patient in a more holistic manner. Furthermore, it provides insight to possible areas of additional training for medical practitioners to aid in mind and body wellness during and after an intensive care critical care admission.

As previously stated, the anatomy and physiology skill set showed no difference between experts and nonexperts; however, knowledge related to anatomy and physiology did demonstrate a difference as compared to chance or a guess. This may indicate that experts and nonexperts may have the same level of knowledge indicating that working in the field does not improve knowledge. As a second explanation, these findings may indicate a need for additional training in anatomy and physiology as it relates to the tracheostomized and or mechanically ventilated patient populations.

It is important to highlight that in the expert panel review, the anatomy and physiology skill set only had one stimulus item that met the 0.75 inclusion criteria. The remaining stimulus items had questionable wording or scored 0.5 or 0.33. Therefore, it is plausible that the wording of the questions in this skill set impacted validity. Due to the concurrent nature of the pilot and the main study, the anatomy and physiology skill set was retained within the main study. Due to the lack of validity for the anatomy and physiology skills assessment in the expert panel review, and the results of the analyses against chance, the main study results should be interpreted with caution. Recognizing that anatomy and physiology are foundational to complex knowledge and skills, considerations for redevelopment of the anatomy and physiology stimulus items in future versions of the KCT-TMV is warranted.

Pilot

The pilot provided insight into the various levels of knowledge between experts, practicing speech pathologists, and students in the study of communication disorders in the United States across the six skill sets (e.g., anatomy and physiology, terminology, lab values, equipment, disease and illness, and psychological factors). The underlying theory in the pilot refers back to educational psychology in which the concept of greater training provides greater knowledge. Results indicated a difference concerning terminology, lab values, equipment, disease, and illness and demonstrated that the amount of training does differ for expert vs non-expert as measured by the KCT-TMV. These findings support the educational psychological theory that the greater the education and training, the greater the knowledge in four of the six skill sets. However, in skills related to anatomy and physiology and psychological factors, training was not different between the groups. This may imply that training is not different between the two groups and working with the tracheostomized and MV patient population does not appear to increase knowledge in these two skill sets. Again, wording of the stimuli based on feedback from the expert panel require consideration as well.

In further evaluation of the anatomy and physiology and psychological factors skill sets, the participants did perform differently than chance or a guess. Again, this supports the theory that those with no training compared to those with training will perform differently. This finding again supports the educational theory of training and knowledge and reinforces the quality of the KCT-TMV. However, due to the non-statistical difference between the expert and nonexpert, revisions of these two skill sets is necessary.

Upon review of the demographics, it appears that participants who indicated some contact with the tracheostomized or MV patient populations worked few hours (1-10 hours, 28.9%) or more than half of their week (21-30 hours, 10.5%) in direct contact with this patient population. The difference between hours per week and knowledge are further discussed in the main study, however in the pilot it is important to highlight that two distinct groups (1-10 hours per week and 21-30 hours per week) were the largest percentage of participants. This is important to highlight as training can occur through observation, direct application of skills, and through a participants cognitive, behavioral, and environmental factors.

Furthermore, those who have little or infrequent contact with the patient population may demonstrate a difference in their understanding and application of key knowledge components or have the ability to recognize a gap in their knowledge. This directly connects with the SCT (Bandura, 1986). The triadic reciprocality of behavior, cognition, and personal motivations may interact. If a practitioner does not have the opportunity to engage in or witness actions related to the diagnoses and treatment of the tracheostomized and MV patient populations, they may have limited symbolizing, forethought, vicarious, self-regulatory, and self-reflective capabilities. It is the symbolizing capability that allows an individual to form a guide toward future behaviors (Bandura, 1986) and lays a foundation toward forethought capability. The forethought capability permits an individual to make determinations prior to a situation and make adjustments in their behaviors prior to action (Bandura, 1986). If the participants do not have the exposure to the tracheostomized and MV patient population, these two critical and foundational aspects of learning under the SCT may be episodic thus resulting in a change in learning.

Main Study

The main study provided multifactorial analyses of demographics, knowledge and skills, confidence, self-efficacy, and trends of SLPs in the United States associated with the diagnosis and treatment of tracheostomized and mechanically ventilated patient populations. The implications of the findings are vast and therefore are divided into the following sections: demographics, self-efficacy and confidence, training, and trends.

Demographics. ASHA (2016e) currently reports greater than 186,000 members which includes speech pathologists and audiologists. Of the total members,156,254 are SLPs (ASHA, 2016d). Furthermore, the SLP membership records indicate males comprise 3.7% of SLPs and 19.2% of dual certification (i.e., Audiologist and SLP) with a greater volume of members being female (ASHA, 2016d).

A difference was noted between males and females on the KCT-TMV in which females did better than males in relation to equipment knowledge. It does not indicate if the knowledge was adequate or suboptimal, yet, only indicates a difference. However, due to the small sample of male participants, the reliability of this finding is questionable. No difference was noted across the remaining skill sets (e.g., A&P, terminology, lab values, disease and illness, and psychological factors) which may imply that knowledge is relatively similar, however without respect to levels of adequacy.

When looking at the factor of direct patient clinical contact and knowledge, SLPs with direct tracheostomy or MV patient contact scored lower in equipment knowledge as compared to SLPs without direct contact. While this finding is not what was expected, it does raise considerations toward the impact of self-efficacy, confidence, and SLPs awareness of their real knowledge and skills in regards to equipment. There was a difference in confidence related to equipment knowledge between those with direct contact and those without which implies that SLPs are confident they have adequate knowledge when scores indicate they do not have the knowledge.

The implications are significant as it relates to patient health outcomes. If a SLP with direct patient contact is confident in their skills, it may be a result of their symbolizing, forethought, vicarious, and self-regulatory capabilities (Bandura, 1986) based on prior experiences. However, for the SLP to engage in self-reflective aspects, they must have the insight and awareness to analyze their thoughts, performance, level of knowledge, and their actions taken (Bandura, 1986). In the absence of negative consequences of their actions (e.g., negative patient health outcomes) associated with their actions, it may appear that the individual made appropriate and sound decisions, which would reinforce their belief they have the appropriate level of knowledge. Furthermore, the triadic reciprocality (Bandura, 1986) of behavior, cognition, and personal factors along with extraneous factors (e.g., patients co-morbidities) may create additional influences (e.g., complications of diseases, medications etc.). The SLP may make a determination that their skills and knowledge are adequate even in the face of negative consequences as the negative outcomes may be a possibility of a different factor (Bandura, 1986). Given this, an SLP with direct patient contact may have a high level of confidence toward equipment knowledge and no awareness of their lacking real knowledge as reasons for negative outcomes can be attributed to extraneous factors.

In contrast, those with no direct tracheostomy or MV patient contact had lower levels of confidence, yet, performed better on the KCT-TMV equipment knowledge skill set. Through the lens of the SCT (Bandura, 1986), it can be speculated that those without direct contact rely on symbolizing capabilities to aid in forethought and planning. If they recognize that their confidence is low in a skill area, they may seek out methods for vicarious learning and be self-driven to self-evaluate their knowledge and skills. With this process, they can make the determination if their skills are adequate as compared to the standard they hold as the unit of measure. Given that they do not have direct patient contact, symbolic capability is limited to only a thought and limited in real action thus creating a potential of low confidence.

Further analyses of the direct patient contact included the averages of hours per week the SLPs worked with the tracheostomized or MV patient populations. Similar to the findings and implications above, SLPs with zero hours per week scored higher than SLPs working 11-20 hours when referring to equipment knowledge. The implication of this finding is consistent with above.

SLPs reporting working 31-40 hours per week scored higher on terminology than SLPs with 1-10 hours per week. Referring back to the concept of symbolizing, forethought, vicarious, self-regulatory and self-reflective capability as indicated by the SCT (Bandura, 1986), SLPs with exposure to the tracheostomized or MV patient population may allow for a greater foundation of learning specifically through the aspects of repeated exposure. However, no differences in knowledge were found in lab values, disease and illness, and psychological factors, which creates question if these skill sets are discussed and trained prior to reaching the clinical filed or while in the clinical field. This may indicate that direct clinical contact does not add knowledge in the areas of lab values, disease and illness, and psychological factors or that overall knowledge in these areas is lacking among SLPs.

In the matter of populations served and knowledge, SLPs working with pediatrics and adolescents demonstrated less knowledge of equipment and pediatrics demonstrated lower scores regarding anatomy and physiology as it relates to tracheostomy and MV. It is important to highlight that the volume of pediatrics and adolescents that require tracheostomy and MV in the United States is unknown due to reasons as addressed in chapter two. It is equally important to highlight that the large volume of pediatric and adolescent services are provided in the general main stream school settings, outpatient, and clinics in which the tracheostomized and MV pediatric patient populations would not usually be attending. This does not mean that there are not pediatrics with tracheostomy or MV and therefore, caution must be exercised when making inferences about population generalities. The implications of this finding include SLPs who work with pediatrics or adolescents may not seek out knowledge or training on topics that do not directly influence their ability to provide competent services. Referring back to triadic reciprocity (Bandura, 1986) environmental and personal factors may have an overriding influence on the pursuit of training. If the SLP perceives their skills and knowledge are adequate for their targeted patient population and setting, the lack of seeking training may be related to the lack of personal benefit. Furthermore, if the environmental factors (e.g., school setting) do not support treating tracheostomized and or MV patient populations, the motivation for training in these skill areas may be lacking or reduced.

An additional finding was SLPs treating pediatrics and adolescents indicated low levels of confidence related to the equipment and anatomy and physiology skill sets within the KCT-TMV. Although not statistically significant, the implication of this finding is SLPs who work with pediatrics and adolescents appear to recognize limited knowledge areas (e.g., equipment and anatomy and physiology). However, due to personal and environmental reasons, pursuit of training for tracheostomy and MV may be limited. This does not imply that those SLPs are less competent overall than others are, rather skills are founded in areas other than tracheostomy and MV.

SLPs providing services to adults demonstrated greater knowledge in lab values as compared to SLPs who do not work with adults. Similar to SLPs with greater exposure to the tracheostomized and or MV patient populations, SLPs working with adults may have a greater exposure to lab values. This may allow for a greater foundation of learning specifically through the aspects of repeated exposure, vicarious learning, modeling, observational learning, retention, production, and motivation (Bandura, 1977).

Clinical settings additionally provided insight to the knowledge and skills of practicing SLPs in the United States as it relates to tracheostomized and MV patient populations. SLPs working in acute care score higher while those working in SNFs scored lower on the KCT-TMV knowledge related to psychological factors. The implications for this finding is that SLPS may be an instrumental source for identifying needs for psychological services at the acute stage of a patient's illness. By providing early psychological interventions, is may be possible to decrease long-term negative effects. This would possibly improve overall patient mental and physical health outcomes as positive emotional and psychological experiences while in the acute stage has been found to produce a positive impact of health outcomes (Brodsky & Brady, 2013; Rattray et al., 2005).

In contrast, SLPs in the SNF setting demonstrated lesser knowledge on the KCT-TMV as it relates to psychological factors and anatomy and physiology. In a SNF setting, patients are predominantly medically stable, yet require nursing or rehabilitative care. The lack of SLP knowledge related to psychological factors may negatively affect the patient in that the SLP may not be able to recognize or be aware of psychological needs and therefore not make the appropriate referrals for psychological supportive services. Referring back to the SCT (Bandura, 1986), “The capability for intentional and purposive action is rooted in symbolic activity” (p. 19). If the SLP does not have the ability to create a symbolic representation of psychoemotional factors, they will have a limited ability to create a guide for future situations. In addition, it will limit forethought and self-regulatory mechanisms. The SLP must be aware of their lacking knowledge in efforts to seek training and create the symbolic foundations toward psychological knowledge.

As previously stated, patients at this level of care are predominantly medically stable. Any potential surgical or medically altered changes in anatomy and physiology are rare for patients at this level of care, however it does not mean that knowledge of anatomy and physiology are not necessary. If the SLP is aware that changes to their patient caseload will most likely not involve anatomy and physiological changes for their patient, the possible implication is that the SLP does not find the need for training in this area as a need. Similar to implications of SLPs working with pediatrics or adolescents, if the knowledge is perceived as not necessary for the SLP to perform their job for the patients they serve, through personal and environmental reasons, they may not pursue training for anatomy and physiology for tracheostomy and MV patient populations. This does not imply that those SLPs are less competent overall than others are, rather skills are founded in areas other than tracheostomy and MV.

SLPs working in outpatient and LTACH settings demonstrated higher knowledge of terminology related to tracheostomy and MV on the KCT-TMV. At the OP and LTACH levels of care, factors related to LOS and familiarity with each patient may serve as a factor in this finding. The longer duration of speech services at this level of care as compared to acute and SNF allows the SLP to have repeated exposure to the terminology used by the team members. This may imply that the greater the exposure to terminology, the greater the learning which refers back to the premise of educational psychology. A second implication is that SLPs in these settings seek training in specific areas related to terminology for reasons unknown from the study. It may be speculated that at the OP setting, SLPs may have an infrequent caseload of tracheostomy and MV patients and in the LTACH setting terminology may be inconsistent. In accordance with the SCT (Bandura, 1986), this may trigger the SLP to evaluate/re-evaluate internal standards against their abilities (e.g., self-regulatory capabilities) resulting in a determination if their abilities are adequate to safely treat the patient. If the SLP is aware of lacking knowledge or unsure of abilities, and there is personal and environmental factors that would encourage seeking training, there is a possibility that the SLP would pursue education. However, if the SLP is unaware of lacking knowledge, the need for training may not be considered. The end result would be a practicing SLP providing services in which knowledge and skills are less than competent as directed by the ASHA Code of Ethics (2016b).

In the acute care setting, SLPs performed lower than those not in the acute care setting on knowledge as it relates to equipment. Similar to the results in the pilot, this finding may indicate that training is not different between those in acute and those not in acute care. This implies a few possibilities. First, working with the tracheostomized and MV patient population in the acute care setting does not appear to increase knowledge. Or secondly, SLPs working in acute care are not aware of their real knowledge level as compared to what they perceive as knowledgeable. Again, participants did perform better than chance or a guess, but the impact of working in the acute care setting did not demonstrate any difference in equipment knowledge.

SLPs working in the school setting demonstrated lower scores on lab value knowledge. Similar to the above point, patient caseload will most likely not involve lab values, therefore the SLP may make the personal and environmentally driven decision to not obtain training in lab values. However, many SLPs working in the schools pick up “per diem” or as needed work in healthcare centers during weekends or summer months when school is not in session. The SLP would then encounter patients whose health is monitored by lab values (e.g., CHF, DM, renal disease etc.). If the SLP does not have knowledge in lab values and the consequences of a patient’s lab values changing, they will also lack the knowledge to determine if certain treatment options are contraindicated; thus placing the patient at risk.

While the SCT (Bandura, 1986) defines the triadic reciprocality as reasons for an individual’s behaviors or functioning, it is also important to discuss the matter of human agency and collective agency (Bandura, 2000) as it relates to human behaviors. For

SLPs, in clinical practice, SLP's rarely work in isolation. In the above settings, SLPs do not have control over their environment, social situations, or their organizations practices, therefore they may seek out others with various expertise to help them achieve what it is they want/need. This is referred to as agency or when in a group, collective agency (Bandura, 2000). The concept that in the presence of a group (e.g., medical team), the SLP may perceive to perform services competently without the necessary training. This may afford them the rationale for their lack of personally seeking training for a skill set if they rely on collective agency. If this is the case, the implications of relying on other group/team members for knowledge in various skill sets decreases the educated collaborative interaction among specialists, which may decrease informed decision making of the team. Ultimately, undereducated or limited knowledge of one team member may influence the group as a whole resulting in less than ideal patient health outcomes.

Self-efficacy and confidence. The results of the study contain many implications regarding self-efficacy, or an individual's belief in their own ability to think, organize, plan, and complete tasks that result in manageable outcomes (Bandura, 1995). This study looked at the relationship of self-efficacy, knowledge, confidence, and the type, amount, and pursuit of training. Through the KCT-TMV, self-efficacy was high in the following situations (a) when confidence with the tracheostomized and or MV was high, (b) the SLP receives training through multidisciplinary inservices at work, teleconferences, and participation in a CCU delivery care group, (c) SLPs' motivation to work with this patient population based on QoL factors, and (d) employer support for training.

When a participant reported high confidence in a skill set, it did not equal high knowledge; however, it did correlate with high self-efficacy. Shinnick and Woo (2014) discovered gains in self-efficacy and knowledge, yet no correlation between self-efficacy and knowledge nor was self-efficacy an indicator of “good” knowledge. The implication of the current study’s finding is participants who indicated high confidence think they are knowledgeable in the skill sets assessed, yet that is not necessarily the case. In addition, they report a high level of belief in their own ability to think and complete tasks that they perceive to be skilled in with the assumption they can control outcomes. This is a concerning finding because a SLP may have the belief they can manage a given situation and may not have insight to knowledge lacking, they pose a potential harm to the patient. In addition, they may not pursue additional training. Therefore, in referring back to the predicted behaviors of the SLP based on the SCT (Bandura, 1986), it is apparent that when confidence is high, self-efficacy is inversely related to a high pursuit of advanced training.

Yet, in the situation when the SLP receives training through multidisciplinary inservices at work, teleconferences, and participation in a CCU delivery care group, high self-efficacy appears to be equal to a high pursuit of higher/advanced training. However, this association must be interpreted with caution, as the participant was not asked in the survey if their involvement with multidisciplinary inservices at work, teleconferences, or a CCU delivery care group was self-motivated or directed by an employer. This may result in a difference to the relationship of self-efficacy and training in this particular situation. However, in the situation when the SLP reported employer support for training, self-efficacy was high. Additional studies related to the impact of employer support of training, knowledge, and self-efficacy is warranted. Other implications include SLPs who are involved with multidisciplinary inservices at work, teleconferences, or participation in a CCU delivery care groups may have a distorted belief in their own ability to think and act or they may believe they have the ability to control the patient outcome.

It is important to reflect back to the aspect of learning and the benefits of simulation as indicated in the literature as it relates to self-efficacy. In the current study, participants with a higher self-efficacy score were involved in multidisciplinary inservices at work, teleconferences, or participation in a CCU delivery care groups. Of these modalities, simulation or hands on experience were limited or non-existent. In the literature, the benefits of simulation training on self-efficacy and knowledge have been growing. In nursing students, simulation training resulted in increased self-efficacy (Goldenberg, Andrusyszyn, & Iwasiw, 2005), and in SLP training, simulation provided increased and maintained confidence for four months, yet did not indicate matters of adequate knowledge (Ward et al., 2014). Again, Shinnick and Woo (2014) noted gains in self-efficacy and knowledge, however, no correlation was noted between self-efficacy and knowledge. In addition, was self-efficacy was not an indicator of "good" knowledge (Shinnick & Woo, 2014). The current study is consistent with the literature in that high self-efficacy does not indicate high knowledge based on the results of the KCT-TMV.

Self-efficacy was also high in participants who indicated their motivation to work with tracheostomized and or MV patients based on QoL factors. SLPs are trained as "communication specialists" with significant training surrounding the cognitive and linguistic aspects of communication. In the presence of a tracheostomy or MV, a patient's verbal communication is limited or the patient is unable to speak. Through the lens of the SCT (Bandura, 1986), SLPs may reflect on their symbolic representation of communication (e.g., human connection or social interaction) and the impact on quality of life, therefore creating a motivation for assisting the tracheostomized and or MV patient. Furthermore, the SLP may consider the potential positive impact of communication could have on a patient and or family and then strive to plan a course of action based on their symbolic representation of the benefits of communication. While these factors may motivate the SLP to work with the tracheostomized or MV patient, it does not indicate knowledge or skills are adequate. Therefore, self-regulation and self-evaluation against those an individual's internal standards occur regardless of knowledge level. The implication is that a SLP may have the best of intentions and believe that they are doing right by the patient based on their symbolic representation of communication or swallowing as a positive factor for QOL; however, their knowledge may not be adequate to support the overall medical needs of the patient. This may result in negative patient outcomes when the SLP's knowledge is less than adequate.

In contrast, self-efficacy was low when the participants indicated they were lacking knowledge in specific skill sets (e.g., mechanical ventilation, equipment, anatomy and physiology, diagnostic instrumentation, lab values, disease, disorders, treatment methods). SLPs scored even lower in self-efficacy when they indicated lacking knowledge in "everything" related to tracheostomy and or MV. In addition, self-efficacy scores were low when the participant reported uncertainty toward their level of knowledge and skills in the diagnosis and treatment of tracheostomized and or MV patients. This finding resonates with self-reflective capability (Bandura, 1986). Bandura (1982, p. 21) states:

Among the types of thoughts that affect action, none is more central or pervasive than people's judgments of their capabilities to deal effectively with different realities. It is partly on the basis of self-percepts of efficacy that they choose what to do, how much effort to invest in activities, how long to persevere in the face of disappointing results, and whether tasks are approached anxiously or self-assuredly.

Therefore, participants who recognized that they lacked knowledge in one, several, or all skill sets on the KCT-TMV, may have done so through the lens of self-reflection. Given the stimuli on the KCT-TMV and the participants' self-regulatory abilities, participants may have paused to think about the question, their response, self-appraise their response, and then made a determination of their perceived accuracy or skills on subsequent questions within the KCT-TMV. The design of the KCT-TMV did not inform the participant if their responses were correct, therefore, the participant must complete a self-reflection and respond to subsequent questions based on self-regulatory thought. Similar to clinical practice, responses or actions are completed followed by self-reflective actions.

The implications of SLPs with reported lacking knowledge when treating patients are significant when looking at the pursuit of knowledge, confidence, and self-efficacy. If a SLP thinks and acts without adequate knowledge, upon completion of the action, self-reflective capability may result in disappointment and will have an impact on future events thus creating hesitation, second-guessing, or nervousness in the presence of a similar situation. It may even prevent the pursuit of training if self-reflection resulted in negative emotional responses (e.g., anxiety or fear) and or lower confidence of ability for the SLP. Further study is needed in the area of self-reflective activity and training with SLPs treating the tracheostomized and or MV patient populations.

Trends. The qualitative aspect of the KCT-TMV addressed trends related to the provision of care, pursuit of knowledge, and factors that may prevent or limit practicing SLPs in the United States from obtaining specific training for the diagnosis and training of tracheostomized and MV patient populations. Key areas of analyses included SLP motivation, SLP perceptions of knowledge areas lacking, educational opportunities, factors prohibiting training, employer support, definition of EBP per ASHA's version, knowing if skills and knowledge are adequate, the impact of healthcare changes on EBP, training, and in patient care.

***Motivation*.** The predominating trends indicated that SLPs were motivated to work with the tracheostomized and or MV patient population based on the patients QoL and the SLPs desire for challenging and interesting work. Further analyses noted that the trends were divided into three groups, regard for self (e.g., SLP driven), regard for the patient (a.k.a., patient driven), or forced. For those motivated by the patients' QoL, it can be speculated that the SLP symbolizes communication, swallowing, and function as QoL and therefore, the SLP is motivated to work for the betterment of the patient. This coincides with the SCT (Bandura, 1977). However, motivation through the lens of SCT involves self-regulation and self-motivating function (Bandura, 1991) yet, based on the results of the study, it appears to also involve self-driven factors.

SLPs' perceived ability to control or gain control of a given situation and outcomes were reported as a trend (e.g., gain professional learning opportunities, team collaboration, and involvement). It may be speculated that the participants who reported their motivations were based on self-driven factors (e.g., team collaboration, professional learning opportunity, SLP desire for challenging and interesting work), may attend closely to their work performance and set goals accordingly (Bandura, 1991). However, this does not imply that the goals involve the pursuit of training. Close attention and monitoring of performance may decrease the pursuit or not have an impact at all. According to Bandura (1991) the compounding factor is an individual's internal drive or "self-directedness" (page 251). Furthermore, self-directed behaviors are more readily obtained in the face of consequences. Referring back to the concept of collective agency (Bandura, 2000), and that SLPs work in collaboration with other healthcare providers, the SLP may perceive or dismiss patient negative consequences because of other factors, and therefore not identify the consequences with their actions. In this case, the SLP may not have the ability to self-monitor and self-reflect, and therefore pursuit of training my not be perceived as a necessity or need. Additionally, factors of personality, symbolizing capability, and forethought capability compound the overall complexity of an individual's motivation toward the obtainment of training.

The implications have several possibilities. One implication is certain personality types may influence motivational factors. Secondly, a SLP's personal definition of QoL and the impact of supporting a patient's communication or swallow function through therapeutic interventions may drive motivation. Lastly, based on the SCT (Bandura, 1991), the SLP may perform self-monitoring and self-reflective behaviors driving their motivation. The concept of "consequences" and the impact on self-monitoring warrants future study especially in the presence of collective agency. Further research is warranted in the area of personality, self-monitoring, and self-regulation as it pertains to SLPs and the motivation for training.

SLP perceptions of lacking knowledge. Through the participant's responses, it was evident that the ventilator/mechanical ventilation, as well as "everything" (i.e., all areas addressed in the KCT-TMV), were dominant as areas of lacking knowledge. The concern with this finding is if the knowledge and skills are lacking in the domain of artificial respiration and the SLP is required to make modifications of the ventilator during various diagnostic and treatment interventions, it is possible that adverse patient outcomes will occur. In addition, this finding implies that SLPs are providing services to a medically complex patient population without the foundational competencies, which is a violation of the ASHA Code of Ethics (ASHA, 2016b).

Educational opportunities. In matters of educational opportunities, participants indicated that online (e.g., teleconferences or webinars) were the preferred method of training due to limited resources (e.g., time or money). However additional comments indicated that hands on and peer based training was preferred for retaining and applying information as well as increasing overall confidence. This is consistent with the current nursing and medical training literature in that simulation and direct hands on training result in the greater retainment and application of knowledge (Dorton et al., 2014; Lighthall & Barr, 2007).

Literature specific to SLPs indicated that simulation based or hands on training aided in increasing and maintaining confidence (Ward et al., 2014); however, it is important to state that it did not indicate adequate knowledge or competency. The current study is consistent with the literature in that despite reports of involvement with multidisciplinary trainings at the workplace or involvement with the critical care team, knowledge score was not different from those without involvement yet self-efficacy and confidence was. Ultimately, this translates to SLPs involved in these types of training modalities report themselves as more confident and with a higher report of self-efficacy, yet they do not have higher levels of knowledge as it pertains to the knowledge skills assessed in the KCT-TMV. This raises concerns for SLPs practicing with less than competent skills placing patients at risk, as well as possibly violating the ASHA Code of Ethics (ASHA, 2016b).

Factors prohibiting training. The participants indicated that limited resources (e.g., time and money) were the predominant reasoning for not pursuing training. Limited resources is an external factor and different from the psychological drive of obtaining knowledge, however one can argue that limited resources is an aspect of environmental factors under the SCT (Bandura, 1977; Bandura, 1986; Bandura, 1991). Given that behaviors are influenced by cognitive, personal, and environmental factors and that there is a mutual and interactive relationship among these variables, environmental influences (e.g., time and money) may in fact be a key determinant of the pursuit of training. SLPs may make different decisions based on the perceived impact of the interactive relationship of cognitive, personal, and environmental factors which is in accordance with reciprocal causation noted in triadic reciprocality (Bandura, 1986). The question posed to the participants was what prohibits or limits the obtainment of training; yet, it did not ask if those limiting factors stopped them from enrolling in training. Despite the report of limited resources, 92.1% (n= 211) indicated some form of involvement with training. This again, supports the SCT and triadic reciprocality (Bandura, 1986) in which the interactive relationship of the factors are considered one aspect toward the pursuit of training, and will provide variable influences on action of the individual. This finding indicates that SLPs recognize the importance and need for advanced training for the tracheostomized and or MV patient populations, and despite limited resources, SLPs continue to participate in training modules.

Employer support. Trends related to employer support, were focal to the employer wanting the SLP to be trained; however, provision of resources (e.g., time off, funds for education etc.) were reported as not consistent among the participants. Approximately one third of participants indicated no support, yet the participants continued to report involvement with training and education. Consistent with the discussion above related to factors prohibiting training, the interactive relationship involved in triadic reciprocality may influence the action of the individual. In the case of training for the tracheostomized or MV patient population, participants demonstrated their self-motivation to seek training was based on perceived importance and possibility through the lens of self-reflective capability (Bandura, 1986). However, while training was pursued, it did not indicate an increase in knowledge as measured by the KCT-TMV. This finding indicates that while SLPs perceive training as important, and they continue to pursue training despite limiting environmental factors, the training received does not support the level of knowledge necessary for the competency. This supports the need for regulated training and competency measures that are uniform in both training modalities as well as within clinical practice. In addition, it is also consistent that training may increase confidence and self-efficacy, yet it does not indicate increased knowledge (Ward et al., 2014).

Additionally, the literature approaches employer support through the lens of Maslow's Hierarchy of Needs (Benson & Dundis, 2003). Maslow (1943b) indicated that an individual will seek to achieve needs based on a series of levels to explain an individual's motivation. These levels include physiological, safety, social, self-esteem, and self-actualization (Maslow, 1943b). Benson and Dundis (2003) utilized Maslow's hierarchy with a modification to apply it to the workplace. While the levels were the same, the application was slightly altered.

In the workplace, the employees' physiological needs were based in salary. Safety was based in a secured working environment in which training was considered a key element (Benson & Dundis, 2003). If safety was met, it is postulated that the employee will seek social belongingness, which then leads to self-esteem through appraisals and incentives (Benson & Dundis, 2003). Lastly, the employee would be able to move toward self-actualization and learn new things as well as develop their true potential (Benson & Dundis, 2003).

Furthermore, if the employer supports the SLP in the pursuit of training, the SLP may make reflective and regulatory decisions as to which mode of learning/training best serves their learning method (Bandura, 1977). The current study and the current literature indicate that with employer support, the SLP may have the opportunity to progress through the levels hierarchy of need, provide self-reflection, gain self-esteem and self-efficacy with ultimately approaching self-actualization and the drive for ongoing development of one's potential. This may lead to staff retainment, reduced organizations costs, improved patient care outcomes, and may allow skilled in house hands on or simulated training which has been demonstrated as a beneficial mode of training (Dorton et al., 2014; Goldenberg et al., 2005; Lighthall & Barr, 2007; Shinnick & Woo, 2014; Ward et al., 2014)

Definition of EBP per ASHA. The trend associated with the participants' definition of EBP was a limited understanding of the interactive aspects between reach, clinical expertise, and patient/client/caregiver perspectives. Almost half of the participants stated EBP was related to research only. This finding implies that SLPs are not providing EBP if they do not incorporate clinical expertise and patient/client/caregiver perspectives in conjunction with research/the literature in their care plan. Furthermore, it indicates a lack of understanding of the equal relationship the patient/client/caregiver has in the planning of the diagnostics and treatments of the individual/patient. This raises concerns for a disruption in communication between the patient/client/caregiver related to the patient's perspective of priority/need, goals, and insight to illness or prognosis. Considering the SLP is responsible to "serve individuals, families, groups, and the general public through a broad range of professional activities" (ASHA, 2001, p. 5) a failure to include and acknowledge the patient/client/caregiver as an essential aspect of care or the use of clinical expertise violates the ASHA scope of practice. It is apparent that ongoing education of EBP and the clinical application remains an area of ongoing need for the SLP in the United States.

Knowing if skills and knowledge are adequate. In the matter of knowing if skills and knowledge were adequate for diagnosing and treating the tracheostomized and or MV patient populations, trends indicted that over one third of the participants had perceptions that their skills are not adequate, and 13.5% of the of the participants had some objective form (e.g., competencies at work) of measurement of knowledge and skill. Despite these numbers, participants indicated they continue to provide services to the tracheostomized and or MV patient populations. This raises concerns for competency and adherence to the ASHA Code of Ethics (ASHA, 2016b). This also brings consideration back to forethought capability, vicarious capability, and self-regulatory capability (Bandura, 1986). This finding is concerning for the patient's safety and the possibility of patient harm based on lack of competency. Even more concerning is that the participants self-reported a lack of knowing if skills are adequate yet they continue to provide services and did not indicate reference to their ethical obligation (ASHA, 2016b) of competency prior to the treatment of patients.

Impact of healthcare changes on EBP, training, and in patient care. Of all of the qualitative questions, the last few were concentrated on healthcare changes and the impact on EBP, training, and patient care. While these do not directly tie to the SLP, it does have an impact on their performance; therefore, the phenomena associated with these factors will be discussed.

Healthcare changes and the impact on EBP practice centered on financial and business aspects of care (e.g., productivity, reimbursement, documentation expectations). These external forces are not controlled or managed by the SLP, but rather directed by governmental or organizational practices. However, of the stated trends related to EBP and healthcare changes that did directly affect the SLP providing care was the change in allowed diagnostic and treatment time with patients. Again, time with patients translates to billable and financial gains for the organization. As previously stated, due to the complexity of the tracheostomized and MV patient population, significant time of patient care is with collaboration of services and “non-billable” aspects. This trend implies a push for a reduction in collaboration or it may indicate that healthcare teams are becoming more streamlined resulting in less “non-billable” time. Currently, research is expanding in the matter of benefits of “trach-teams” and ventilator pathways and demonstrating the efficiency and patient benefits of such teams (Arora et al., 2008; de Mestral et al., 2011; Hopkins et al., 2007; Pandian et al., 2012; Parker et al., 2007; Sudderth, 2011; Walter, 2012).

Healthcare changes influencing training were directed at limited resources (e.g., time and money). Participants indicated they once had resources for training with a more recent change in which funds were eliminated from their benefits. Referring back to Maslow’s hierarchy of needs (Benson & Dundis, 2003; Maslow, 1943a), this becomes a threat to the employee’s perception of physical needs and safety as not being met.

Participants indicated online training/webinars were the most appealing form of education; however, results of the knowledge assessment did not indicate a difference in knowledge scores based on online training. In addition, there is no regulation of the content of the training module. ASHA requires that all continuing education providers to include the ASHA approved provider logo with the following statement on all brochures based on their lack of regulation of training courses: “ASHA CE Provider approval does not imply endorsement of course content, specific products or clinical procedures” (ASHA, 2016a)

Two key findings were identified related to the trends associated with healthcare changes and the impact on patient care. These included changes in standard practice (although still unregulated) and a lack of knowledge or awareness of trends or healthcare changes. This indicates a concern for lack of consistent and scientifically demonstrated best practices for the tracheostomized and or MV patient populations. While the complex nature (e.g., multiple co-morbidities or etiology for needed tracheostomy or MV) of the tracheostomized and or MV patient population may be possible reasons for difficulty in developing a standard of care, it continues to raise concern for what *is* best practice. Current studies have that found medical terminology (e.g., full vent vs partial vent), tracheostomy or MV timing (e.g., early verse late), or equipment related to the tracheostomized and or MV populations (e.g., ventilator equipment), are not regulated or consistent (Chelluri et al., 2003; Griffiths et al., 2005; Heffner, 1993; Kojicic et al., 2011; Lone & Walsh, 2011). In addition, training for healthcare practitioners is also not regulated or monitored by a medically skilled organization or entity. While practitioners may enroll in training, it does not mean that the content or method of training will result in increased knowledge. As the results of the current study found, participation in training does not mean increased knowledge in skill sets tested on the KCT-TMV.

Limitations of the study

Expert Panel

Recruitment of physicians proved to be a limitation of the expert panel. Over a five-month span (i.e., May 2015 through September 2015) and despite personal invitation, posted fliers, hand delivered participant recruitment fliers, office managers facilitating communication with experts, and repeated requests, physician participation was difficult. In addition, participant sampling may be considered a limitation. Participants were recruited only from a local area in the northwest suburbs of Chicago and included only otolaryngologists, intensivists, pulmonologists, and neonatologists. It is possible that work demands and limited time created difficulty in obtaining responses. It is also possible that additional medical experts could have offered additional insight toward the knowledge and skills necessary to treat and manage this patient population.

Pilot

Recruitment of experts, practicing SLPs, and students proved to be a limitation of the study. The pilot was initially completed in the Chicago metropolitan area with four stakeholders. Each stakeholder established a limit on the number of announcements allowed as well as how the flier would be permitted to be disseminated. This may have impacted the overall participation.

Similar to the expert panel, obtaining physician involvement proved difficult. It can be speculated that the physicians work demands, limited time, or lack of awareness of the study created difficulty in obtaining responses. The fliers specifically requested otolaryngologists, intensivists, pulmonologists, neonatologists, and critical care nurses. It may have been beneficial to expand the specialists to include a larger diversity of medical specialists.

Main Study

Recruitment of speech language pathologists in the United States was initially focused on the following ASHA special interest groups and communities; 2: Neurophysiology and Neurogenic Speech and Language Disorders, 10: Issues in Higher Education, 13: Swallowing and Swallowing Disorders (Dysphagia), 15: Gerontology, SLP Healthcare, and Research. ASHA does contain many additional SIG's and therefore the self-selection of specific SIGs introduces a self-selection bias into the research process. In efforts to offset this bias, the use of snowball recruitment and social media recruitment was introduced; however, the bias is noteworthy as the original notice of participation recruitment was announced only to several identified ASHA groups. This can be considered a significant sample limitation of the study.

Secondly, all participants were required to have access to a computer or an online environment. Many participants indicated in the qualitative aspects of the study, that time and resources were limited resulting in limited access to online training. If the resources are lacking for training, they most likely are lacking for research participation.

In addition to the sample limitations of the study, the number of participants was smaller than planned and anticipated. While the reason(s) for lack of participation from the 186,000 ASHA professionals (2016e) is unknown, it can be speculated that the subject matter (i.e., tracheostomy and MV) may have created negative responses (e.g., anxiety or fear) that may have limited a potential participant from taking the survey. In addition, it is possible that those who did participate shared their thoughts or perceptions of the study with peers. The discussion could have created a negative reaction and therefore, additional SLPs who heard of the study from a participant chose not to participate in the study. However, in contrast, those who did participate and wanted to re-attempt the study may have chosen to do so from a different computer (e.g., a different identifier). Due to the anonymity of the study, participants were not blocked from taking the online survey more than once except by technology-based identifiers resulting the potential for participants learning bias.

Another limitation of the study is my professional role in the field of speech-language pathology. Under the ASHA Code of Ethics (2016b), I am obligated to report ethical violations including those related to lack of competence. The potential that participants feared being identified despite the stated anonymity of the study may have influenced their willingness to participate. Secondly, ASHA has recognized me as a knowledgeable professional in the matters of tracheostomy and mechanical ventilation. If the participants recognized my name, and are aware of my expertise, the participant(s) may have more hesitations or fears associated with being identified as lacking the required competency skills for the tracheostomized and or MV patient populations needs.

An important finding was those participants who attempted and dropped out, had poor scores on the KCT-TMV. One can speculate that the drop out participants may have had negative emotional responses (e.g., anxiety, awareness of lack of knowledge, embarrassment etc.) or the survey may have enlightened their lack of knowledge and resulted in fear associated with the potential of being identified and possibly labeled as being incompetent. In 2016, ASHA updated the Code of Ethics and enforced that all licensed SLPs sign a document with their licensure renewal that they have read and will abide by these changes. Therefore, of the above reasons for a lack of discussions related to tracheostomy and MV and critical illness, the most intimidating for the professional is the potential of violating the ASHA (2016b) Code of Ethics. Appendix J lists some of the potential ethical violation considerations.

Ultimately, the reasons for the lack of participant volume will remain unknown; however, in my professional experience, SLPs do not like to discuss complex medical topics of the critically ill. Reasons for the lack of discussion include but are not limited to; lack of training, diversity of terminology, lack of education regulation, fears of being "incompetent" in an area of professional scope, and possibly violating the ASHA code of ethics.

Recommendations

Expert Panel

Recommendations for future research with experts may include a new knowledge and skills assessment specifically for physicians in the intensive care or long term acute care settings in which the tracheostomy and MV patient populations reside. Suggested areas of knowledge assessment include Maslow's (1943a) hierarchy, psychological illness (e.g., anxiety, depression, PTSD, etc.) and medically induced illness (e.g., delirium). Based on the results, training and additional continuing educational programming may be developed to aid in improved patient care and overall health outcomes.

The impact of addressing a patient's hierarchy of needs (Maslow, 1943a) is another area of recommended research. The consideration of a patients need was above discussed, however additional consideration should be placed on perspectives of the healthcare provider compared to the patient and compared to the caregiver. The analyses should include various levels of acre (e.g., acute, subacute, long-term acute care, and home). Questions related to the perceptions of need as compared to stage of medical need may serve insightful toward the psychological interventions most prudent at various times of the illness.

Lastly, it is recommended that a repeated expert panel be completed on a revised KCT-TMV to ensure validity and reliability of the assessment tool. Expanding the stimulus items to a larger number (e.g., 10 questions) within each skill set may also provide a greater sense of real knowledge within each skill set. In addition, a larger sample of experts of diverse backgrounds may serve as insightful toward the specialists' knowledge as well as confirm the validity of the KCT-TMV.

Pilot

The concepts founded in educational psychology, such as training in an individual's preferred learning style improves learning (APA, 2014), and that the greater the duration of training results in a greater level of knowledge, are supported by the results of this study. Furthermore, recognizing that multiple specialists are involved in the diagnosis and treatment of the tracheostomized and MV patient populations, educational psychology and the concept of specialty training through the use of multidisciplinary and team based modules may serve as a key method of diversifying knowledge. If the SCT (Bandura, 1977) is additionally applied, reciprocal interactions (e.g., cognition, behavior, and environment) may result in an individual making efforts to exceed or place limits on their ability. Therefore, with environmental factors (e.g., multiple specialists, team rounds, multidisciplinary inservices and methods of learning identified as ideal for each team member), a multidisciplinary team may provide a greater duration of training resulting in a greater level of knowledge. Given the findings of the pilot, and the noted differences among the groups (i.e., students, SLPs, and experts), further study regarding methods of learning, duration of training, motivations for training, and environmental factors warrant additional investigation.

In addition, it is recommended that a revision of the KCT-TMV be created with a second validation. The revision of the KCT-TMV may provide SLPs and institutions a standardized measure of skill competency screening. In no way would the KCT-TMV be the sole determinant of a SLP's competency; however it would allow for a baseline of knowledge level and identify areas of strength and or weakness across skill sets. This would allow the SLP and or employers potentially establish a plan for advanced professional training of the SLP in efforts to provide competent speech pathology services.

Main Study

Professional practice recommendations are present based on the results of this study. It is recommended that a specialty certification for tracheostomy and MV or critical care be developed to ensure adequate training and knowledge of SLPs working with the tracheostomized and or MV patient population. It is also recommended that a standardized assessment tool in the skill sets necessary to treat this patient population be adopted and standardized to screen for strengths and weaknesses to aid in educational goal planning for professionals. Lastly, it is strongly encouraged that ASHA consider revisiting the training requirements of the graduate programs in speech pathology and consider a divide between medical and educational speech pathology based on the results of this current study and the reported growth in speech pathology services in healthcare. The diversity of knowledge between academic settings and medical settings no longer allow a generalized speech pathology degree to permit a professional to be deemed competent to treat across the life span or diseases.

The current study results and implications indicate the need for a significant number of future research recommendations. Areas related to SLPs and the tracheostomized and or MV patient populations include, but are not limited to; knowledge and gender, knowledge acquisition and simulation based training, employer support and knowledge, direct patient contact and knowledge, motivation of SLPs (e.g., patient driven factors compared to SLP driven factors), and the impact of understanding and using EBP in clinical practice. In addition, studies related to confidence, self-efficacy, and real knowledge of practicing SLPs in the United States related to the tracheostomized and MV patient populations is strongly encouraged.

Gender demonstrated a difference in knowledge, however due to the limited sample of males, it is recommended to re-run the study with a greater sample of participants in effort to determine the accuracy of the initial findings. Considering the current population of SLPs in the United States is listed at greater than 186,000 (ASHA, 2016e), specific data related to gender and various demographics (e.g., place of employment, highest degree earned, years in clinical practice etc.) may serve beneficial in targeting and obtaining a greater sample of males. Involvement from ASHA may serve well in the obtainment of such data.

In the matter of confidence, self-efficacy, and real knowledge, future study may aid in the understanding of knowledge acquisition as compared to confidence and self-efficacy in the presence of simulation based training. Participants in the current study reported that hands on and simulation based training was beneficial. The current literature supports the benefits of simulation (Dorton et al., 2014; Goldenberg et al., 2005; Lighthall & Barr, 2007; Shinnick & Woo, 2014; Ward et al., 2014). Simulation based training affords a practical and hands on approach to skill and knowledge retention without placing patients at risk for harm. Therefore, it would be beneficial to assess if there is a difference in knowledge between simulation-based training for SLPs in the areas of tracheostomy and or MV as compared to other forms of training. This may aid in the development of advanced training programs for SLPs. Foundations of this proposed study may be in educational psychology, cognitive psychology, or Bandura's (1977) Social Learning Theory.

In looking at professional growth and life-long learning of SLPs over the course of their career, the aspect of employer support and knowledge acquisition is also an area of recommended study. Through the lens of Maslow's (1943a) hierarchy of need, the presence or absence of employer support toward training of SLPs with tracheostomy and or MV and employees knowledge levels with and without employer support warrant investigation. Furthermore, research looking at years of service at an organization and using Maslow's hierarchy (Maslow, 1943a), may serve as an indication of how employers or employees could build an internal teaching and learning model for the betterment of employee satisfaction and patient care outcomes. In addition, aspects of self-efficacy could be integrated to discern relationships as employees possibly progress through the proposed Maslow's (Maslow, 1943a) hierarchy of needs in the workplace.

Additionally, it is recommended that future research continue to assess real as compared to perceived knowledge as it relates to this patient population with a concentration on the impact of SLP direct clinical contact (e.g., hours per week) with the tracheostomized and or MV patient population. It is suggested that an assessment like a skills and knowledge test (i.e., KCT-TMV) be used and then analyzed against the SLPs' perception of their score, or possibly even have the participant self-grade their survey and obtain qualitative reports of the participants' perspectives. Furthermore, SLPs may benefit from participating in a case study knowledge and skill assessment with a multiple-choice survey followed by a qualitative response explaining their clinical judgment. Trends can then be identified for areas of lacking knowledge, areas of strength, or trends in clinical practice among SLPs in the United States. The theoretical foundations of this proposed study remain in Bandura's (1991) SCT.

In the matter of motivation of SLPs to work with the tracheostomized and or MV patient populations, additional study on patient driven factors (e.g., QoL) and SLP driven factors (e.g., opportunity for professional collaboration learning) is recommended. The theoretical foundation may remain in Bandura's (1991)SCT and may incorporate Maslow's (1943a) hierarchy of needs. It is proposed that the element of real compared to perceived knowledge, confidence, and self-efficacy are retained to continue to address the gap in the literature related to SLPs. Furthermore, study related to the presence or involvement of SLPs self-reflective activity and the pursuit of training regarding treating the tracheostomized and or MV patient populations is warranted. Given the SCT (Bandura, 1986; Bandura, 1991) and the results of the current study, the role of self-reflective capability for SLPs in clinical practice, consideration of personality influences, and self-determinism warrants investigation. Studies may consider assessing personality, self-monitoring, and self-regulation as it pertains to SLPs and the motivation for training.

Lastly, recommendations for future study should center on SLPs in the United States' understanding of EBP and the clinical application of the triadic definition proposed by ASHA (2016c). Research may center on the perspectives of the patient/client/caregiver or the SLP and the impact on the patients' health outcomes. While many of the above stated proposed studies target SLPs, it is also suggested that these studies also incorporate all healthcare providers working with the tracheostomized and or MV patient populations (e.g., respiratory therapy, occupational therapy, physical therapy, physicians, nurses etc.).

Implications

The current study has several implications for social change including suggested changes for SLPs, patient care, health outcomes, and organizational staff development and retainment. Additional implications for future research in the area of the care of the tracheostomy and MV patient population is also indicated, yet discussion will remain centered only on aspects related to self-efficacy, real compared to perceived knowledge, and the pursuit of knowledge in efforts to remain within the boundaries of the current study.

Social change for SLPs. This study holds many benefits and opportunity for positive social change in the training and provision of health care for tracheostomized and mechanically ventilated populations receiving services from SLPs in the United States. Using a validated clinical knowledge assessment (e.g., KCT-TMV), SLPs can identify areas of strength or weakness in the areas of tracheostomy and or MV and then focus their specialized training as indicated. In addition, the KCT-TMV may serve as a general knowledge competency screening which can aid in the development of a training plan for the SLP. While the KCT-TMV is a validated tool, it is important to emphasize, the test tool is only one suggested method of determining knowledge. Demonstration of skill is also a requirement under the direction of ASHA (Council for Clinical Certification in Audiology and Speech-Language Pathology, 2013).

The study adds value to the current literature as it relates to the training and skill acquisition of SLPs. The demographic analysis indicated differences in knowledge when direct patient contact/hours per week, patient populations served, settings, and professional training were in specific areas. Using the current study findings, SLPs may identify various demographics and make professional and vocational changes in efforts to increase their access to knowledge and training opportunities in addition to obtaining professional course training. For example, SLPs who wish to wish to work with the tracheostomized and or MV patient populations may consider working in an acute care setting and among a CC care delivery group in efforts to increase knowledge in anatomy and physiology as it relates to tracheostomy and MV. This may lead to positive social change in that SLP awareness may be increased and behaviors may be altered in the pursuit of training.

Furthermore, it raises awareness that while SLPs who work with this patient population perceive they have the knowledge and skills necessary, they may not have the adequate knowledge across the skill sets in the KCT-TMV. This highlights the importance of life-long learning and the ongoing pursuit of training in efforts to maintain and provide competent services as indicated by the ASHA Code of Ethics (ASHA, 2016b). The implication of SLPs perceiving they have an adequate level of knowledge compared to their real knowledge may place patients at risk and or may cause negative patient outcomes.

The results of this study affords a recommendation toward change in policy and training required to coincide with the ASHA scope of practice (ASHA, 2001), "Rules of

Ethics" (ASHA, 2016b) and ASHA standards for the certificate of clinical competence (ASHA, 2014). Considering ASHA has a general guide of the requirements for a graduate degree (i.e., Masters) in Communication Sciences and Disorders (ASHA, 2014; Council for Clinical Certification in Audiology and Speech-Language Pathology, 2013), ASHA does not have any regulations related to specialization in critical care, medical speech pathology, or tracheostomy and or MV. This means that any SLP from an accredited graduate program in Communication Sciences and Disorders can work in any setting and provide any services under the Scope of Practice (ASHA, 2001) and or as directed by the job responsibilities. It is the ASHA Code of Ethics (ASHA, 2016b) that indicates a need for competency, yet if the SLP does not perceive they lack knowledge or skills, they may not recognize that their abilities are less than competent and may not pursue training.

Currently, ASHA does not have any regulation of required training stated as it pertains to tracheostomy or MV. The implication of the current study and the noted difference between perceived knowledge and real knowledge of SLPs related to tracheostomy and MV includes those performing services may not have the knowledge or skills, lack insight to real knowledge level, and lack guidance by ASHA to help the SLP determine a need necessary training and knowledge. Therefore, in efforts to promote positive social change, it is suggested that ASHA consider a specialization in medical speech pathology, specifically in the area of tracheostomy and or MV patient populations.

Patient care, health outcomes, and positive social change. Due to the inconsistency in current practice standards, changes in clinical practice, discrepancies across healthcare providers, and the results of this study, positive social change is needed related to regulate training for SLPs serving this fragile population. The regulation may include areas listed in the KCT-TMV, and or additional areas as indicated by future research. Through the lens of regulation, positive social change may occur not only with SLPs, but also across multiple disciplines that work directly with the tracheostomized and or MV patient populations. Ultimately, the greater the consistency and knowledge of the required skills, tracheostomized and or MV patient health outcomes would be hypothesized to improve.

Additionally, with greater training comes greater knowledge under the premise of educational psychology. With a greater knowledge base, SLPs may become more efficient in the workplace, and provide improved services which may reduce overall healthcare costs. To reduce the costs associated with tracheostomy or MV care would be a positive social change for the patients requiring this form of medical intervention as well as the organization that provides the healthcare. As previously stated, the healthcare costs associated with the tracheostomized and or MV patient population is significant. Therefore, any reduction in unnecessary expenditure of resources would result in positive social change.

The impact of a critical care admission and the use of a tracheostomy or MV has been well documented as resulting in negative patient outcomes. Positive social change may occur through the advanced training of medical practitioners in the areas of psychological factors related to critical illness and use of tracheostomy and or MV. This may afford the practitioner increased knowledge and ability to identify a patient's psychological needs at all levels of care and provide interventions in efforts to reduce or eliminate potential negative long term health effects for the patient. The potential impact on patients' outcomes is currently unknown, however, it can be hypothesized with appropriate use of health interventions at the onset of illness, or disorder, the better the overall patient outcome.

Organizational staff development and retainment. The participants in the current study indicated that the presence of employer support resulted in higher self-efficacy. SLPs with resources (e.g., time off and financial support) to obtain training and knowledge in various skills sets may create a positive social change for the SLP in that they may be able to progress through the Maslow's hierarchy of needs in the work place. This would ultimately support the level of physical needs as well as perceived safety. By doing so, SLPs may remain committed with their employer and reduce staff turnover, which ultimately reduces the organizational cost. While organizations may perceive continuing educational resources as a "loss of resources," the implications of this study and its findings suggest that through employer based support for training, organizations may save on employee turnover costs and decrease adverse patient health outcomes.

Theoretical Implications

The theoretical implications of this study support the foundations of educational psychology and the SCT (Bandura, 1986; Bandura, 1991). It is evident that advanced training results in greater knowledge. In addition, matters related to symbolic thought, forethought, vicarious learning, self-regulatory, and self-reflective capabilities, appear to aid in building self-efficacy and motivation for ongoing life learning. Of these factors in the SCT (Bandura, 1986; Bandura, 1991), an individual's ability to self-evaluate and self-determine personal needs results in the greatest pursuit and obtainment of knowledge. However, in the presence of a discrepancy between perceived knowledge and real knowledge, symbolizing capability and the foundations of cognitive capacity to anticipate outcomes of behaviors or actions warrant consideration. In addition, the impact of collective agency and self-efficacy are critical in the ability to recognize a potential need for training and obtainment of real knowledge.

Furthermore, the theoretical foundations related to confidence, self-efficacy, and real knowledge indicate that high self-confidence equates with high self-efficacy, yet high self-efficacy does not equate with high levels of knowledge. In addition, high self-confidence does not indicate high levels of knowledge. Therefore, real knowledge is a product of multiple factors including yet not limited to self-efficacy, symbolizing, forethought, vicarious, self-regulatory, self-reflective capabilities, as well as self-determinism and the impact of agency.

Conclusions

This study was the first of its kind to assess real compared to perceived knowledge of SLPs in the United States related to the diagnosis and treatment of the tracheostomized and or MV patient population. A test tool (i.e., KCT-TMV) targeting six foundational aspects of caring for this patient population as indicated by the literature. The KCT-TMV was validated and utilized to assess the quantitative and qualitative aspects of knowledge, role of self-efficacy, confidence, and trends related to the diagnosis and treatment of the tracheostomized and or MV patient population. Practicing

SLPs in the United States were the participants of this study. Based on the results of the data analyses and the increase in tracheostomized and or MV patients, there is a greater sense of urgency in creating social change for training of SLPs, in efforts to promote positive patient outcomes.

The role and responsibilities of the SLP are continuing to grow, yet the graduate training guidelines remain stagnant. Currently there is no specialized training, standardized competency assessments, or regulations from ASHA for SLPs regarding tracheostomy and or MV. However, the demand of this patient population is on the rise. Patient referrals to SLPs, patient co-morbidities, and medical complexities are increasing, and the SLP is not consistently provided with employer support, adequate training, or regulation based guidelines in efforts to be competent in the provision of services to the tracheostomized and or MV patient population.

Based on the results of the current study, SLPs perception of knowledge is different from real knowledge related to the skill sets in the KCT-TMV. SLPs report confidence and high self-efficacy, yet it does not relate with high levels of knowledge. Considering SLPs must complete clinical training toward their Master degree requirement, and a subsequent clinical fellowship year under the supervision of a licensed SLP, it is possible that SLPs who report high levels of confidence and self-perceptions of adequate knowledge will provide training for less experienced SLPs resulting in inadequate training or training of incorrect information. This is concerning for both professional growth as well as patient health outcomes.

The literature has found discrepancies in the care of the tracheostomized and or MV patient populations (Chatburn & Volsko, 2010; Eber & Oberwaldner, 2006; Gomes et al., 2012; Terragni et al., 2010; Yavas et al., 2009; Young et al., 2013). These discrepancies are across a wide array of topics (e.g., terminology, equipment, timing, etc.) and compound the difficulty and the complexity of training SLPs to be competent with this patient population. The lack of regulation and standardization of medical terminology alone results in challenges in healthcare standards and the provision of "best practice" for the tracheostomized and or MV patient population. Furthermore, the lack of training, inconsistency in practice patterns, and limited utilization of psychological supportive and interventional services may add to the potential factors surrounding adverse patient health outcomes.

In conclusion, SLPs perceive their knowledge to be different from what is real, yet they are confident they know what they are doing. This is a serious and complex problem for the profession of speech-language pathology and a significant risk for patients receiving speech and swallowing services in the presence of a tracheostomy and or MV. It is with great anticipation that the current study is a catalyst for research on practice trends in medical speech pathology focal to the tracheostomized and or MV patient populations. The current study should serve as an alert to the regulatory bodies that determine specialty training recognition as well as graduate training requirements for SLPs. In addition, this study should raise awareness and application of life learning skills including symbolizing, forethought, vicarious, self-regulatory, self-reflective capabilities, personality, and self-determinism toward the obtainment of knowledge.

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Zimmerman, B. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology, 25*(1), 82-91. doi:http://dx.doi.org/10.1006/ceps.1999.1016

Appendix A: Maslow’s Hierarchy of Needs and Maslow’s Hierarchy of Needs in Critical Care

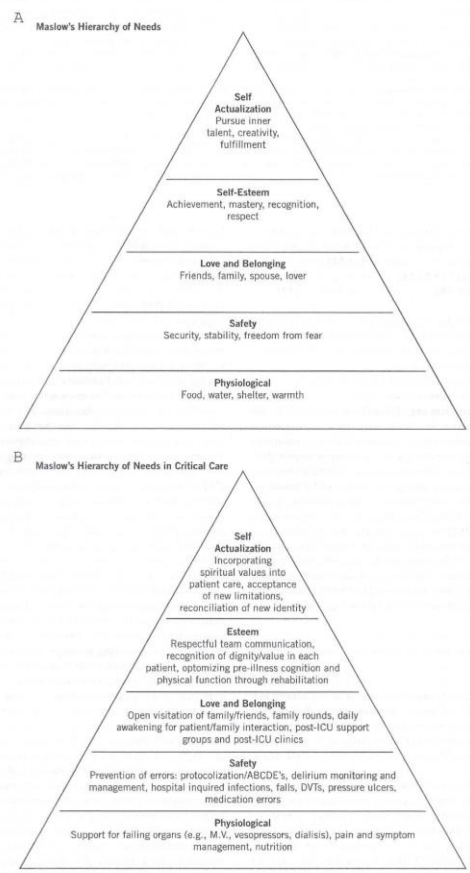

Fig. 1. A, Maslow's hierarchy of needs[23,24]—the original depiction of the hierarchy of human needs as described by Maslow in 1943. One does not move into upper tiers of human needs until the needs are met at each lower level (ie, one moves from bottom to top in stepwise fashion). B, Adapted version of Maslow's hierarchy of needs for the ICU (see also Table 1)—an adaption of Maslow's depiction of the hierarchy of human needs as viewed through the prism of critical care. Maslow's time-tested truths make it evident that the ICU first had to deal with the lowest level of "needs" (ie, basic elements of survival such as cardiovascular stability, nutrition, and pain control). The persistence of the mindset as "sufficient goals for ICU care" has retarded the maturation of the culture of critical care. We must move actively toward the higher levels of human needs shown in Maslow's hierarchy to restore or preserve the patient fully to his/her pre-illness mind, body, and spirit.

Jackson, J., Santoro, M., Ely, T., Boehm, L., Kiehl, A., Anderson, L., & Ely, E. (2014). Improving patient care through the prism of psychology: Application of Maslow’s hierarchy to sedation, delirium, and early mobility in the intensive care unit. *Journal of Critical Care, 29*(3), 438-444. http://dx.doi.org/10.1016/j.jcrc.2014.01.009.

Appendix B: Predicted SLP Self-Efficacy and Pursuit of Training Based on Bandura's Theory

Diagram 1: Potential predictions of SLP's self-efficacy and the pursuit of advanced learning.

(a): High level of self-efficacy is equal to a high pursuit of higher/advanced training

(b): Self-efficacy is inversely related to a high pursuit of higher/advanced training

(c): Low level of self-efficacy is equal to a low pursuit of higher/advanced training

Appendix C: Nine Core Essentials for the Baccalaureate Nursing Curricular Framework

Essential:	Possible course content (including but not limited to)
I. Liberal Education for Baccalaureate Generalist Nursing Practice Rationale (includes sciences and arts)	Sciences: Physical science (e.g., physics, chemistry) Life sciences (e.g., biology, genetics) Mathematical science Social science (e.g., psychology and sociology) Arts: Fine art Performing arts Humanities (e.g., literature and theology)
II. Basic Organizational and Systems Leadership for Quality Care and Patient Safety	Sample course content: Leadership Interpersonal communications Quality Improvement/ Continuous Quality Improvement Principals and theory of nursing care delivery
III. Scholarship for Evidenced Based Practice	Sample course content: Applied statistics Research methods Ethical Conduct Scholarship dissemination methods
IV. Information Management and Application of Patients Care Technology	Sample course content: Information technology Patient care technology (e.g., monitors, pumps etc.) Technological and web based resources
V. Healthcare Policy, Finance, and Regulatory Environments	Sample course content: Public and social policy Economics Nurse Practice Act, ethics, consumerism and advocacy Negligence, malpractice and risk management
VI. Inter-professional Communication and Collaboration for Improving Patient Heath Outcomes	Sample course content Advocacy Scopes of practice Team building
VII. Clinical Prevention and Population Health	Sample course content Ecological Models Public health Health literacy Theoretical foundations for education and counseling
VIII. Professionalism and Professional Values	Sample course content History of Nursing Moral and ethics practice
IX. Baccalaureate Generalist Nursing Practice	Sample course content Human Growth and development Physical and psychosocial development across the lifespan Psychology Spiritual Care Cultural diversity

(American Association of Colleges of Nursing, 2008)

Appendix D: Knowledge and Confidence Test of Tracheostomy and Mechanical Ventilation

(KCT-TMV)

*

The Knowledge and Confidence Test of Tracheostomy and Mechanical Ventilation (KCT-TMV) is designed to assess demographics, confidence, knowledge, and self-efficacy (individuals' judgements on their ability to perform and manage various situations) related to speech-language pathologists (SLPs) and the diagnosis and treatment of tracheostomy and mechanically ventilated patient populations.

Please read each question and click on the circle to indicate your response. There are a series of 14 demographic questions, 4 questions in each of the 6 skill sets, and a task value ranking. Please remove all electronics (e.g., cell phones, tablets, laptops, books, or journals) from view/reach prior to completing the skills assessment. You can opt out of the survey at any time by clicking on the exit icon.

Survey of demographic data

1. What area of the country/state do you live?

Quadrants were determined by the National Association of Local Boards of Health (retrieved from http://www.nalboh.org/?page=Quadrants)

○ Northwest Quadrant
(AK, IA, ID, MT, ND, NE, NV, OR, SD, UT, WA, WY)
○ Southwest Quadrant
(AR, AZ,CA, CO, HI, KS, LA, MO, NM, OK, TX)
○ Northeast Quadrant
(CT, DC, DE, IL, IN, MA, MD, ME, MI, NH, NJ, NY, OH, PA, RI, VT, WI)
○ Southeast Quadrant
(AL, FL, GA, KY, MS, NC, SC, TN, VA, WV)

2. What is your age?

○ 18 – 30
○ 31 – 40
○ 41 – 50
○ 51 – 60
○ 61 and above

3. What is your gender?
   ○ Male
   ○ Female

4. What is your highest degree completed?
   ○ BA
   ○ BS
   ○ MA
   ○ MS
   ○ PhD.
   ○ MD
   ○ DO

5. How many years have you been in clinical practice (years after completion of CFY)?
   ○ Not applicable – I am a student
   ○ 0 -5
   ○ 6 -10
   ○ 11- 15
   ○ 16 -20
   ○ 21- 25
   ○ 26 or more

6. How many hours of work per week do you currently provide services for tracheostomized and/or mechanically ventilated patients?
   ○ Not applicable – I am a student
   ○ 0
   ○ 1 - 10
   ○ 11 – 20
   ○ 21 – 30
   ○ 31 – 40

7. What is the setting in which you work?
   ○ Not applicable – I am a student
   ○ Acute Hospital
   ○ Acute Rehabilitation
   ○ Subacute Rehabilitation
   ○ LTACH: Long-term acute care hospital
   ○ Outpatient
   ○ Home Health
   ○ School
   ○ Academic / University

8. What age / population do you serve?
   ○ Not applicable – I am a student
   ○ Neonatal
   ○ Pediatric (0 – 3 years)
   ○ Adolescent (3.1 -18 years)
   ○ Adult (18.1 – 64 years)
   ○ Geriatric (> than 64 years)

9. Does your facility have a formal tracheostomy competency-training program for SLPs?
   ○ Not applicable – I am a student
   ○ Yes
   ○ No
   ○ I don't know
      If yes, who provides the training to the SLPs?
      ○ Doctors
      ○ Respiratory Therapists
      ○ Speech Language Pathologists
      ○ Nursing
      ○ Other: ________________

10. Does your facility have a formal mechanical ventilation-training program for SLPs?
   ○ Not applicable – I am a student
   ○ Yes
   ○ No
   ○ I don't know
      If yes, who provides the training to the SLPs?
      ○ Doctors
      ○ Respiratory Therapists
      ○ Speech Language Pathologists
      ○ Nursing
      ○ Other: ________________

11. How many courses have you taken in graduate or medical school with a concentration on tracheostomy?
   ○ None
   ○ 1 - 3
   ○ 4 - 7
   ○ 8 - 10
   ○ 11 or more

12. How many continuing educational opportunities have you taken (after graduation) with a concentration on tracheostomy?
    ○ Not applicable – I am a student
    ○ None
    ○ 1 - 3
    ○ 4 - 7
    ○ 8 - 10
    ○ 11 or more

13. How many courses have you taken in graduate school with a concentration on mechanical ventilation?
    ○ None
    ○ 1 - 3
    ○ 4 - 7
    ○ 8 - 10
    ○ 11 or more

14. How many continuing educational opportunities have you taken (after graduation) with a concentration on mechanical ventilation?
    ○ Not applicable – I am a student
    ○ None
    ○ 1 - 3
    ○ 4 - 7
    ○ 9 - 10
    ○ 11 or more

15. What types of professional skill advancement training have you participated in regarding tracheostomy and mechanical ventilation within the past 10 years?
    ○ Not applicable – I am a student
    ○ Multidisciplinary forums/ in-services at my workplace
    ○ Speech Language Pathology only forums / in-services at my work place
    ○ ASHA sponsored continuing education courses
    ○ Non-ASHA sponsored continuing education courses
    ○ Member of an ASHA special interest group (SIG 13, 15)
    ○ Teleconferences / webinars
    ○ Self-directed learning and peer support
    ○ Part of a critical care delivery group
    ○ Not currently participating in skill advancement for this population
    ○ No response

KCT-TMV

The following six skills sets will ask you to rate your level of confidence related to a specific aspect of care of the tracheostomized and/or mechanically ventilated patient population. A series of 4 statements will follow requesting you agree or disagree. Respond by clicking on the circle next to your response choice. Lastly, indicate how important each skill set is related to tracheostomized and mechanically ventilated populations. The entire test should take you no more than 30 minutes

Skill set 1: Anatomy and physiology of the respiratory and cardiac systems
What is your level of confidence regarding the skill sets of anatomy and physiology of the respiratory and cardiac systems?
○ Not confident at all
○ Somewhat confident
○ Completely confident

Task value rating:
In the diagnosis and treatment of tracheostomized and/or mechanically ventilated patient populations, understanding anatomy and physiology of the respiratory and cardiac systems is:
○ Not important at all
○ Somewhat important
○ Absolutely important

Respond "Agree" if you believe the statement is true.
Respond "Disagree" if you believe the statement is false.
Respond "I do not know" if you are unsure

The main function of respiration is gas exchange.	○ Agree	○ Disagree
The neurological control of respiration involves cortical, subcortical, and peripheral neurological centers.	○ Agree	○ Disagree
The neurological control of respiration involves the peripheral chemoreceptors found in the aortic arch, at the bifurcation of the carotid arteries, in the stretch, irritant, and J-receptors.	○ Agree	○ Disagree
Respiratory muscles are partially innervated by CN X and XI.	○ Agree	○ Disagree

Skill set 2: Cardiopulmonary and mechanical ventilation terminology

What is your level of confidence regarding the skill sets of cardiopulmonary and mechanical ventilation terminology?
○ Not confident at all
○ Somewhat confident
○ Completely confident

Task value rating:
In the diagnosis and treatment of tracheostomized and/or mechanically ventilated patient populations, the understanding cardiopulmonary and mechanical ventilation terminology is
○ Not important at all
○ Somewhat important
○Absolutely important

Respond "Agree" if you believe the statement is true.
Respond "Disagree" if you believe the statement is false.
Respond "I do not know" if you are unsure

Prolonged mechanical ventilation is a term that consistently means greater than ten days.	○ Agree	○ Disagree
Standard practice terms for the timing of tracheostomy placement include "early, late, or emergent."	○ Agree	○ Disagree
Pressure support (PS) ventilation permits spontaneous respiratory action while simultaneously providing a preset amount of preset positive pressure.	○ Agree	○ Disagree
PEEP and CPAP are synonymous.	○ Agree	○ Disagree

Skill set 3: Lab Values

What is your level of confidence regarding the skill sets of lab values?

○ Not confident at all
○ Somewhat confident
○ Completely confident

Task value rating:

In the diagnosis and treatment of tracheostomized and/or mechanically ventilated patient populations, the understanding of lab values is:

○ Not important at all
○ Somewhat important
○Absolutely important

Respond "Agree" if you believe the statement is true.
Respond "Disagree" if you believe the statement is false.
Respond "I do not know" if you are unsure

Bicarbonate (HCO_3-) provides a general measure of the alkalinity or acidity and reflects the CO2 in the blood.	○ Agree	○ Disagree
The three parameters of arterial blood gases (ABG) include power of hydrogen (pH), partial pressure of carbon dioxide in arterial blood (pCO^2), and partial pressure of oxygen in arterial blood (pO^2) (Rothenberg, 2005).	○ Agree	○ Disagree
Acid base disturbances in ventilation can be due to respiratory or metabolic acidosis or alkalosis.	○ Agree	○ Disagree
A diagnosis of moderate hypoxemia is provided when the PaO_2 is <60 mm Hg.	○ Agree	○ Disagree

Skill set 4: tracheostomy and ventilator equipment
What is your level of confidence regarding the skill sets of tracheostomy and ventilator equipment?
○ Not confident at all
○ Somewhat confident
○ Completely confident

Task value rating:
In the diagnosis and treatment of tracheostomized and/or mechanically ventilated patient populations, the understanding of tracheostomy and ventilator equipment is:
○ Not important at all
○ Somewhat important
○ Absolutely important

Respond "Agree" if you believe the statement is true.
Respond "Disagree" if you believe the statement is false.
Respond "I do not know" if you are unsure

A humidification device is a piece of the mechanical ventilator and a tracheostomy tube.	○ Agree	○ Disagree
An advantage of a cuffed tracheostomy tube over a cuffless tracheostomy tube is it permits better delivery of positive pressure ventilation.	○ Agree	○ Disagree
The purpose of an obturator is to clear mucous plugs from the tracheostomy inner cannula.	○ Agree	○ Disagree
A neck flange secures the tracheostomy tube from becoming dislodged.	○ Agree	○ Disagree

Skill set 5: Disease and acute illness
What is your level of confidence regarding the skill sets of disease and illness?
○ Not confident at all
○ Somewhat confident
○ Completely confident

Task value rating:
In the diagnosis and treatment of tracheostomized and/or mechanically ventilated patient populations, the understanding of disease and acute illness is:
○ Not important at all
○ Somewhat important
○ Absolutely important

Respond "Agree" if you believe the statement is true.
Respond "Disagree" if you believe the statement is false.
Respond "I do not know" if you are unsure

The most common comorbidities found with patients requiring mechanical ventilation in the United States include diabetes and pulmonary disease.	○ Agree	○ Disagree
Ventilator-induced lung injury can be reduced by using noninvasive respiratory support in neonates.	○ Agree	○ Disagree
Respiratory disorders can result into long term cardiac disease /damage.	○ Agree	○ Disagree
The TNM head and neck tumor classification was designed to indicate the potential for head and neck airway compromise.	○ Agree	○ Disagree

Skill set 6: Psychological aspects
What is your level of confidence regarding the skill sets of counseling the tracheostomized and/or mechanically ventilated population?
○ Not confident at all
○ Somewhat confident
○ Completely confident

Task value rating:
In the diagnosis and treatment of tracheostomized and/or mechanically ventilated patient populations, the understanding of the psychological aspects is:
○ Not important at all
○ Somewhat important
○ Absolutely important

Respond "Agree" if you believe the statement is true.
Respond "Disagree" if you believe the statement is false.
***Respond "I do not know" if you are unsure*.**

The negative psychological impact of tracheostomy and/or mechanical ventilation include but are not limited to sleep disorders, anxiety, and depression for years beyond the acute stage of the illness.	○ Agree	○ Disagree
The key factor in the presence of anxiety, anger, fear, and depression in the tracheostomized and/or mechanically ventilated population is due to the inability to communicate.	○ Agree	○ Disagree
During sedation holidays, patients report a decline in depression and anxiety.	○ Agree	○ Disagree
Counseling a tracheostomized and/or mechanically ventilated patient regarding depression and anxiety is within the scope of practice of the SLP.	○ Agree	○ Disagree

Self-Efficacy

1. I feel uncertain about tracheostomy diagnosis and treatment
○ Not accurate at all
○ Somewhat accurate
○ Completely accurate

2. I feel uncertain about mechanical ventilation
○ Not accurate at all
○ Somewhat accurate
○ Completely accurate

3. I believe my abilities to find scientific evidence on the diagnosis and treatment of tracheostomy and/or mechanical ventilation are not adequate
○ Not accurate at all
○ Somewhat accurate
○ Completely accurate

4. I find it difficult to find enough time to learn more about tracheostomy and/or mechanical ventilation
○ Not accurate at all
○ Somewhat accurate
○ Completely accurate

5. I feel comfortable speaking to the medical team about the tracheostomy related to swallowing and communication impairments.
○ Not accurate at all
○ Somewhat accurate
○ Completely accurate

6. I feel comfortable about my knowledge and skills in the diagnosis of dysphagia and communication impairments for patients with a tracheostomy.
○ Not accurate at all
○ Somewhat accurate
○ Completely accurate

7. I feel comfortable about my knowledge and skills in the treatment of dysphagia and communication impairments for patients with a tracheostomy.
○ Not accurate at all
○ Somewhat accurate
○ Completely accurate

8. I feel comfortable about my knowledge and skills in the diagnosis of dysphagia and communication impairments for patients with a tracheostomy and receiving mechanical ventilation.
○ Not accurate at all
○ Somewhat accurate
○ Completely accurate

9. I feel comfortable about my knowledge and skills in the treatment of dysphagia and communication impairments for patients with a tracheostomy and receiving mechanical ventilation.
○ Not accurate at all
○ Somewhat accurate
○ Completely accurate

10. I feel comfortable speaking to the patient/family/caregiver about the tracheostomy and dysphagia and communication impairments.
○ Not accurate at all
○ Somewhat accurate
○ Completely accurate

Thank you for participating in this assessment. If you are willing to participate in a 10 question anonymous online survey, please click on this link. Thank you for your time.

Appendix E: Qualitative Survey

1. What motivates you to work with tracheostomy and ventilator patients?

2. What areas of knowledge do you feel you need to improve to treat tracheostomy and mechanically ventilated patients?

3. What type of education opportunities are the most appealing to you and why?

4. What prohibits you from gaining additional education on tracheostomy and mechanical ventilation?

5. How does your employer support your obtainment of knowledge for tracheostomy and mechanical ventilation management?

6. How do you define evidence-based practice?

7. How do you know your knowledge and skills are adequate for treating tracheostomized and mechanically ventilated patients?

8. What healthcare changes have you noticed that influences your ability to provide evidence-based practice to tracheostomized and mechanically ventilated patients?

9. What healthcare changes have you noticed that influences your ability to obtain additional education for tracheostomy and mechanical ventilation patients?

10. What trends, if any, have you noticed concerning tracheostomy and mechanically ventilated patients within the past 1 - 5 years?

Appendix F: Permissions

from: **Albert Bandura** <bandura@stanford.edu>

to: Meredith Baker-Rush <meredith.baker-rush@waldenu.edu>

date: Tue, Apr 21, 2015 at 12:22 PM

subject: Re: Doctoral student seeking permissions and a possible phone interview

mailed-by: stanford.edu:Important mainly because of your interaction with messages in the conversation.

Meredith:

Permission granted to use the figure of triadic reciprocality.

Albert Bandura

The following permissions was received from Dr. James Jackson on February 25, 2015 to utilize the Maslow's hierarchy of needs in the CCU from "Improving patient care through the prism of psychology: Application of Maslow's hierarchy to sedation, delirium, and early mobility in the intensive care unit" (Jackson et al., 2014).

VANDERBILT UNIVERSITY MEDICAL CENTER

Division of General Internal Medicine and Public Health
Center for Health Services Research

2/25/15

Dear Meredith,

This letter confirms that I am giving you permission to use the Maslow diagram in question.

Good luck in your endeavors.

Sincerely,

James C Jackson
Assistant Professor, Vanderbilt University School of Medicine
Assistant Director, ICU Recovery Center
Nashville, TN

1215 21st Avenue South
6000 MCE, North Tower
Nashville, TN 37232-8300

tel 615.936.1010
fax 615.936.1269
www.VanderbiltHealth.com

The following emailed permissions was received from the American Speech Language Hearing Association Subscriptions & Permissions Manager, Libby Bauer on March 4, 2015 to utilize the CAA Standards for Accreditation in table format.

“Dear Meredith:

Thank you for supplying the revision. Permission is granted to reprint the CAA Standards for Accreditation in the table format shown below in your dissertation. As you note, please cite ASHA as the source.

Best regards,

Libby

Libby Bauer
Subscription & Permissions Manager
American Speech-Language-Hearing Association”

The following emailed permissions was received on June 15, 2014 from Bea Spek regarding beliefs and evidence-based practice.

"Dear Meredith,

The instrument I developed is focused on motivational beliefs regarding EBP. It is just a simple questionnaire but developed using a Delphi procedure. I don't think it can be used for other purposes. But of course you're welcome to use/change it the way you want. Hereby the original questionnaire (Dutch) and the article we wrote on the development. In the article you see the (more or less) translation of the Dutch questionnaire.

Very best wishes, Bea

Mrs. B. Spek, MSc

SLT | Clinical Epidemiologist
Docent Universitaire Masterstudie Evidence-Based Practice
Universiteit van Amsterdam, Faculteit der Geneeskunde (AMC)
Meibergdreef 9, Postbus 22660, 1100DD Amsterdam
* b.spek@amc.uva.nl"

The following emailed permissions was received on February 22, 2015 from Elizabeth Ward regarding the articles “Preparation, clinical support, and confidence of speech-language therapists managing clients with a tracheostomy in the UK” as well as “Preparation, clinical support, and confidence of speech-language therapists managing clients with a tracheostomy in Australia.”

Hi there

You are welcome to use the survey and reference its original source

Best wishes for your research

regards

Liz

Professor Liz Ward |

Centre for Functioning and Health Research (CFAHR)| Queensland Health

www.health.qld.gov.au/cfahr| Suite 304| Level 3 Centro Buranda| Ipswich Road,

Buranda| Postal: P.O. Box 6053| Buranda,Queensland, Australia

and

Conjoint Professor| School of Health and Rehabilitation Sciences www.shrs.uq.edu.au|

The University of Queensland| QLD 4072 Australia| Phone: +61 7 34062265|Fax: +61 7 3406 2267| Email: liz.ward@uq.edu.au | CRICOS Provider Number 00025B

SHRS Vision Statement: To provide bold, optimistic, positive global leadership in innovative research and education in the rehabilitation and enabling professions.”

A series of three emails (3/31/14, 2/22/15 and 3/8/15) were sent to Ms. S. Manley through the American Speech Language Hearing Association website membership link. Permissions were sought for the use of the test tool questions provided in the study titled "Preparation of Speech-Language Pathologists to provide services to patients with a tracheostomy tube: A survey."

No response was received from any attempt.

Manley, S., Frank, E., & Melvin, C. (1999). Preparation of Speech-Language Pathologists to provide services to patients with a tracheostomy tube: A survey. *American Journal of Speech-Language Pathology*, *8*(2), 171-180. doi: 10.1044/1058-0360.0802.171

Appendix G: Flyer Example

Appendix P:
Flier

RESEARCH IN PROGRESS

Request to participate in a research study

- Otolaryngologists, Intensivists/critical care physicians, Pulmonologists, and Critical Care Nurses
- Speech-language pathologists holding a an active license and a certificate of clinical competence
- Graduate students in the field of speech pathology/communication sciences and disorders

You are invited to take part in a research study investigating knowledge levels regarding the diagnosis and treatment of the tracheostomized and/or mechanically ventilated patient population.

<u>The study includes</u>
A demographic survey
A skills assessment
A self-rating of confidence and self-efficacy
A task value rating
It will take no more than 30 minutes to complete.

Your participation will result in the creation of a test tool for speech-language pathologists related to the diagnosis and management of tracheostomized and/or mechanically ventilated patients.

The primary researcher is **Meredith Baker-Rush MS CCC-SLP/L**. Please contact her at Meredith.Baker-Rush@waldenu.edu or 847-902-4209 should you have any questions. Please utilize the following URL to take you directly to the consent form and further information regarding the study will be provided within the consent document. To participate in the study, please go to

https://www.surveymonkey.com/r/KCT-TMV_Pilot

Thank you!

Appendix H: Change of Procedures

Change of procedure request #1: A stakeholder (e.g., A) requested a review and modification on the power analysis related to the pilot aspects of the study. Given this request, the power analysis was re-run and it was agreed to increase the sample size by five in each of the participant groups (e.g., students, practicing SLPs, and experts). The request was submitted to the Walden IRB on July 24, 2015 and approved on August 7th, 2015.

Change of procedure request #2: A stakeholder (e.g., N) identified a repeated statement on the pilot consent to participate form. The duplicated statement (e.g., "All information obtained in this study is strictly anonymous and confidential") was removed from the consent. A change of procedures request was submitted to the Walden IRB on August 19th, 2015 and approved on September 9, 2015.

Change of procedure request #3: A stakeholder (e.g., E) requested an IRB representative from the college be listed on the consent form as well as the duration that the data will be retained (e.g., seven years). These changes were made on the Elmhurst College stakeholders consent form for the pilot aspects of the study. A change of procedures request was submitted to the Walden IRB on August 25, 2015 and approved on August 31, 2015.

Change of procedure request #4: A stakeholder (e.g., G) identified a repeated statement on the pilot consent to participate form. The duplicated statement (e.g., "All information obtained in this study is strictly anonymous and confidential") was removed from the consent. In addition, IRB members of stakeholder G requested the Co-Chairs of the G IRB be stated on the consent form of the pilot aspect of the study. These changes were made and a change of procedures request was submitted to the Walden IRB on September 9, 2015 and approved on September 14, 2015.

Change of procedure request #5: Three change of procedure requests were submitted on the fifth “change of procedures” submission. Part 1, stakeholder A requested a modification of the recruitment flier. New images were chosen from the Bing public domain website and the changes were implemented. All stakeholder IRBs were provided an updated flier with the respective changes.

Part 2, due to the variations of the consent forms related to the pilot, several versions of the Survey Monkey online survey was created. The only variation between the surveys was related to the consent forms. Due to this change of the online survey tool, an ethical threat (e.g., violating the confidential aspects of participant involvement) became apparent. Therefore, it was suggested that a third party download the raw data from Survey Monkey creating a comprehensive data set in which the participants would not be identified by stakeholder. Hence, part 3 of the change of procedures request involved my chair, Dr. Leann Stadtlander, downloading all the data from the four stakeholders Survey Monkey data into one data base. Dr. Stadtlander would then create a master data set and forward that set onto me for analysis in efforts to remove the source of participants.

A change of procedures request including all three aspects stated above was submitted to the Walden IRB on October 3, 2015. The Walden IRB requested resubmission, therefore on October 6, 2015 it was resubmitted and then approved on October 16, 2015.

Change of procedure request #6: Multiple requests were submitted on the sixth “change of procedures” request. Based on the duration required to obtain participants for the pilot (i.e., validation) aspects of the study, a request was made to run the main study concurrent with the pilot. In efforts to increase expert participation, two additional forms of recruitment were proposed including a letter physician office managers to aid in recruiting physicians and a letter to the physicians requesting participation and for snowball recruitment. A change of procedures request including all aspects stated above was submitted to the Walden IRB on December 12, 2015, and approved on December 28, 2015.

Change of procedure request #7: In efforts to advance additional participant recruitment, a seventh change of procedures was submitted requesting permissions to send out reminders to potential participants at the various stakeholder locations and physician offices. In addition, permission to allow members of ASHA to pass along the survey link to other speech language pathologists in the United States. The change of procedure request was submitted to the Walden IRB on January 5, 2016 with approval received on January 20, 2016 allowing a series of three reminders.

Change of procedure request #8: On December 8, 2015, an email communication was sent to stakeholder N’s IRB contact, the Director, Research and Professional Practice to provide an update on the status of the study and requesting to discuss ideas on how to increase participant recruitment. On January 7, 2016, stakeholder N’s contact offered to directly email potential participants within the NCH organization the flier and recruitment letter. Therefore, an eighth change of procedures request was submitted to the Walden IRB on January 8, 2016 requesting permissions to allow direct email communications from the NCH IRB identified contact to the potential participants. Approval was received on February 2, 2016.

Change of procedure request #9: On February 3, 2016, the ninth change of procedures request was submitted to the Walden IRB after email communications with two of the healthcare stakeholders regarding recruitment materials. In efforts to promote participant recruitment, changes to the wording of the recruitment letter to the managers/department heads/managers were proposed as well as adding all IRB approval numbers to the fliers. Stakeholder A responded on February 3, 2016 granting permissions pending Walden's approval of the suggested change. Approval was received from the stakeholder N's IRB on February 8, 2016. Final approval from the Walden IRB was received on February 18, 2016.

Change of procedure request #10: On March 12, 2016 a tenth, change of procedures was submitted due to the lack of participants for the pilot as well as the national survey. The change of procedures request included the following aspects: use of social media (e.g., LinkedIn and ASHA Facebook page) for participant recruitment, snowball recruitment, and last call/final reminder for ASHA community postings. In addition, participant pools were expanded to invite the American Speech Language Association (ASHA) Community under the Student to Empowered Professional (STEP) group, and the use of the MLBR Seminars & Consulting, LLC mailing list. The change of request was acknowledged on March 17, 2016 and approved on March 25, 2016.

Appendix I: Expert Panel Results

Skill Set 1: Anatomy and physiology of the respiratory and cardiac systems

Statement	Score	Comments
The main function of respiration is gas exchange.	* 83% 5/6 rated important	
The neurological control of respiration involves cortical, subcortical, and peripheral neurological centers.	* 50% 3/6 rated as quite important-important	
The tracheobronchial tree can be divided into 23 divisions.	0% 0/6 rated as quite important-important	
Oxygenated blood returns to the heart via the inferior and superior vena cava.	16% No responses by 4 of the participants as	Statement was false and placed to ensure reading of the stimulus items
Nonalveolate aspects of the airway are considered a conducting zone.	16% 1/6 rated as quite important-important	One expert reported not knowing terminology in the statement
Cardiac impairments do not interfere with the ability to ventilate.	50% 3/6 rated as quite important-important	Two experts challenged the wording
The neurological control of respiration involves the peripheral chemoreceptors found in the aortic arch, at the bifurcation of the carotid arteries, in the stretch, irritant, and J-receptors.	* 33% 2/6 rated as quite important-important	
Respiratory muscles are partially innervated by CN X and XI.	* 33% 2/6 rated as quite important-important	

* indicates the statement will be used in the KCT-TMV

Skill Set 2: Cardiopulmonary and mechanical ventilation terminology

Statement	Score	Comments
Mechanical ventilation terminology is not standardized nor regulated.	50% 3/6 rated as quite important-important	One expert questioned accuracy of statement
Non-invasive and invasive ventilation are used during respiratory failure with the decision based on the patients' comorbidities and complications.	83% 5/6 rated as quite important-important	
Prolonged mechanical ventilation is a term that does not have a consistent and defined time.	* 83% 5/6 rated as quite important-important	
Standard practice terms for the timing of tracheostomy placement include "early, late, or emergent."	* 67% 4/6 rated as quite important-important	
Pressure support (PS) ventilation permits spontaneous respiratory action while simultaneously providing a preset amount of preset positive pressure.	* 83% 5/6 rated as quite important-important	
PEEP and CPAP are not synonymous.	* 83% 5/6 rated as quite important-important	
The alarm term "high pressure" means the mechanical ventilator has been set to sense resistance to the preset volume of air.	67% 4/6 rated as quite important-important	Two experts questioned wording
Concepts of ventilation indicate level of ventilator support related to work of breathing while modes indicate the specifics of volume, flow, rate and pressure.	67% 4/6 rated as quite important-important	One expert questioned accuracy of statement

* indicates the statement will be used in the KCT-TMV

Skill Set 3: Lab Values

Statement	Score	Comments
When carbon dioxide (CO_2) is greater than 40, it indicates acidosis.	60% 3/5 rated as quite important-important	
Bicarbonate (HCO_3^-) provides a general measure of the alkalinity or acidity and reflects the CO_2 in the blood.	* 50% 3/6 rated as quite important-important	
The three parameters of arterial blood gases (ABG) include power of hydrogen (pH), partial pressure of carbon dioxide in arterial blood (pCO_2), and partial pressure of oxygen in arterial blood (pO_2)	* 83% 5/6 rated as quite important-important	
A normal level of Troponin, the most sensitive cardiac marker, is <0.01 μg/L.	0% 0/5	One expert did not respond
A normal pressure of carbon dioxide in arterial blood (pCO_2) is 80 to 100 mm Hg in adults.	33% 2/6	Three experts challenged the wording
Acid base disturbances in ventilation can be due to respiratory or metabolic acidosis or alkalosis.	* 66% 4/6 rated as quite important-important	
A normal pH value is resultant from bicarbonate (from the kidney) and carbon dioxide (from the lung) at a ratio of 20:1.	40% 2/5 rated as quite important-important	One expert did not respond
A diagnosis of moderate hypoxemia is provided when the PaO_2 is <70 mm Hg.	* 67% 4/6 rated as quite important-important	

* indicates the statement will be used in the KCT-TMV

Skill Set 4: Tracheostomy and Ventilator Equipment

Statement	Score	Comments
The tracheostomy cuff should be deflated during a swallow evaluation depending on the patients status and ability.	83% 5/6 rated as quite important-important	
A humidification device is a piece of the mechanical ventilator and is not part of the tracheostomy tube.	* 83% 5/6 rated as quite important-important	
Tracheostomy tubes may have an inner and outer cannula.	100% 6/6 rated as quite important-important	
A high pressure low volume cuff is the safest to prevent damage to tracheal mucosa.	66% 4/6 rated as quite important-important	Two experts did not respond & questioned the wording
An advantage of a cuffed tracheostomy tube over a cuffless tracheostomy tube is it permits better delivery of positive pressure ventilation.	* 83% 5/6 rated as quite important-important	One expert did not respond
The purpose of an obturator is to aid in the insertion and placement of a tracheostomy.	* 83% 5/6 rated as quite important-important	
A fome cuff adapts to a change in pressures and cannot be deflated for speaking valve use.	100% 6/6 rated as quite important-important	
A neck flange provides information on the size and type of tracheostomy as well as allow for trach tie connections	* 100% 6/6 rated as quite important-important	

* indicates the statement will be used in the KCT-TMV

Skill Set 5 Disease and Acute Illness

Statement	Score	Comments
The most common comorbidities found with patients requiring mechanical ventilation in the United States include diabetes and pulmonary disease.	* 40% 2/5 rated as quite important-important	One expert did not respond
Mechanical ventilation is not consistently associated with structural injury to the diaphragm muscle fibers.	0% 0/5 rated as quite important-important	One expert did not respond
The term “chronic critical illness” refers to patients who survive an acute critical illness or injury, however they continue to require life sustaining medical interventions.	20% 1/5 rated as quite important-important	One expert did not respond
Patients who required prolonged mechanical ventilation spend longer time in the hospital after the intensive care discharge than non-prolonged mechanical ventilation patients.	66% 4/6 rated as quite important-important	
Ventilator-induced lung injury can be reduced by using noninvasive respiratory support in neonates.	* 60% 3/5 rated as quite important-important	One expert did not respond
Respiratory disorders can result into long term cardiac disease /damage.	* 66% 4/6 rated as quite important-important	
The TNM head and neck tumor classification was designed to indicate the size of primary tumor, number, size, and location of lymph nodes involved and the presence of metastasis.	* 16% 1/6 rated as quite important-important	
Patients with Guillian Barre Syndrome (GBS) may require some form of tracheostomy and mechanical ventilation with the decision based on severity, disease progression, and comorbidities.	66% 4/6 rated as quite important-important	

* indicates the statement will be used in the KCT-TMV

Skill Set 6: Psychological Aspects

Statement	Score	Comments
The negative psychological impact of tracheostomy and/or mechanical ventilation include but are not limited to sleep disorders, anxiety, and depression for years beyond the acute stage of the illness.	*66% 4/6 rated as quite important-important	
The key factor in the presence of anxiety, anger, fear, and depression in the tracheostomized and/or mechanically ventilated population is due to the inability to communicate.	*83% 5/6 rated as quite important-important	
Tracheostomized and/or mechanically ventilated patients must achieve the fundamental needs purported by Maslow's hierarchy of needs before they can advance to an increase in function and recovery.	20% 1/5 rated as quite important-important	One expert stated "I don't know"
The psychological effects are based on admission to the intensive care or critical care settings and the treatments received.	40% 2/5 rated as quite important-important	One expert stated "I don't know"
The presence of delirium has been found to complicate cognitive deficits and emotional consequences in the mechanically ventilated patient population.	83% 5/6 rated as quite important-important	
During sedation holidays, patients report an increase in depression and anxiety.	*40% 2/5 rated as quite important-important	Two experts indicated unsure
Counseling a tracheostomized and/or mechanically ventilated patient regarding depression and anxiety is not within the scope of practice of the Speech Language Pathologist.	* 40% 2/5 rated as quite important-important	Two experts questioned wording
Anxiety and depression are managed with sedation medications while the patient is in the ICU/CCU.	60% 3/5 rated as quite important-important	One expert challenged the wording

* indicates the statement will be used in the KCT-TMV

Appendix J: Potential ASHA Ethical Violation Considerations from the ASHA Code of Ethics

Principal of Ethics	Rules of Ethics	Page number
I - A	Rules of Ethics: "individuals shall provide all clinical and scientific activities competently"	4
I - S	"Individuals who have knowledge that a colleague is unable to provide professional services with reasonable skill and safety shall report this information to the appropriate authority, internally if a mechanism exists and, otherwise, externally"	6
II- A	"Individuals who hold the Certificate of Clinical Competence shall engage in only those aspects of the professions that are within the scope of their professional practice and competence, considering their certification status, education, training, and experience"	6
II- D	"Individuals shall enhance and refine their professional competence and expertise through engagement in lifelong learning applicable to their professional activities and skills"	6

III-A	"Individuals shall not misrepresent their credentials, competence, education, training, experience, and scholarly contributions"	7

(American Speech Language Hearing Association, 2016b)

Appendix K: Glossary of Acronyms

AAC: Augmentative and alternative communication
AACN: American Association of Colleges of Nursing
ABG: Arterial blood gas
APA: American Psychiatric Association
APACHE: Acute Physiology and Chronic Health Evaluation
ARD: Acute renal disease
ARF: Acute respiratory failure
ASHA: American Speech Language Hearing Association
B.A.: Bachelor of Arts
B.S.: Bachelor of Science
CAA: Council on Academic Accreditation
CCC: Certificate of Clinical Competence
CCI: Chronic Critical Illness
CCNE: Commission on Collegiate Nursing Education
CCU: Critical Care Unit
CFCC: Council for Clinical Certification in Audiology and Speech Language Pathology
CFY: Certified Fellowship Year
CN: Cranial Nerve
CO2: Carbon Dioxide
COPD: Chronic obstructive pulmonary disease
CPAP: Continuous positive airway pressure
CRD: Chronic renal disease
CSC: Clinical Specialty Certification
DM: Diabetes Mellitus
D.O.: Doctor of Osteopathic Medicine
DRG: Diagnostic related group
DSM: Diagnostic and Statistical Manual of Mental Disorders
EBP: Evidence-Based Practice
ENT: Ears, nose and throat
GBS: Guillian Barre Syndrome
GCS: Glasgow Coma Scale
HADS: Hospital Anxiety and Depression Scale
HCO3: Bicarbonate
H-CUP: Healthcare Cost and Utilization Project
ICD-9: International Classification of Diseases – 9th Revision
ICU: Intensive Care Unit
IRB: Institutional Review Board
KCT-TMV: Knowledge and Confidence Test of Tracheostomy and Mechanical Ventilation

LOS: Length of stay
LTACH: Long term acute care hospital
M.A.: Masters of Arts
M.D.: Doctorate of Medicine
MI: Myocardial infarction
M.S.: Masters of Science
MV: Mechanical Ventilation
NIVM: Noninvasive mechanical ventilation
NLN: National League of Nursing
PAMV: Prolonged acute mechanical ventilation
PEEP: Positive end expiratory pressure
pCO2: Carbon dioxide in arterial blood
pH: Power of hydrogen
Ph.D.: Doctor of Philosophy
pO2: Partial pressure of oxygen in arterial blood
PNKAS- Shriners Revision: Pediatric Nurses' Knowledge and Attitudes Survey Regarding Pain
PILOTS: Published International Literature on Traumatic Stress
PMV: Prolonged mechanical ventilation
PS: Pressure Support
PTSD: Post Traumatic Stress Disorder
QoL: Quality of Life
RN: Registered Nurse
SIG: Special Interest Groups
SLP: Speech Language Pathologist
TNM: Tumor, node, metastasis
UKCC: United Kingdom Central Council for Nursing Midwifery and Health Visiting CV