A Capstone Project

entitled

Assessment of Patient Safety Attitudes of Respiratory Therapists who are Members of the Professional Association in Virginia

by

Daniel Ulysses Gochenour

Submitted to the Graduate Faculty as partial fulfillment of the requirements for the Doctor of Health Sciences Degree in the Department of Public Health and Healthcare Leadership

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An Abstract of

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There is limited data reporting patient safety attitudes of respiratory therapists in the United States. Positive patient safety attitudes have been associated with improved outcome measures such as employee retention, reduction in medication errors, and decreased length of ICU stay. This study looked to report patient safety attitudes of respiratory therapists and determine attributes that lead to having a more positive patient safety attitude. To assess patient safety attitudes, a non-experimental, cross-sectional study design using the safety attitudes questionnaire (SAQ), a validated survey tool, was employed.

To be included in the study, participants were required to be respiratory therapists and a member of the professional association in Virginia. The primary recruitment strategy for the study was online message board announcements, which generated an email notification. A postcard mailer and social media posts were also utilized for

recruitment. Participants volunteered to be included in the study by answering the demographic and the SAQ survey questions electronically using the survey tool Qualtrics.

Once the survey was closed, the data was transferred into SPSS for statistical analysis. Data analysis was completed by converting the 5-point Likert scale ranging from “Disagree Strongly” to “Agree Strongly” to a 100-point scale. The SAQ survey has six patient safety domains in the areas of teamwork climate, job satisfaction, perception of management, safety climate, working conditions, and stress recognition. By obtaining the mean scores of each domain, statistical analysis was completed by assessing the attributes of having 10 or more years of experience, being 40 years old or older, having a baccalaureate or graduate degree in respiratory therapy, having a baccalaureate or graduate degree in any field, obtaining a specialty credential, or earning the RRT credential. Internal consistency was evaluated by using the Cronbach’s alpha method. Each hypothesis was tested using the Mann-Whitney U test to determine statistical significance along with a multiple regression analysis to determine which attributes are associated with having a more positive patient safety attitude.

There were 1,144 members in the Virginia professional association at the time of recruitment. Of this population, 145 completed responses were received for data analysis. The survey data were determined to have a high overall internal consistency with a Cronbach’s alpha of 0.933 when assessing all scale item questions. Overall, the most important finding of this study was the discovery that obtaining a specialty credential led to a more positive patient safety attitude score by scoring nearly 5 points higher on the total score. Having a specialty credential accounted for 12.9% of the variation in patient

safety attitude scores determined by an $R^2 = .129$. The results of the statistical analysis showed having a specialty credential predicted having a more positive patient safety attitude (F (8, 135) = 2.506, p = .014).

Other significant results showed respiratory therapists who were 40 years old or older had a statistically significant difference in having a positive patient safety attitude in the domains of teamwork climate (p = .034), job satisfaction (p = .022), perceptions of management (p = .001), and working conditions (p = .002). Respiratory therapists who had 10 years of experience or more had a statistical significance in having a positive patient safety attitude in the domains of safety climate (p = .043), perceptions of management (p = .005), and working conditions (p = .047). Lastly, respiratory therapists who had achieved a specialty credential had a statistically significant difference in having a positive patient safety attitude in the domains of safety climate (p = .038), stress recognition (p = .028), and perceptions of management (p = .042).

The results of this study determined a significant difference in patient safety attitudes of respiratory therapists who have obtained a specialty credential. These results are similar to data reported from the nursing literature on the benefits of obtaining a specialty credential. Further research should be conducted to determine the importance of earning a specialty credential, obtaining a baccalaureate or graduate degree in respiratory therapy, as well as obtaining the RRT credential. Investigation into these attributes on a national level could help to provide evidence-based recommendation for education and credentialling for respiratory therapists.

Dedication

This body of work is dedicated to the spirit of never giving up, finding your passion, and knowing your self-worth. When I first began my educational journey at Radford University as an undergraduate, I had no true direction or motivation. It wasn't until I hit academic rock bottom by ending up on academic probation with a GPA of 2.0 that I knew this wasn't the person or student I wanted to be. Thankfully, Radford University allowed me to continue my academic career at RU with the new student programs initiative geared towards struggling students during their first year. It wasn't until my Professor Dr. David Sallee at RU that I really understood what it is like to have a passion for education and learning. His drive and excitement for the material started to resonate a true desire for me to learn and understand that I belong at the university level.

I was lucky to find my career passion in the profession of respiratory therapy and have the drive to continue my education. When I first started my Doctor of Health Sciences degree, the program was at Jefferson College of Health Sciences, where I completed my respiratory therapy degree summa cum laude. It is only appropriate now that I look to complete my doctoral degree at the very place my academic career was almost cut short. I am not the student I once was when I started Radford University, but I am certainly proud of the one I have become today. This work signifies every meaning in not giving up, finding your passion, and knowing your self-worth.

Acknowledgements

Without the support and guidance from my program committee this body of work would not have been what it is today. Thank you to the committee chair, Dr. F. Jeannie Everhart, along with my committee members, Dr. Chase Poulsen and Dr. Doug Wright, for their direction and support of this paper. I am appreciative and thankful for all the time and expertise Dr. Francis Dane provided in guiding the statistical analysis of this research. I owe a special thank you to my unofficial editor-in-chiefs Samantha Gochenour and Carolyn Gochenour for their many reviews of the paper. I greatly appreciate the support, time, and effort everyone placed into making this research paper possible.

''The biggest challenge to moving toward a safer health system is changing the culture from one of blaming individuals for errors to one in which errors are treated not as personal failures, but as opportunities to improve the system and prevent harm''

(Institute of Medicine, 2001).

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List of Abbreviations

AARC .....American Association for Respiratory Care

AHRQ .....Agency for Healthcare Research and Quality

CRT.....Certified Respiratory Therapist

Et al .....et alii (And Others)

HSOPS .....Hospital Survey on Patient Safety Culture

HSOPSC .....Swedish Hospital Survey on Patient Safety Culture

ICU.....Intensive Care Unit

IOM.....Institute of Medicine

NBRC.....National Board for Respiratory Care

OR .....Operating Room

QR .....Quick Response Code

RRT.....Registered Respiratory Therapist

SAQ.....Safety Attitudes Questionnaire

SAQ-RT .....Safety Attitudes Questionnaire Respiratory Therapy

SOS .....Safety Organizing Scale

SPSS.....Statistical Package for the Social Sciences

U.S. .....United States

VSRC .....Virginia Society for Respiratory Care

Chapter I

Introduction

Patient safety in the United States (U.S.) has been a key focus for leaders in healthcare since the landmark report from the Institute of Medicine (IOM), which estimated 44,000 to 98,000 deaths per year occur due to medical error (Kohn et al., 2000). Medical error has been described as an act of omission or commission in planning or execution, which leads to an unintended outcome (Grober & Bohnen, 2005). With the understanding that human error will occur, the focus on improving patient safety has been driven through the use of improving systems of care (Longo et al., 2005). The systems approach is based upon the high reliability organization theory in which organizations such as aircraft carriers and nuclear power plants consistently operate at a near error-free rate, despite the potential for catastrophic failures (Christianson et al., 2011).

High reliability organizations prevent catastrophic failures by focusing on error detection and management of errors when they occur (Weick et al., 1999). The key characteristics of high reliability organizations are having a preoccupation with failure, avoiding the tendency to minimize problems, being cognizant of operations, developing the capability to adjust for unexpected events, and deference to expertise (Christianson et al., 2011). For healthcare systems to become a high reliability organization, they must institute the same characteristics as other high reliability organizations. Developing a safety culture in the U.S. healthcare system requires a focus on preventing errors before they occur, and detecting errors when they occur to prevent them from becoming catastrophic failures. The first step in creating a safety culture is understanding the current patient safety attitudes among healthcare clinicians.

Assessing patient safety attitudes among healthcare clinicians can be accomplished by the use of psychometric surveys to measure the perception of their safety culture (Sexton et al., 2006). Positive patient safety attitudes of healthcare clinicians are linked to many different outcomes such as increased healthcare clinician retention, reduced medication errors, and decreased intensive care unit (ICU) length of stay, which have a positive impact on patient safety and outcomes (Sexton et al., 2005). Several studies describe patient safety attitudes among specific clinicians such as physicians and nurses, while others have focused on the multidisciplinary team (Brasaite et al., 2016; Källberg et al., 2017; Modak et al., 2007). Currently, there is only one study outside of the United States that specifically looks at patient safety attitudes among respiratory therapists (Shie et al., 2011). To understand patient safety attitudes of respiratory therapists in the United States, it is important to investigate this group of healthcare clinicians to know if education or process improvement projects are needed to improve patient safety attitudes of respiratory therapists. This research study looked to fill a void in the literature by assessing patient safety attitudes of respiratory therapists located in Virginia.

Background

Medical error has been estimated to be the third leading cause of death in the United States with over 250,000 deaths per year (Makary et al., 2016). With the large number of deaths occurring due to medical error, it is imperative that all members of the healthcare team focus on patient safety. Meta-analysis data has shown healthcare provides who suffer from burnout along with poor well-being have an association with higher rates of medical errors (Hall et al., 2016; Panagioti et al., 2018). Caregiver burnout

can lead to jeopardized patient care from repetitive exposure to occupation stress, depersonalization, and professional efficacy (Panagioti et al., 2018). It is important to recognize when these attitudes are developing in order to prompt interventions to improve patient safety attitudes and achieve a positive patient safety culture (Sexton et al., 2006).

A number of studies have assessed patient safety attitudes among physicians, nurses, and multidisciplinary teams. However, there is a lack of data that looks specifically at patient safety attitudes of respiratory therapists. With the need of a multidisciplinary approach to reduce the overall number of deaths related to medical error, it is necessary to understand the patient safety attitudes of all members of the healthcare team, including respiratory therapists.

Respiratory Therapy

Respiratory therapists in the United States serve a vital role in the delivery of healthcare to patients with cardiopulmonary compromise, critical care, and disease management. Nationally, according to the U.S. Bureau of Labor Statistics (2019), there are approximately 134,000 respiratory therapists with an expected growth rate of 21% over the next 10 years. Respiratory therapists can have a significant impact on patient safety with over 81% working in the hospital setting (U.S. Bureau of Labor, 2019). Patient safety attitudes of respiratory therapists in the United States are relatively under-examined with only one study outside of the United States specifically reporting on patient safety attitudes among respiratory therapists (Shie et al., 2011). At this time, the only data reported in U.S. literature on the safety attitudes of respiratory therapists is in conjunction with other members of the ICU team. A single center study assessed the

safety culture of ICUs and reported data from 26 respiratory therapists out of the 318 total surveys received (Huang et al., 2007). Another study assessing the improvements of a patient safety climate at the state level included respiratory therapists but did not specifically report the survey results of the cohort (Sexton et al., 2011). To further understand the patient safety attitudes of respiratory therapists in the United States, this study focused exclusively on the safety attitudes of respiratory therapists.

The Virginia Department of Health Professions reported 4,327 licensed respiratory therapists in Virginia (VDHP, 2018). The VDHP obtained survey data from 3,204 respiratory therapists in Virginia when they were obtaining or renewing their licenses to practice as a respiratory therapist (VDHP, 2018). The workforce survey had a 74% response rate with demographic data of 71% female, 79% with an associate degree, and median age of 46 years old (VDHP, 2018). Around 80% of respiratory therapists reported working directly with patients for at least 60% of their time (VDHP, 2018). With respiratory therapists having a significant role in the delivery of healthcare to patients, it is vital to understand the patient safety attitudes of the profession. This study focused on recruitment of respiratory therapists in Virginia who are members of the professional association for respiratory care.

American Association for Respiratory Care

The American Association for Respiratory Care (AARC) is the professional association for respiratory care (AARC, 2020). The AARC looks to encourage and promote professional excellence, advance the science and practice of respiratory care, and serve as an advocate for patients, families, and the profession (AARC, 2020). The AARC was founded in 1947 as a not-for-profit professional association with 47,000

members both national and international (AARC, 2020). The AARC further subdivides into a network of 50 state societies to involve members at the state level (AARC, 2020). At the time of the study, the Virginia Society for Respiratory Care (VSRC) had 1,144 members, which was the target population for recruitment into this study. Each member is granted access to the state member society message board referred to as AARConnect (AARC, 2019). The AARConnect message board was used to send mass messages to members for recruitment into the study.

Statement of the Problem

Over 20 years has passed since the original release of the Institute of Medicine report highlighting the issues of patient safety in the U.S. healthcare system (Kohn et al., 2000). While certain areas of patient safety have been improved upon, there is still significant work to be done to create a safer environment for the delivery of healthcare in the United States (Pronovost et al., 2016). In order to make significant changes in the U.S. healthcare system, a safety culture needs to be developed within all healthcare disciplines. A safety culture encourages honesty and learning, and balances individual and organizational accountability (Gandhi, 2016). The first step in creating a safety culture is understanding the current safety attitudes of healthcare clinicians. Through the use of survey assessment tools, patient safety attitudes can be measured to determine if interventions are needed or to measure the effectiveness of an intervention (Sexton et al., 2006). Respiratory therapists' attitudes towards patient safety in the United States has not been directly assessed in the current literature.

Significance

It has been estimated that 251,454 deaths occur per year due to medical error in the United States (Makary & Daniel, 2016). This data is a calculated mean from published studies since the release of the 1999 Institute of Medicine report (Makary & Daniel, 2016). However, some estimate the total number of deaths related to medical error could be as high as 400,000 per year (James, 2013). Some researchers have suggested the means are overestimated with the actual number of deaths related to medical error being closer to 25,000 per year (Shojania & Dixon-Woods, 2017). Many issues surround the inability to document patient deaths from error due to both legal concerns and willingness to document medical errors. Until there is a more uniform reporting mechanism, the actual number of medical errors leading to death in the United States will remain unknown (Pronovost, 2016). Regardless, the rate of medical error leading to harm is too prevalent with a rate of error calculated as high as 25.1 per 100 admissions (Landrigan et al., 2010). This rate of error was calculated from a retrospective study of 10 hospitals with 2,341 admissions that identified 588 harm events from internal reviewers (Landrigan et al., 2010).

These estimates require action from all healthcare clinicians to make patient safety a priority while delivering care to patients. Respiratory therapists have the opportunity to provide significant support to the efforts of improving patient safety in the U.S. healthcare system. The majority of respiratory therapists are employed in the hospital settings with many working in high-risk areas such as emergency departments and intensive care units. For respiratory therapists to have an impact on patient safety, there is a need for the current safety attitudes of the profession to be assessed. The

completion of this assessment of patient safety attitudes among respiratory therapists allows for a better understanding of the current state of safety culture within the profession.

Purpose of the Research

The purpose of this study was to investigate patient safety attitudes of respiratory therapists in Virginia using the SAQ-USRT survey. Patient safety attitudes among respiratory therapists within the United States has not been reported in the literature at this time. One study outside of the United States has assessed patient safety attitudes among respiratory therapists using the SAQ survey (Shie et al., 2011). The researchers from Taiwan assessing patient safety attitudes of respiratory therapists also used an altered version of the SAQ referred to as the SAQ-RT (Shie et al., 2011). The SAQ-RT was not utilized for this survey because of the differences between the Taiwan and U.S. health systems. The questions were altered in different ways for the specific target audience of respiratory therapists in each of the two countries. It is also not known if patient safety attitudes from the two countries are similar. This study looked to determine the patient safety attitudes of respiratory therapists within the United States to further understand the safety culture of the profession. Statistical analysis including inferential statistics were utilized to answer the following research questions and the associated hypotheses.

Overview of the Study Design

This non-experimental, cross-sectional study using a validated survey instrument tool assessed patient safety attitudes among respiratory therapists by utilizing an altered version of the SAQ (Sexton et al., 2006). The altered version of the SAQ is referred to as

the safety attitudes questionnaire for United States respiratory therapists (SAQ-USRT). The SAQ is a frequently used survey tool in the healthcare setting based upon its design of measuring caregiver attitudes in six patient safety related domains (Sexton et al., 2006). The six patient safety related domains are teamwork climate, safety climate, perceptions of management, job satisfaction, working conditions, and stress recognition (Sexton et al., 2006). The SAQ questions that are used in this study are altered from the Safety Attitudes: Frontline Perspectives from this Patient Care Area questionnaire (Appendix A). The changes to the survey were made to be more directed to the target population of respiratory therapists and referred to as the SAQ-USRT. The SAQ-USRT questions were transferred to an online survey tool for respiratory therapists to complete the questionnaire electronically. The link to the SAQ-USRT was sent to respiratory therapists in Virginia who are members of the professional association for respiratory care through an online message board. A quick response (QR) code was also made available to potential participants from a mailed postcard, which also included a link to the survey.

The target population was respiratory therapists in Virginia who are members of the professional association. At the time of the study, there were 1,144 members in the VSRC. Responses were collected using the online survey tool Qualtrics and transferred into Statistical Package for the Social Sciences (SPSS) version 26.0 for data analysis (IBM Corp, 2019). The Likert-scale data was converted to a 100-point scale as recommended by the original SAQ authors. Responses with a score of 75 or greater were consider positive on the 100-point scale.

Implications of the Research

By obtaining this survey data and using inferential statistics, it is possible to better understand the patient safety attitudes of respiratory therapists in Virginia. Using a multiple regression model determined which attributes of respiratory therapists were associated with having a more positive patient safety attitude. This study specifically looked at the attributes of age, sex, having 10 or more years of experience, being 40 years old or older, obtaining a baccalaureate degree in respiratory therapy or higher, achieving any baccalaureate degree or higher, obtaining a specialty credential, and earning the RRT credential. Identifying these attributes will help guide improvements in patient safety outcomes, facilitate changes in the profession of respiratory therapy, and also serve as a reference when assessing potential job candidates.

Research Question and Hypotheses

RQ1: What attributes of respiratory therapists determine a more positive attitude towards a teamwork climate?

$H1.1_o$: Respiratory therapists who have at least 10 years of experience will not have a more positive attitude towards a teamwork climate.

$H1.1_a$: Respiratory therapists who have at least 10 years of experience will have a more positive attitude towards a teamwork climate.

$H1.2_o$: Respiratory therapists who are 40 years old or older will not have a more positive attitude towards a teamwork climate.

$H1.2_a$: Respiratory therapists who are 40 years old or older will have a more positive attitude towards a teamwork climate.

$H1.3_o$: Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will not have a more positive attitude towards a teamwork climate.

$H1.3_a$: Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will have a more positive attitude towards a teamwork climate.

$H1.4_o$: Respiratory therapists who have achieved a specialty certification will not have a more positive attitude towards a teamwork climate.

$H1.4_a$: Respiratory therapists who have achieved a specialty certification will have a more positive attitude towards a teamwork climate.

$H1.5_o$: Respiratory therapists who have achieved the RRT credential will not have a more positive attitude towards a teamwork climate.

$H1.5_a$: Respiratory therapists who have achieved the RRT credential will have a more positive attitude towards a teamwork climate.

$H1.6_o$: Respiratory therapists who have achieved any bachelor's degree or higher will not have a more positive attitude towards a teamwork climate.

$H1.6_a$: Respiratory therapists who have achieved any bachelor's degree or higher will have a more positive attitude towards a teamwork climate.

RQ2: What attributes of respiratory therapists determine a more positive attitude towards a safety climate?

$H2.1_o$: Respiratory therapists who have at least 10 years of experience will not have a more positive attitude towards a safety climate.

$H2.1_a$: Respiratory therapists who have at least 10 years of experience will have a more positive attitude towards a safety climate.

$H2.2_o$: Respiratory therapists who are 40 years old or older will not have a more positive attitude towards a safety climate.

$H2.2_a$: Respiratory therapists who are 40 years old or older will have a more positive attitude towards a safety climate.

$H2.3_o$: Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will not have a more positive attitude towards a safety climate.

$H2.3_a$: Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will have a more positive attitude towards a safety climate.

$H2.4_o$: Respiratory therapists who have achieved a specialty certification will not have a more positive attitude towards a safety climate.

$H2.4_a$: Respiratory therapists who have achieved a specialty certification will have a more positive attitude towards a safety climate.

$H2.5_o$: Respiratory therapists who have achieved the RRT credential will not have a more positive attitude towards a safety climate.

$H2.5_a$: Respiratory therapists who have achieved the RRT credential will have a more positive attitude towards a safety climate.

$H2.6_o$: Respiratory therapists who have achieved any bachelor's degree or higher will not have a more positive attitude towards a safety climate.

$H2.6_a$: Respiratory therapists who have achieved any bachelor's degree or higher will have a more positive attitude towards a safety climate.

RQ3: What attributes of respiratory therapists determine a more positive attitude towards job satisfaction?

$H3.1_o$: Respiratory therapists who have at least 10 years of experience will not have a more positive attitude towards job satisfaction.

$H3.1_a$: Respiratory therapists who have at least 10 years of experience will have a more positive attitude towards job satisfaction.

$H3.2_o$: Respiratory therapists who are 40 years old or older will not have a more positive attitude towards job satisfaction.

$H3.2_a$: Respiratory therapists who are 40 years old or older will have a more positive attitude towards job satisfaction.

$H3.3_o$: Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will not have a more positive attitude towards job satisfaction.

$H3.3_a$: Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will have a more positive attitude towards job satisfaction.

$H3.4_o$: Respiratory therapists who have achieved a specialty certification will not have a more positive attitude towards job satisfaction.

$H3.4_a$: Respiratory therapists who have achieved a specialty certification will have a more positive attitude towards job satisfaction.

$H3.5_o$: Respiratory therapists who have achieved the RRT credential will not have a more positive attitude towards job satisfaction.

$H3.5_a$: Respiratory therapists who have achieved the RRT credential will have a more positive attitude towards job satisfaction.

$H3.6_o$: Respiratory therapists who have achieved any bachelor's degree or higher will not have a more positive attitude towards job satisfaction.

$H3.6_a$: Respiratory therapists who have achieved any bachelor's degree or higher will have a more positive attitude towards job satisfaction.

RQ4: What attributes of respiratory therapists determine a more positive attitude towards stress recognition?

$H4.1_o$: Respiratory therapists who have at least 10 years of experience will not have a more positive attitude towards stress recognition.

$H4.1_a$: Respiratory therapists who have at least 10 years of experience will have a more positive attitude towards stress recognition.

$H4.2_o$: Respiratory therapists who are 40 years old or older will not have a more positive attitude towards stress recognition.

$H4.2_a$: Respiratory therapists who are 40 years old or older will have a more positive attitude towards stress recognition.

$H4.3_o$: Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will not have a more positive attitude towards stress recognition.

$H4.3_a$: Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will have a more positive attitude towards stress recognition.

$H4.4_o$: Respiratory therapists who have achieved a specialty certification will not have a more positive attitude towards stress recognition.

$H4.4_a$: Respiratory therapists who have achieved a specialty certification will have a more positive attitude towards stress recognition.

$H4.5_o$: Respiratory therapists who have achieved the RRT credential will not have a more positive attitude towards stress recognition.

$H4.5_a$: Respiratory therapists who have achieved the RRT credential will have a more positive attitude towards stress recognition.

$H4.6_o$: Respiratory therapists who have achieved any bachelor's degree or higher will not have a more positive attitude towards stress recognition.

$H4.6_a$: Respiratory therapists who have achieved any bachelor's degree or higher will have a more positive attitude towards stress recognition.

RQ5: What attributes of respiratory therapists determine a more positive attitude towards perceptions of management?

$H5.1_o$: Respiratory therapists who have at least 10 years of experience will not have a more positive attitude towards perceptions of management.

$H5.1_a$: Respiratory therapists who have at least 10 years of experience will have a more positive attitude towards perceptions of management.

$H5.2_o$: Respiratory therapists who are 40 years old or older will not have a more positive attitude towards perceptions of management.

$H5.2_a$: Respiratory therapists who are 40 years old or older will have a more positive attitude towards perceptions of management.

$H5.3_o$: Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will not have a more positive attitude towards perceptions of management.

$H5.3_a$: Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will have a more positive attitude towards perceptions of management.

$H5.4_o$: Respiratory therapists who have achieved a specialty certification will not have a more positive attitude towards perceptions of management.

$H5.4_a$: Respiratory therapists who have achieved a specialty certification will have a more positive attitude towards perceptions of management.

$H5.5_o$: Respiratory therapists who have achieved the RRT credential will not have a more positive attitude towards perceptions of management.

$H5.5_a$: Respiratory therapists who have achieved the RRT credential will have a more positive attitude towards perceptions of management.

$H5.6_o$: Respiratory therapists who have achieved any bachelor's degree or higher will not have a more positive attitude towards perceptions of management.

$H5.6_a$: Respiratory therapists who have achieved any bachelor's degree or higher will have a more positive attitude towards management.

RQ6: What attributes of respiratory therapists determine a more positive attitude towards working conditions?

$H6.1_o$: Respiratory therapists who have at least 10 years of experience will not have a more positive attitude towards working conditions.

$H6.1_a$: Respiratory therapists who have at least 10 years of experience will have a more positive attitude towards working conditions.

$H6.2_o$: Respiratory therapists who are 40 years old or older will not have a more positive attitude towards working conditions.

$H6.2_a$: Respiratory therapists who are 40 years old or older will have a more positive attitude towards working conditions.

$H6.3_o$: Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will not have a more positive attitude towards working conditions.

$H6.3_a$: Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will have a more positive attitude towards working conditions.

$H6.4_o$: Respiratory therapists who have achieved a specialty certification will not have a more positive attitude towards working conditions.

$H6.4_a$: Respiratory therapists who have achieved a specialty certification will have a more positive attitude towards working conditions.

$H6.5_o$: Respiratory therapists who have achieved the RRT credential will not have a more positive attitude towards working conditions.

$H6.5_a$: Respiratory therapists who have achieved the RRT credential will have a more positive attitude towards working conditions.

H6.6$_o$: Respiratory therapists who have achieved any bachelor's degree or higher will not have a more positive attitude towards working conditions.

H6.6$_a$: Respiratory therapists who have achieved any bachelor's degree or higher will have a more positive attitude towards working conditions.

RQ7: When all demographic variables of interest are assessed by using a multiple regression model for each subscale, which attribute will be the most significant predictor of a positive safety attitude among respiratory therapists?

H7.1$_o$: There will be no demographic variable of interest that is predictive of a positive safety attitude among respiratory therapists, using a multiple regression model of each subscale.

H7.1$_a$: There will be a demographic variable of interest that is predictive of a positive safety attitude among respiratory therapists, using a multiple regression model of each subscale.

Chapter II

Review of the Literature

Patient Safety Culture

The Institute of Medicine report that highlighted the significant patient safety issues in the United States also called for the development of patient safety cultures within healthcare systems (IOM, 1999). The desire to develop patient safety cultures comes from understanding the need to have a preoccupation with failure (Weick et al., 1999). The preoccupation with failure is the mindset of looking for and avoiding errors in every aspect of daily work (Weick et al., 1999). Developing a patient safety culture within a healthcare system requires commitment to patient safety at the individual level and the managerial level (Mardon et al., 2010). Both the individual and the group need to have values such as positive attitudes, perceptions, competencies, and behaviors that are committed to delivering safe care to patients (Mardon et al., 2010). When a positive patient safety culture is developed, it results in the association of fewer patient safety issues within the healthcare system (Mardon et al., 2010). Safety attitude assessment tools can be used to measure and understand the safety culture of a specific health system or group of caregivers.

Patient Safety Assessment Tools

Currently there is no general consensus as to which assessment survey is the best tool for measuring caregivers' attitudes towards patient safety (Curran et al., 2018). A review of patient safety surveys from 2005 found nine survey tools that were developed for the use of assessing patient safety cultures in the healthcare setting (Colla et al., 2005). In 2018, another review was published that found the number of patient safety

assessment tools had increased to 17, with the majority of the surveys being adapted from the SAQ and the Swedish Hospital Survey on Patient Safety Culture (HSOPSC) (Curran et al., 2018).

From the 2005 review of surveys, the results showed nine of the surveys used Likert scales to measure attitudes of the individuals in five common areas of patient safety (Colla et al., 2005). The five common areas of the survey were leadership, policies and procedures, staffing, communication, and reporting. The strength of psychometric testing varies between the surveys (Colla et al., 2005). Table 1 lists the nine surveys with the summary of characteristics for each survey listed along with the name of the survey tool.

Table 1

Patient Safety Surveys: Summary of Characteristics

Name of Survey	SLOAPS	PSCHO	VHA	HSOPS	CSS	SAQ	SCS	MSSA	HTSSCS
General Characteristics									
Setting for appropriate use	General	General	General	General	General	Multi-use	Multi-use	Pharm	Transfusion
Use of 5-point Likert scale	Yes	Yes	Yes	Yes	Partial	Yes	Yes	Yes	Yes
Completed by individuals	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Measurers implementation of actions	Yes	No	No	No	No	No	No	Yes	No
Common Dimensions Covered									
Leadership	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Partial
Policies and Procedures	Yes	Partial	Yes	Partial	No	Partial	Partial	Yes	Partial
Staffing	Yes	Partial	Yes	Yes	Partial	Yes	Partial	Yes	No
Communication	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Reporting	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Total dimensions	9	5	13	12	4	6		20	8
Psychometrics Performed									
Item analysis	No	Partial	Yes	Yes	No	Yes	Partial	No	Yes
Cronbach's alpha	No	No	.45-.90	.63-.83	Poor	.68-.81	Good	.44-.84	.61-.85
Test/retest reliability	No	No	No	No	Yes	Yes	Partial	No	No
Correlated composite scores across dimensions	No	No	Yes	Yes	No	Yes	No	Partial	Yes
Analysis of variance across services	No	Yes	No	Yes	No	Yes	No	Partial	Yes

Note. SLOAPS, Strategies for Leadership: An Organizational Approach to Patient Safety; PSCHO, Patient Safety Cultures in Healthcare Organizations; VHA PSCQ, Veterans Administration Patient Safety Culture Questionnaire; HSOPS, Hospital Survey on Patient Safety; CSS, Culture of Safety Survey; SAQ, Safety Attitudes Questionnaire; SCS, Safety Climate Survey; MSSA, Medication Safety Self-Assessment; HTSSCS, Hospital Transfusion Service Safety Culture Survey. Data for this table was obtained from Etchegaray & Thomas, 2012.

In a separate study, the authors compared two of the assessment tools from Table 1 looking to determine the reliability and validity between the Safety Attitudes Questionnaire (SAQ) and the Hospital Survey on Patient Safety Culture (HSOPS) (Etchegaray & Thomas, 2012). The researchers found that both the SAQ and HSOPS had similar reliability and predicted validity to assess patient safety climates (Etchegaray & Thomas, 2012). Overall, the SAQ is a shorter assessment tool that would allow for a more efficient way to trend data and would potentially have a higher response rate due to the shorter assessment tool (Etchegaray & Thomas, 2012).

Multiple reviews of patient safety assessment tools seem to conclude the SAQ and the HSOPSC are the preferred questionnaires for determining the safety climate of a healthcare system (Alsalem et al., 2018; Flin et al., 2006; Halligan et al., 2011; Jackson et al., 2010; Singla et al., 2006). A recent review found the safety organizing scale (SOS) tool to also have an adequate assessment of psychometric properties along with the SAQ

and HSOPSC (Alsalem et al., 2018). Table 2 displays the general features of survey tools with adequate psychometric properties (Alsalem et al., 2018).

Table 2

Data Extraction of General Features

Features	Name of Instrument				
	HSOPSC	SAQ	PSCHO	SOS	Can-PSC
Authors	Sorra & Dyer	Sexton	Singer et al	Vogus & Sutcliffe	Ginsburg et al
Publication year	2010	2006	2007	2007	2013
Country	U.S.	U.S.	U.S.	U.S.	Canada
Instrument Details					
Number of items	42	30 (core items)	38	9	19
Type of Likert scale	5 point	5 point	5 point	7 point	5 point
Level of analysis	Individual, Unit, Hospital	Individual, Unit	Individual, Unit, Hospital	Unit	Unit, Hospital
Results Reporting	Positive percentage scores	Positive percentage scores	Percentage problematic scoring	Not reported	Not reported
Setting	Hospital setting	Hospital setting	Hospital setting	Hospital setting	Hospital setting
Staff	Healthcare Staff	Healthcare Staff	Healthcare Staff	Nursing units	Healthcare Staff

Note. HSOPSC Hospital Survey on Patient Safety Culture, SAQ Safety Attitudes Questionnaire, PSCHO Patient Safety Climate in Healthcare Organizations, Can-PSC Canadian Patient Safety Climate Scale, SOS Safety Organizing Scale. Information for this table was obtained from Alsalem et al., 2018.

Psychometric Properties

Psychometric properties are the validity and reliability of a measurement tool such as the patient safety attitude surveys (Asunta et al., 2019). This requires the assessment tool to be evaluated extensively before determining if the tool has adequate psychometric properties, which requires the scale to be both reliable and valid (Asunta et al., 2019). Of the published survey tools assessing patient safety, the belief is that only the SAQ and the HSOPSC have adequate reporting on psychometric properties (Alsalem et al., 2018). Some researchers also believe the HSOPSC assessment tool does not meet the standard psychometric criteria (Perneger et al., 2014). With this consideration, the SAQ will be further discussed as the primary assessment tool for understanding caregiver attitudes on patient safety.

Safety Attitudes Questionnaire

The SAQ was developed from the Intensive Care Unit Management Attitudes Questionnaire, which was created from an assessment tool used frequently in aviation to measure the safety climate perceptions of a group of pilots (Sexton et al., 2006). Researchers found a significant amount of errors in the airline industry were due to the breakdown in interpersonal aspects of crew performance such as teamwork, leadership, and communication (Sexton et al., 2006). With the help of the assessment tool, the number of errors were greatly reduced by improving safety attitudes among crew members (Sexton et al., 2006).

The goal of the SAQ is to use a similar approach to identify and improve areas in healthcare where there is a breakdown in interpersonal aspects that lead to patient error (Sexton et al., 2006). By identifying areas of breakdown in teamwork, speaking up,

leadership, communication, and collaborative decision making, the healthcare industry could see similar improvements in safety that have been reported in high reliability organizations (Sexton et al., 2006). Transitioning healthcare to a high reliability organization with a preoccupation in failure to improve patient safety requires psychometric and benchmarking data that can be measured with assessment tools such as the SAQ (Sexton et al., 2006).

The SAQ authors prefer the term “safety climate” to “safety culture” due to the limitations of a single survey assessment in a specific period of time (Sexton et al., 2006). Safety culture is known as the values, attitudes, perceptions, competencies, and patterns of behavior within the individual or group that determine the commitment to safety in the organization (Hellings et al., 2007). Safety climate is specific to the organization and describes individual perceptions of the value of safety in the workplace (Reichers et al., 1990). Climates are known to be more readily measurable than cultures due to the limited capabilities to capture all aspects of a culture such as behavior, values, and competencies (Sexton et al., 2006). The SAQ assessment tool is centered on six factors to measure provider attitudes of the patient safety climate (Sexton et al., 2007). The six factors and definitions are listed in Table 3 along with an example for each factor.

Table 3

SAQ Factor Definitions and Example Items

Scale Item: Definition	Example items
Teamwork Climate	
Perceived quality of collaboration between personnel	Disagreements are appropriately acted upon Our staff work together as a coordinated team
Job Satisfaction	
Positivity about the work experience	I like my job This is a good place to work
Perceptions of Management	
Approval of managerial action	Management is supportive of my daily work efforts
Safety Climate	
Perceptions of a strong and proactive organizational commitment to safety	I would feel safe being a patient here Staff frequently disregard rules
Working Conditions	
Perceived quality of the work environment and logistical support (staffing, equipment, etc.)	Staffing levels are sufficient for patient acuity I have the equipment necessary for patient care
Stress Recognition	
Acknowledgment of how performance is influenced by stressors	I am less effective when I am tired

Note: Information for this table was obtained from Sexton et al., 2006.

To assess the six factors of the patient safety climate, the survey uses 36 questions, along with demographic information, which can be completed in 10 to 15 minutes as seen in Appendix A (Sexton et al., 2006). The questions are answered based upon a 5-point Likert scale of disagree strongly, disagree slightly, neutral, agree slightly, and agree strongly with some questions being negatively described (Sexton et al., 2006). Modifications to the SAQ have been made for the specific areas in which the survey was completed such as the ICU, operating room (OR), or general inpatient areas (Sexton et al., 2006). Those changes were minor and made to reflect the clinical area in which the survey was being delivered, such as "In this clinical area, it is difficult to discuss mistakes" to "In this Emergency Department, it is difficult to discuss mistakes" (Sexton et al., 2006). These minor changes are considered acceptable and help to personalize the survey to the participant.

SAQ Validation

The SAQ assessment tool is a validated questionnaire that adequately measures caregiver attitudes and patient safety perceptions (Sexton et al., 2006). The survey questionnaire shows reliability by using the Raykov's ρ coefficient test, which resulted in a p value for the SAQ of .90, indicating strong reliability of the questionnaire (Sexton et al., 2006). This strong reliability with a multi-level factor analysis shows the questionnaire has good psychometric properties to assess the patient safety climate in the healthcare setting (Sexton et al., 2006). Using this validated survey allowed for a more in-depth understanding of clinicians' attitudes of patient safety with accuracy and reliability.

Psychometric Properties of the SAQ

The original development of the SAQ utilized pilot studies and investigation into factor analysis within four critical care units in the United States (Sexton et al., 2000; Thomas et al., 2003). This led to the current survey questionnaire number of items and six-factor areas of interest (Sexton et al., 2006). Between 2000 and 2003, the SAQ was administered six times at a total of 203 sites in the United States, United Kingdom, and New Zealand (Sexton et al., 2006). There were no substantial revisions needed following the pilot testing, which resulted in the first non-pilot testing occurring in 106 United Kingdom ICUs and twenty New Zealand ICUs (Sexton et al., 2006). This was followed by testing in the United States at 77 different locations including inpatient, OR, ambulatory, and ICUs (Sexton et al., 2006).

By using the combined results of the 203 sites in the United States, United Kingdom, and New Zealand, the researchers were able to validate their questionnaire (Sexton et al., 2006). The researchers used Mplus version 2.12 to evaluate the six-factor model with multilevel confirmatory factor analysis with the entire sample of respondents from the 203 sites (Sexton et al., 2006). To assess the overall data for each of the models, the researchers used the Mplus MLR chi-square test for model fit for non-parametric data (Sexton et al., 2006). To evaluate descriptive measures, the researchers used the Standardized Root Mean Residual, Comparative Fit Index, and the Root Mean Square Error of Approximation by using the cutoff values of .90 for the Comparative Fit Index, .08 for the Root Mean Square Error of Approximation, and .10 for the Standardized Root Mean Residual (Sexton et al., 2006). In order to display consistency and reliability for both clinical areas and individuals, the computed coefficient alpha values in Mplus were

modeled based upon the Miller and Raykov structural equation modeling-based approach (Sexton et al., 2006). Following the acceptance of the model fit, the researchers used the results to compute composite scale reliability using Raykov's coefficient (Sexton et al., 2006).

The overall SAQ response rate from the 203 sites was 10,843, which was a 67% response rate (Sexton et al., 2006). Composite scale reliability for the questionnaire was assessed using Raykov's p coefficient (Sexton et al., 2006). The p value for the questionnaire in this study was .90, which indicates a strong reliability of the questionnaire (Sexton et al., 2006). The strong reliability along with the multi-level factor analysis demonstrates the quality of the psychometric properties of the questionnaire (Sexton et al., 2006).

SAQ Publications

There are a number of published studies that use the SAQ to assess patient safety attitudes of healthcare clinicians in a variety of ways. To date, over 1,500 publications have cited the original SAQ study from 2006 (Google Scholar, 2020). Studies performed outside of the United States have also showed adequate psychometric results from the SAQ when translated to assess their patient safety climate (Kaya et al., 2010; Nordén-Hägg et al., 2010). Research from Taiwan on hospital safety culture has shown healthcare workers with positive attitudes scored on the SAQ survey were more likely to have good collaboration with coworkers and more likely to encourage safety among others (Lee et al., 2010).

More recent studies using the SAQ have assessed areas such as staff satisfaction to gain insight to potential safety attitudes and their relationship with job satisfaction

within a teaching healthcare system (Cheng et al., 2020). Other areas of the SAQ include the assessment of patient safety attitudes of caregivers working within an emergency department after significant change has occurred (Milton et al., 2020). Specific groups of healthcare clinicians have been assessed using the SAQ to investigate burnout and patient safety attitudes of pediatric nurses (Bilal & Sari, 2020). The SAQ was also found to be a useful tool assessing medical team training, which allowed for researchers to prove effectiveness of safety improvement activities (Watts et al., 2010). To show the relationship between safety attitudes and the potential for improved outcomes, the findings from past research studies will be further described.

Findings from past research studies

Nurses have been a frequent study population for assessing the patient safety climate and its relationship to patient outcomes; other areas include improving management strategies such as employee retention (Day et al., 2007; Hayhurst et al., 2005). When developing a positive patient safety culture, it is necessary to have acceptance from both the individual and the different groups within the healthcare system. When assessing the patient safety climate of managers, there seems to be a greater positive safety attitude among senior managers versus non-senior managers (Singer et al., 2008). Acknowledging this difference and understanding the variance between the two groups is necessary for the acceptance of the safety climate downstream of the non-senior managers and to the individual level. The idea of having a safety culture is an important concept as it is necessary to have all levels focused on creating a positive patient safety climate (Deilkås et al., 2010).

The patient safety climate should not be a focus for just senior management level; it needs to occur on all levels (Deilkås et al., 2010). This requires a focus on a patient safety climate from the frontline staff at the individual level, as well as non-senior managers and senior management (Deilkås et al., 2010). Within the same organization, it is possible to have individual areas of positive safety climate as well as areas with a negative safety climate. The goal should be to focus on having a positive patient safety climate throughout the entire healthcare system and not limited to one facility or one department. The ultimate goal should be to transcend positive patient safety climates throughout the U.S. healthcare system. There have been positive patient safety changes made at the state level with influence of process improvement utilizing the SAQ to measure the attitudes of clinicians.

Michigan launched a statewide project to improve patient safety in their ICUs by assessing safety attitudes from the SAQ to collect baseline information and to implement quality improvement interventions (Pronovost et al., 2008). The statewide effort was able to improve patient safety in ICUs throughout Michigan by developing a unit-based safety program that significantly improved their safety culture (Pronovost et al., 2008).

U.S. Studies

There are some published studies in which respiratory therapists are included when assessing the attitudes of a specific work area such as a neonatal intensive care unit (Profit et al., 2012). One study looked at the varying perceptions of safety culture across a single institution in its intensive care units (Huang et al., 2007). This study included data from 26 respiratory therapists who answered the survey questionnaire from the single center data collection (Huang et al., 2007). The only study that looked specifically at

patient safety attitudes among respiratory therapists was a study published from Taiwan (Shie et al., 2011).

Patient Safety Among Respiratory Therapists: Shie et al. (2011) from Taiwan

The patient safety attitudes study from Taiwan used an adapted version of the SAQ, which was named Safety Attitudes Questionnaire-Respiratory Therapy (SAQ-RT) (Shie et al., 2011). The SAQ-RT used similar strategies as the original SAQ to ensure reliability and accuracy by implementing two reverse-coded questions to ensure the respondents read and answered the questions carefully (Shie et al., 2011). Their study also included demographic data that assessed for educational level, years of experience, and the type of hospital environment where the respiratory therapists were working (Shie et al., 2011).

The safety attitudes survey was completed with the assistance of the Respiratory Therapist Society for Republic of China in which the survey was mailed to department directors who then passed the survey out in person to the individual respiratory therapists (Shie et al., 2011). There were 1,220 copies of the surveys handed out with 730 returned for scoring for a response rate of 60.2% (Shie et al., 2011). Their demographic data showed 96% of respondents were female, 75% had baccalaureate or master's degrees, and 75% had five or more years of work experience (Shie et al., 2011). Their study found respiratory therapists in Taiwan had low positive safety attitudes within their health care system with variations in different clinical settings (Shie et al., 2011). The researchers believed this was due to high workload demands, management of respiratory therapists under other professions, and lack of autonomy (Shie et al., 2011).

Respiratory Therapists (RTs) in the United States: Virginia RTs Can Serve as an Example

There are many differences between the Taiwan healthcare system and the U.S. healthcare system. These differences require the investigation of patient safety attitudes among respiratory therapists in the United States. The Virginia Department of Health Professions conducted a survey of respiratory therapists who were renewing their state licensure as a respiratory therapist (VDHP, 2018). When looking at the demographic data from the VDHP survey, their results showed a female response rate of 74% compared to the Taiwan study of 96% (Shie et al., 2011; VDHP, 2018). The Taiwan study also reported a much higher educational level with 75% having a baccalaureate or master's degree compared to the data reported from the VDHP, which concluded only 16% of all respiratory therapists in Virginia hold a baccalaureate degree or higher (Shie et al., 2011; VDHP, 2018).

Table 4 shows data collected by the VDHP from a survey published in 2018 (VDHP, 2018). The survey data from the VDHP showed a response rate of 74%, which included demographic data such as 71% female and a median age of 46 years old (VDHP, 2018). Table 4 also shows a survey response breakdown of respiratory therapists according to their age and gender that completed the volunteer survey (VDHP, 2018). Further analysis of these responses shows 76% of Virginia respiratory therapists are female and under the age of 40 (VDHP, 2018).

Table 4

Age and Gender of Virginia Respiratory Therapist

Age	Male		Female		Total	
	#	% Male	#	% Female	#	% in Age Group
Under 30	81	23%	268	77%	349	10%
30 to 34	113	27%	312	74%	424	12%
35 to 39	95	23%	326	77%	421	12%
40 to 44	125	31%	279	69%	404	12%
45 to 49	129	29%	315	71%	445	13%
50 to 54	129	29%	313	71%	442	13%
55 to 59	120	28%	303	72%	423	12%
60+	213	41%	307	59%	520	15%
Total	1,005	29%	2,423	71%	3,428	100%

Note: Data for this table was obtained from the Virginia Department of Health Professions from a survey published in 2018 (VDHP, 2018).

Table 5 shows the number and percentage of respiratory therapists according to the level of credentialing they have achieved (VDHP, 2018). The table lists 50% of the respiratory therapists in Virginia have earned the CRT (certified respiratory therapist) credential and 72% have earned the RRT (registered respiratory therapist) credential (VDHP, 2018). This is likely a misunderstanding of the question. At the time of the survey, in order to be an RRT, the therapist must have also passed the CRT. If 72% of therapists were RRT certified, that should leave 28% holding the CRT credential. This

research study looked to distinguish between the two levels of certifications by asking for the highest level achieved with the RRT being the more advanced credential.

Table 5

Certifications of Respiratory Therapist in Virginia

Certification	Total Number	Percentage
Certified Respiratory Therapist (CRT)	1,843	50%
Registered Respiratory Therapist (RRT)	2,648	72%
Neonatal/Pediatric Specialty (NPS)	298	8%
Certified Pulmonary Function Technologist (CPFT)	171	5%
Adult Critical Care Specialty (ACCS)	150	4%
Registered Pulmonary Function Technologist (RPFT)	84	2%
Certified Asthma Educator (AE-C)	42	1%
Sleep Disorder Specialty (SDS)	11	<1%

Note: Data for this table was obtained from the Virginia Department of Health Professions from a survey published in 2018 (VDHP, 2018).

Gaps in the Literature

There is currently a lack of U.S. data that directly assesses respiratory therapists' attitudes towards patient safety. By using results of studying a sample of RTs in the

United States, such as those in the state of Virginia, researchers will have a better understanding of RT patent safety attitudes. The SAQ-USRT, often used in similar studies, was a logical choice as a validated research instrument for conducting the study.

Merits of a Study

Directly assessing respiratory therapists' attitudes is an important step in determining the current mindset of patient safety in this profession. Relying on data that only captures the safety attitudes of respiratory therapists when included in a specific work area, such as an intensive care unit, is not adequate to fully understand the current status. By specifically assessing respiratory therapists' attitudes of patient safety in the United States, it will close an important gap in the literature and increase the understanding of the attitudes of the profession. Over 50% of the respiratory therapists working in Virginia reported working in the critical care environment (VDHP, 2018). This means there are over 2,000 people working with a high-risk population that has the potential for improvement in the safety of the care being delivered in high-risk areas (VDHP, 2018). Understanding the safety attitudes of the profession is the first step in improving the safety of the medical care being provided.

Chapter III

Methodology

Study Design

This study employed a non-experimental, cross-sectional quantitative study design utilizing a validated survey instrument to assess patient safety attitudes among respiratory therapists. The Safety Attitudes Questionnaire (SAQ) is the validated survey tool originally developed by Sexton et al. (2006) used for this research study. The SAQ was designed to measure caregiver attitudes in six patient safety-related domains to assess safety attitudes with acceptable psychometric properties (Sexton et al., 2006). The survey is adopted from the SAQ: Frontline Perspectives from this Patient Care Area and consists of 36 questions along with eight demographic questions. This study used an altered version of the SAQ named the Safety Attitudes Questionnaire for United States Respiratory Therapists (SAQ-USRT).

Instruments and Measures

The survey instrument included the 36-item SAQ-USRT, as well as an eight-item survey focused on the demographics of the participants. This version was named the SAQ-USRT due to a previous version named SAQ-RT used outside of the United States. The SAQ-RT could not be used for this study due to the difference between the United States and Taiwan healthcare systems. The alterations in the SAQ-USRT were made to the survey questions to be tailored towards the target population of respiratory therapists in the United States.

Measures for the SAQ-USRT are on a 5-point Likert scale ranging from "Disagree Strongly" to "Agree Strongly." The demographic questions consist of eight

questions that assess attributes of respiratory therapists, including age, gender, years of experience, level of education, level of certification, work location, primary population served, and specialty credentials to assess the different attributes of a respiratory therapist.

The survey typically took less than 15 minutes to complete. Some example alterations to the original SAQ assessment tool are questions one and six. Question one from the SAQ survey was edited from "Nurse input is well received in this clinical area" to "Respiratory Therapist input is well received in this clinical area." Also, question six was altered from "The physicians and nurses here work together as a well-coordinated team" to "The physicians, nurses, and respiratory therapists here work together as a well-coordinated team." The full list of revised SAQ-USRT survey questions that were used in this study can be seen in Appendix C.

Target Population

The target population of this study was respiratory therapists licensed in Virginia who are members of the professional association known as the American Association for Respiratory Care (AARC). By being a member of the AARC and either living or working in Virginia, the respiratory therapist can be a member of the Virginia Society for Respiratory Care (VSRC). At the time of the survey request, there were 1,144 members listed on the state roster for the VSRC (AARC, 2020). The total number of Virginia licensed respiratory therapists is 4,327, which means this study protocol attempted to contact 26% of the respiratory therapists in Virginia who chose to be members of the professional association (VDHP, 2018).

Sampling. This study used a convenience sample of respiratory therapists who are members of the VSRC. Data was collected from participants via an electronic survey tool. Three survey requests were sent out through an online message board to members of the VSRC as seen in Appendices G, H, and I. Three advertisement posts were made through the VSRC social media page to alert members of the active survey as seen in Appendices L, M, and N. Finally, a postcard flyer was sent to members of the VSRC to notify them of the survey and also provide a QR code for completing the survey as seen in Appendix K.

The primary survey advertisement was the online message board communication. The advertisement for the survey was sent out from a representative of the AARC on behalf of the researcher. These announcements were sent out once a week for three weeks. Members of the VSRC are enrolled in the online community message board known as AARConnect. Members do have the option of choosing to opt out of receiving email notifications from the message board. Without email notification, the potential participant would not have received the recruitment message. The person could sign into the message board to find the recruitment message. However, members are not required to sign into the message board, which would mean the person may never receive the request to complete the survey. Based upon personal communication with a representative from the AARC, the VSRC had 47 members who had opted out of email notifications at the time of the survey requirement (Appendix D). Also, it is unknown as to how many email messages are routinely read or sent directly to a clutter or junk mailbox folder.

Inclusion. To be included in the study, the participant was required to be a respiratory therapist. According to Regulations Governing the Practice of Respiratory Therapists, the Virginia Board of Medicine requires the person to complete the requirements set forth by the Virginia Board of Medicine in Appendix E (Virginia Board of Medicine, 2019). For this study, the respiratory therapist must also be a member of the AARC. To be an active AARC member, the individual must live in the United States or its territories, or was an active member prior to moving outside of its borders, and must meet one of the following criteria: (1) legally credentialed as a respiratory care professional if employed in a state that mandates such, or (2) is a graduate of an accredited educational program in respiratory care, or (3) holds a credential issued by the National Board for Respiratory care (NBRC) (AARC, 2020). To obtain the minimal respiratory therapy credential from the NBRC, which is the Certified Respiratory Therapist (CRT), the candidate must meet the requirements in Appendix F (NBRC, 2020).

Exclusion. This study excluded individuals who were not respiratory therapists and who did not meet the AARC membership requirements. AARC requirements are also dependent upon the NBRC requirements listed in Appendix F. Respiratory therapists included were required to be VSRC members but were not required to be living in Virginia. The NBRC excludes individuals under the age of 18 from sitting for an exam. In return, this study also excluded anyone under the age of 18. Membership to the AARC requires an annual membership fee and is optional for respiratory therapists.

Sample Size. The population size of respiratory therapists who are members of the professional state society in Virginia is 1,144. This research study recruited 176

participants who started the survey with 31 participants discontinuing the survey before completion. Most of the participants who did not complete the survey discontinued after the demographics section. The remaining 145 participants completed all of the SAQ questions. Of the 145 completed SAQ questions, one participant chose not to answer their age in the demographic section. However, the person indicated they had 35 years of experience, which made them eligible for inclusion in the research questions.

An ideal sample size with a margin of error of 5% and confidence level of 95% would have been 288 completed responses (Raosoft, 2004). This study did not reach the target of 288 completed responses. The response rate for this online survey collection achieved a 13% response rate. Measures were put into place to achieve the highest response rate possible. Those strategies included keeping the survey as brief as possible, sending out reminder notifications and advertisements, having information that is meaningful to the participant, and utilizing a lottery incentive (Pit et al., 2014).

This research study used a lottery incentive as a known way to improve completion of survey data (Doerfling et al., 2010). A $100 lottery incentive to three random respondents to the survey was advertised as an incentive for participants to complete the survey. To be eligible for the $100 lottery prize, the participants were required to meet the requirements of the survey, which included being a respiratory therapist and being over the age of 18. The participant was only eligible to take the survey one time and only eligible for one entry into the random selection. At the end of the survey in the comments section, the participant needed to provide his or her name and mailing address to be eligible for the random selection. This information was not kept or used for research purposes. The only intent of this data collection was to award the prize

to the randomly selected participant. If the participant's name and mailing address were not included, the person was no longer eligible for the lottery incentive. The incentive was self-funded by the researcher with no outside bias related to funding the project.

Data Collection

The SAQ-USRT survey questions along with demographic questions were placed on the online survey tool Qualtrics^{XM} (Qualtrics, 2020). The survey was live from July 1, 2020 until August 12, 2020. During that time, a representative from the AARC sent out three mass messages for recruitment in the survey through AARConnect. The messages included information about the research study and a survey link to Qualtrics for participation in the study (Appendices G, H, and I). A postcard mailer was also sent out to VSRC members with a QR code requesting their participation in the survey (Appendix K). Three advertisements were made on the VSRC social media page for participation in the survey (Appendices L, M, and N). A link was not attached to the social media page to ensure only VSRC members would complete the survey. On August 12, 2020, the survey was closed to enrollment.

Data Analysis

Once the survey was closed, the data was exported from Qualtrics^{xm} to Statistical Package for Social Sciences (SPSS) version 26.0 software for statistical analysis (IBM Corp, 2019). The data was transferred from Qualtrics to SPSS using the code book from Appendix Q. Data was then assessed and reviewed for accuracy along with necessary edits for proper analysis in SPSS. Some data cleanup was necessary for respondents who included words instead of numbers, such as seven years of experience instead of reporting only the number "7."

Once the data was exported into SPSS, the SAQ data was converted to a 100-point scale as recommended by the original SAQ authors. The SAQ uses a 5-point Likert scale for the survey questions to assess the participants' opinion of the survey item from a 1-5 ranking system with 1 = Disagree Strongly, 2 = Disagree Slightly, 3 = Neutral, 4 = Agree Slightly, and 5 = Agree Strongly. The Likert scale results were converted to a 100-point scale to determine if the response is positive or negative. To convert the items to the 100-point scale, the results are scored as follows: 1 = 0, 2 = 25, 3 = 50, 4 = 75, and 5 = 100. A score of 75 or above is considered to be a positive answer. The score of 75 on the scale system would indicate the same thing as "agree slightly."

A complete list of both demographic questions and SAQ-USRT study questions can be found in Appendix Q. The SAQ-USRT scale items were grouped together and analyzed in respect to each hypothesis. The scale items were determined by the original authors of the SAQ to look at six specific areas of safety attitudes (Sexton et al., 2006). Table 6 lists the questions that are grouped together with their assessment target for the following areas of interest: teamwork climate, safety climate, job satisfaction, stress recognition, perceptions of management, and working conditions. Some of the questions are not grouped together and were not used in the data analysis due to original SAQ author recommendations.

Table 6

Safety Attitudes Grouped Together for Scale Items

Category	Question
Teamwork Climate	SAQ Questions 1-6
Safety Climate	SAQ Questions 7-13
Job Satisfaction	SAQ Questions 15-19
Stress Recognition	SAQ Questions 20-23
Perceptions of Management	SAQ Questions 24-28
Working Conditions	SAQ Questions 29-32
Not part of a scale	SAQ Questions 14, 33-36
Reverse Scored	SAQ Questions 2, 11, & 36

Eight demographic questions were assessed in the survey as seen in Appendix Q. These questions were the independent variables that were used for descriptive and inferential statistical analysis. Specifically, five of the demographic factors were used to determine a correlation between patient safety attitudes and attributes of respiratory therapists. The attributes that were specifically analyzed were age, years of experience, level of education, specialty credential, and achieving the RRT credential. Appendix Q shows the 36 SAQ-USRT questions that are the dependent variables used for statistical analysis of the survey data. The demographic section and the SAQ-USRT section make up the complete questionnaire that was employed to assess patient safety attitudes of respiratory therapists in Virginia.

Survey data from Qualtrics[xm] was transferred directly to SPSS for calculating the item score for the SAQ responses. The mean score for each of the scale items was determined using SPSS. Statistical analysis was completed on each of the six research questions and hypotheses as seen in Table 7. Inferential statistics were used to determine what attributes of respiratory therapists determine a more positive safety attitude to answer research question number seven. By using specific demographic data, each of the six scale items was investigated. The scale items are all aspects of patient safety attitudes in areas such as teamwork, safety, job satisfaction, stress recognition, perceptions of management, and working conditions. Each of the hypotheses were assessed using the statistical test based upon the data type as displayed in Table 7.

Table 7

Research Questions and Hypotheses Table with Variable Types

RQ1: What attributes of respiratory therapists determine a more positive attitude towards a teamwork climate?

#	*Hypothesis*	*IV(s)*	*Variable Name*	*IV(s)*	*DV(s)*	*DV Data*	*Statistical Test*
H1. 1a	Respiratory therapists who have at least 10 years of experience or more will have a more positive attitude towards a teamwork climate.	Years of experience 10 or more	YEARS _EXP10	Categorical (dichotomous)	Safety attitude mean score for teamwork climate	C	Mann-Whitney U Test
H1. 2a	Respiratory therapists who are 40	Age 40 or over	40orOV ER	Categorical (dichotomous)	Safety attitude mean	C	Mann-Whitney U Test

	years old or older will have a more positive attitude towards a teamwork climate.				score for teamwork climate		
H1.3a	Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will have a more positive attitude towards a teamwork climate.	Bachelor's degree or higher in RT	BACHELOR_HIGHER_RT	Categorical (dichotomous)	Safety attitude mean score for teamwork climate	C	Mann-Whitney U Test
H1.4a	Respiratory therapists who have achieved a specialty certification will have a more positive attitude towards a teamwork climate.	Specialty credential	SECIALITY_CRED	Categorical (dichotomous)	Safety attitude mean score for teamwork climate	C	Mann-Whitney U Test
H1.5a	Respiratory therapists who have achieved the RRT credential will have a more positive attitude towards a	RRT or CRT	RRT	Categorical (dichotomous)	Safety attitude mean score for teamwork climate	C	Mann-Whitney U Test

	teamwork climate.						
H1. 6a	Respiratory therapists who have achieved any bachelor's degree or higher will have a more positive attitude towards a teamwork climate.	Bachelors or higher in any field	Bachelors_Or_Higher_any	Categorical (dichotomous)	Safety attitude mean score for teamwork climate	C	Mann-Whitney U Test

RQ2: What attributes of respiratory therapists determine a more positive attitude towards a safety climate?

#	*Hypothesis*	*IV(s)*	*Variable Name*	*IV(s)*	*DV(s)*	*DV Data*	*Statistical Test*
H2. 1a	Respiratory therapists who have at least 10 years of experience or more will have a more positive attitude towards a safety climate.	Years of experience 10 or more	YEARS_EXP10	Categorical (dichotomous)	Safety attitude mean score for safety climate	C	Mann-Whitney U Test
H2. 2a	Respiratory therapists who are 40 years old or older will have a more positive attitude towards a safety climate.	Age 40 or over	40orOVER	Categorical (dichotomous)	Safety attitude mean score for safety climate	C	Mann-Whitney U Test

H2.3a	Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will have a more positive attitude towards a safety climate.	Bachelor's degree or higher in RT	BACHELOR_HIGHER_RT	Categorical (dichotomous)	Safety attitude mean score for safety climate	C	Mann-Whitney U Test
H2.4a	Respiratory therapists who have achieved a specialty certification will have a more positive attitude towards a safety climate.	Specialty credential	SECIALITY_CRED	Categorical (dichotomous)	Safety attitude mean score for safety climate	C	Mann-Whitney U Test
H2.5a	Respiratory therapists who have achieved the RRT credential will have a more positive attitude towards a safety climate.	RRT or CRT	RRT	Categorical (dichotomous)	Safety attitude mean score for safety climate	C	Mann-Whitney U Test
H2.6a	Respiratory therapists who have achieved any bachelor's degree or higher will	Bachelors or higher in any field	Bachelors_Or_Higher_any	Categorical (dichotomous)	Safety attitude mean score for safety climate	C	Mann-Whitney U Test

	have a more positive attitude towards a safety climate.						

RQ3: What attributes of respiratory therapists determine a more positive attitude towards job satisfaction?

#	*Hypothesis*	*IV(s)*	*Variable Name*	*IV(s)*	*DV(s)*	*DV Data*	*Statistical Test*
H3.1a	Respiratory therapists who have at least 10 years of experience or more will have a more positive attitude towards job satisfaction.	Years of experience 10 or more	YEARS_EXP10	Categorical (dichotomous)	Safety attitude mean score for job satisfaction	C	Mann-Whitney U Test
H3.2a	Respiratory therapists who are 40 years old or older will have a more positive attitude towards job satisfaction.	Age 40 or over	40orOVER	Categorical (dichotomous)	Safety attitude mean score for job satisfaction	C	Mann-Whitney U Test
H3.3a	Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will have a more positive	Bachelor's degree or higher in RT	BACHELOR_HIGHER_RT	Categorical (dichotomous)	Safety attitude mean score for job satisfaction	C	Mann-Whitney U Test

	attitude towards job satisfaction.						
H3. 4a	Respiratory therapists who have achieved a specialty certification will have a more positive attitude towards job satisfaction.	Specialty credential	SECIALITY_CRED	Categorical (dichotomous)	Safety attitude mean score for job satisfaction	C	Mann-Whitney U Test
H3. 5a	Respiratory therapists who have achieved the RRT credential will have a more positive attitude towards job satisfaction.	RRT or CRT	RRT	Categorical (dichotomous)	Safety attitude mean score for job satisfaction	C	Mann-Whitney U Test
H3. 6a	Respiratory therapists who have achieved any bachelor's degree or higher will have a more positive attitude towards job satisfaction.	Bachelors or higher in any field	Bachelors_Or_Higher_any	Categorical (dichotomous)	Safety attitude mean score job satisfaction	C	Mann-Whitney U Test

RQ4: What attributes of respiratory therapists determine a more positive attitude towards stress recognition?

#	*Hypothesis*	*IV(s)*	*Variable Name*	*IV(s)*	*DV(s)*	*DV Data*	*Statistical Test*
H4. 1a	Respiratory therapists who have at least 10 years of experience or more will have a more positive attitude towards stress recognition.	Years of experience 10 or more	YEARS _EXP10	Categorical (dichotomous)	Safety attitude mean score for stress recognition	C	Mann-Whitney U Test
H4. 2a	Respiratory therapists who are 40 years old or older will have a more positive attitude towards stress recognition.	Age 40 or over	40orOVER	Categorical (dichotomous)	Safety attitude mean score for stress recognition	C	Mann-Whitney U Test
H4. 3a	Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will have a more positive attitude towards stress recognition.	Bachelor's degree or higher in RT	BACHELOR_HIGHER_RT	Categorical (dichotomous)	Safety attitude mean score for stress recognition	C	Mann-Whitney U Test

H4.4a	Respiratory therapists who have achieved a specialty certification will have a more positive attitude towards stress recognition.	Specialty credential	SECIALITY_CRED	Categorical (dichotomous)	Safety attitude mean score for stress recognition	C	Mann-Whitney U Test
H4.5a	Respiratory therapists who have achieved the RRT credential will have a more positive attitude towards stress recognition.	RRT or CRT	RRT	Categorical (dichotomous)	Safety attitude mean score for stress recognition	C	Mann-Whitney U Test
H4.6a	Respiratory therapists who have achieved any bachelor's degree or higher will have a more positive attitude towards stress recognition.	Bachelors or higher in any field	Bachelors_Or_Higher_any	Categorical (dichotomous)	Safety attitude mean score stress recognition	C	Mann-Whitney U Test

RQ5: What attributes of respiratory therapists determine a more positive attitude towards perceptions of management?

#	*Hypothesis*	*IV(s)*	*Variable Name*	*IV(s)*	*DV(s)*	*DV Data*	*Statistical Test*
H5.1a	Respiratory therapists who have at least 10 years of experience or more will have a more positive attitude towards perceptions of management.	Years of experience 10 or more	YEARS_EXP10	Categorical (dichotomous)	Safety attitude mean score for perceptions of management	C	Mann-Whitney U Test
H5.2a	Respiratory therapists who are 40 years old or older will have a more positive attitude towards perceptions of management.	Age 40 or over	40orOVER	Categorical (dichotomous)	Safety attitude mean score for perceptions of management	C	Mann-Whitney U Test
H5.3a	Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will have a more positive attitude towards perceptions of	Bachelor's degree or higher in RT	BACHELOR_HIGHER_RT	Categorical (dichotomous)	Safety attitude mean score for perceptions of management	C	Mann-Whitney U Test

	management.						
H5.4a	Respiratory therapists who have achieved a specialty certification will have a more positive attitude towards perceptions of management.	Specialty credential	SECIALITY_CRED	Categorical (dichotomous)	Safety attitude mean score for perceptions of management	C	Mann-Whitney U Test
H5.5a	Respiratory therapists who have achieved the RRT credential will have a more positive attitude towards perceptions of management.	RRT or CRT	RRT	Categorical (dichotomous)	Safety attitude mean score for perceptions of management	C	Mann-Whitney U Test
H5.6a	Respiratory therapists who have achieved any bachelor's degree or higher will have a more positive attitude towards perceptions of management.	Bachelors or higher in any field	Bachelors_Or_Higher_any	Categorical (dichotomous)	Safety attitude mean score perceptions of management	C	Mann-Whitney U Test

RQ6: What attributes of respiratory therapists determine a more positive attitude towards working conditions?

#	*Hypothesis*	*IV(s)*	*Variable Name*	*IV(s) Data*	*DV(s)*	*DV Data*	*Statistical Test*
H6. 1a	Respiratory therapists who have at least 10 years of experience or more will have a more positive attitude towards working conditions.	Years of experience 10 or more	YEARS _EXP10	Categorical (dichotomous)	Safety attitude mean score for working conditions	C	Mann-Whitney U Test
H6. 2a	Respiratory therapists who are 40 years old or older will have a more positive attitude towards working conditions.	Age 40 or over	40orOV ER	Categorical (dichotomous)	Safety attitude mean score for working conditions	C	Mann-Whitney U Test
H6. 3a	Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will have a more positive attitude towards working conditions.	Bachelor's degree or higher in RT	BACHE LOR_H IGHER _RT	Categorical (dichotomous)	Safety attitude mean score for working conditions	C	Mann-Whitney U Test

H6.4a	Respiratory therapists who have achieved a specialty certification will have a more positive attitude towards working conditions.	Specialty credential	SECIALITY_CRED	Categorical (dichotomous)	Safety attitude mean score for working conditions	C	Mann-Whitney U Test
H6.5a	Respiratory therapists who have achieved the RRT credential will have a more positive attitude towards working conditions.	RRT or CRT	RRT	Categorical (dichotomous)	Safety attitude mean score for working conditions	C	Mann-Whitney U Test
H6.6a	Respiratory therapists who have achieved any bachelor's degree or higher will have a more positive attitude towards working conditions.	Bachelors or higher in any field	Bachelors_Or_Higher_any	Categorical (dichotomous)	Safety attitude mean score working conditions	C	Mann-Whitney U Test

RQ7: When all demographic variables of interest are assessed by using a multiple regression model for each subscale, which attribute will be the most significant predictor of a positive safety attitude among respiratory therapists?

#	*Hypothesis*	*IV(s)*	*Variable Name*	*IV(s) Data*	*DV(s)*	*DV Data*	*Statistical Test*
H7.1a	Respiratory therapists who have achieved a bachelor's degree in respiratory therapy or higher will have a more positive attitude towards patient safety when assessed by a multiple regression model	Age, sex, BSRT or higher, Specialty credential, Bachelor degree or higher any, RRT credential, 40 years old or older, 10 years' experience or more	Age, sex, BACHELOR_HIGHER_RT, SECIALITY_CRED, Bachelors_Or_Higher_any, 40orOVER, YEARS_EXP10	Categorical, Scale, Nominal	Safety attitude mean total score	C	Multiple regression

Note: IV = Independent Variables; DV = Dependent Variables; C = Continuous

Due to the nature of Likert score data, the Cronbach alpha method was used to assess the group score responses for internal consistency. An alpha score above .70 was considered acceptable with an alpha score of .90 or higher considered ideal. An alpha score above .70 will show acceptable internal consistency and determine the scale to be reliable.

Normality testing was completed using the Shapiro-Wilk test to determine the homogeneity of the data. Each domain item was assessed for normality with values greater than 0.05 considered normally distributed data. Following the results of the Shaprio-Wilk test, the data was determined to be nonparametric. The original plan of using the Levene's test to determine the homogeneity of variance to run an independent t-

test was no longer possible. With the data being nonparametric, the Mann-Whitney U test was utilized to determine statistical significance of the data.

The Mann-Whitney U test was selected for its ability to compare differences between two independent groups when the dependent variable is continuous (Laerd Statistics, 2015). The Mann-Whitney U test is typically considered the nonparametric alternative to the independent t-test, which was the original study plan prior to determining the data to be nonparametric (Laerd Statistics, 2015). To determine if the statistical analysis is significant, a p-value threshold was predetermined.

The p-value will show the probability of the results from the data to occur by chance. A p-value of 0.05 indicates there is only a 5% probability the results of the data occurred at random (Laerd Statistics, 2015). For this study, a p-value of 0.05 or less was considered statistically significant and would mean rejecting the null hypothesis. Each of the hypotheses questions were analyzed using this method to determine if the null hypothesis is rejected and the alternative hypothesis accepted.

Finally, a multiple regression test of all demographic data was completed to determine which attributes were associated with a more positive patient safety attitude. This was completed by assessing the total mean score of the survey scale data. The total mean score is the dependent variable with the demographic variables being the independent variables assessed with a linear regression. The R value, R^2 value, and adjusted R^2 were all used to interpret the attribute that has the most association with having a positive patient safety attitude (Laerd Statistics, 2015).

Missing data was excluded from statistical analysis if the SAQ portion of the survey was not completed. The online survey tool imposed certain restrictions by

requiring the participants to answer a question before moving forward with submitting their response. This allowed for some control over missing data.

Institutional Review Board

Institutional review board (IRB) approval was obtained due to the involvement of human subjects. IRB approval was obtained through the Radford University IRB processes (Appendix O). Approval from the AARC was also obtained due to the use of the AARConnect message board as the primary requirement tool for the survey (Appendix P). Exempt and Expedited IRB approval was granted due to the nature of the study. The study was low risk by including only adults over the age of 18 along with requiring participants to be a certified or registered respiratory therapist. The participation of the survey was voluntary with no repercussions for not completing the survey questionnaire. The cover letter for internet research, provided by Radford University and edited for this study, was utilized in recruitment messages to the participants. The Radford University cover letter format can be seen in Appendix J. Data collection did not begin until final IRB approval from Radford University.

Limitations

The most significant limitation of this study is the inability to survey a random sample of all respiratory therapists in Virginia, or even the entire United States. This would require significant monetary and labor-intensive resources that were not feasible for this study design. This study design was limited to electronic contact information available through the AARConnect message board, VSRC social media advertisements, and a single postcard mailer to VSRC addresses. Electronic contact information was not available for nonmembers of the professional society. Mailing addresses for all licensed

therapists in Virginia were available, but not feasible for this study. Respiratory therapists who are members of the professional society choose to join and are not obligated to be members. Members are required to pay dues to maintain their professional society membership. Due to this commitment to their profession, this group of respiratory therapists may have a more positive attitude towards patient safety. This could result in a more positive patient safety attitude compared to nonmembers.

Virginia was chosen as the target sample population on the AARConnect message board versus a national sample size to improve the overall response rate. At the same time, a presumed low response rate of the survey is assumed, which led to a convenience sample chosen over a random sampling method. The number of responses needed and the number of expected responses based upon past electronic survey data was the determining factor for this decision. Overall, the survey questions are designed to assess personal attitudes of patient safety. Many factors could affect the responses of the individual, such as the timing of the study and what the participant is currently experiencing in his or her specific work area. This data collection occurred during the COVID-19 pandemic and could have altered the number of responses as well as the attitudes of respiratory therapists due to their involvement in the pandemic. Due to the response rate of the data, this could cause a bias in either a positive or negative direction because of the sample size obtained.

Another limitation of this study was the 13% response rate achieved during the recruitment period. The study did not meet the original goal of a 30% response rate. It is consistent with reported response rates for healthcare providers and online survey

collection (Cook et al., 2016). The enrollment period for this study also occurred during the COVID-19 pandemic, which could have influenced the response rate of the survey.

Delimitations

This study design chose to collect responses using an online survey tool due to the feasibility of the design. There is data that suggests a higher response rate can be achieved by mailing a paper survey (Guo et al., 2016). However, due to the monetary cost of mailing paper surveys and the labor associated with the process, it was not practical for this researcher. This decision limited data to only electronic contact information and a single postcard mailing. The other delimitations previously discussed are the decision to use only VSRC members and not an entire sample of Virginia respiratory therapists. This could cause the data to be more positive due to the high involvement level already occurring with the respiratory therapists who choose to be members of their professional association.

Chapter IV

Results

The survey was sent to 1,144 potential respondents. Of these, a total of 176 participants began the survey with five participants stopping after agreeing to the informed consent question. Twenty-six participants answered through the demographic questions but did not complete the SAQ portion of the survey. One participant completed all of the questions including the SAQ, but chose not to answer for their age. However, they did respond to the years of experience question, which resulted in the participant having over 35 years of experience. Due to the number of years of experience, they were included in the data analysis for 10 or more years of experience along with being 40 years old or older. This resulted in 145 total completed surveys with the exception of the one missing age data point, for an overall response rate of 13%.

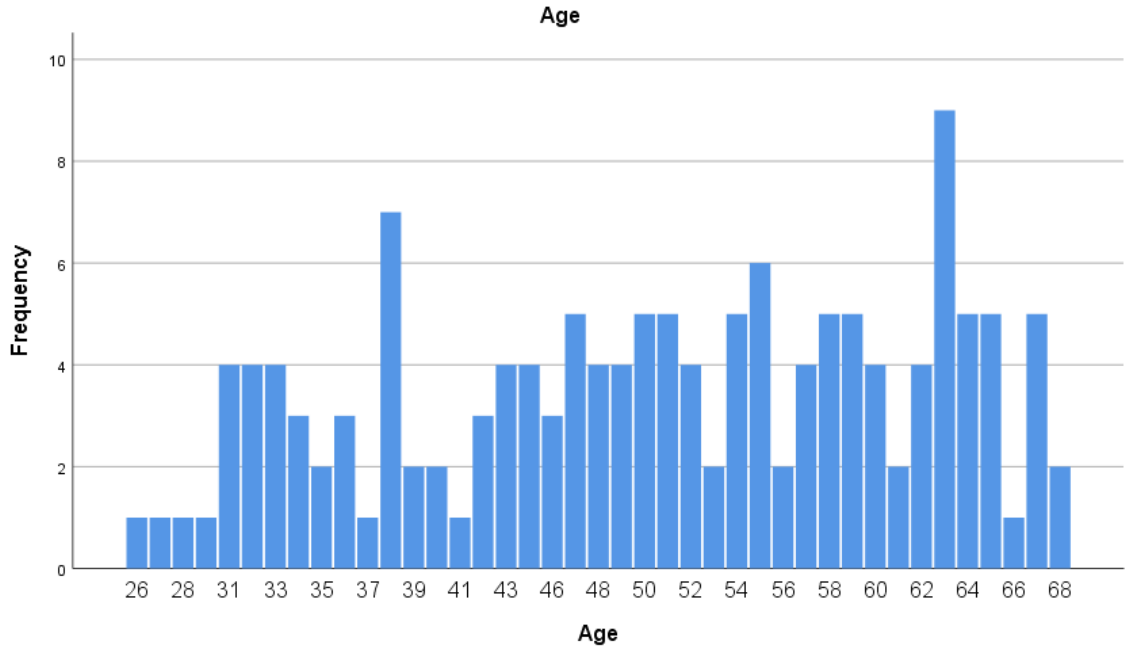
The goal of 288 completed surveys was not achieved in this study, which would have resulted in a 5% margin of error, 95% confidence level, and a response distribution of 50% (Raosoft, 2014). However, this study did obtain enough completed surveys for statistical analysis and reportability. Based upon the Raosoft (2004) calculations, this resulted in a sample size with a margin of error of 8%, a confidence interval of 96%, and a 50% response distribution with 145 completed responses (Raosoft, 2004). The study data obtained on patient safety attitudes of respiratory therapists seems to be the most comprehensive data collection in the United States using the SAQ survey tool known at this time.

Demographic Profile of the Participants

The median age of the 144 participants who completed the survey and answered the age question was 51 years old. The age of participants who completed the survey ranged from 26 to 68 years old. A breakdown of the participants by age can be seen in Figure 1. Participants aged 63 and 38 had the most frequent responses to the research survey.

Figure 1

Age of Participants



This study specifically looked at the differences between participants who were above and below the age of 40 years old. Table 8 shows 76.6% of the participants were over the age of 40. Another demographic factor that is analyzed in this study is the difference between participants with 10 years of experience or more compared to participants with less than 10 years of experience. Table 8 shows 76.6% of participants in this study had over 10 years of experience. The final demographic in Table 8 shows the

percentage of participants who identified as being male or female. This study resulted in 61.4% of the participants identifying as female.

Table 8

Demographic Profile of Participants

Demographic Variable	N	Response %
Responses	145	100%
39 years old or younger	34	23.4%
40 years old or older	111	76.6%
Responses	145	100%
Female	89	61.4%
Male	56	38.6%
Responses	145	100%
9 years of experience or more	34	23.4%
10 years of experience or more	111	76.6%

Demographic Profile of Education

At this time, the entry-to-practice degree requirement for a respiratory therapist is an associate degree in respiratory therapy. There are baccalaureate entry-to-practice programs as well as graduate entry-to-practice programs available in the Unites States. In 2019, the AARC released a position paper that stated its goal is to transition to a minimum of a baccalaureate degree for entry-to-practice by 2030 (AARC, 2019). As of 2020, it is up to the individual, or his or her employer, to pursue degree advancement if he or she entered the field without a baccalaureate or graduate degree. In this study, 63%

of participants reported having an associate degree in respiratory therapy while 29.7% of participants hold a baccalaureate or graduate degree in respiratory therapy. Table 9 shows the summary of all degrees not specific to respiratory therapy, there are 64.1% who hold either a baccalaureate or graduate degree. While less than 30% currently have a baccalaureate or graduate degree specific to respiratory therapy, it is important to point out that nearly 65% of the participants in this survey do report having a baccalaureate or graduate degree.

Table 9

Demographic Profile of Education

Demographic Variable	N	Response %
Degrees Earned		
Associate Degree in Respiratory Therapy	92	63%
Associate Degree (Non-RT)	9	6.2%
Bachelor's Degree in Respiratory Therapy	38	26.2%
Bachelor's Degree (Non-RT)	47	32.4%
Master's Degree in Respiratory Therapy	9	6.2%
Master's Degree (Non-RT)	23	15.9%
Doctoral Degree	5	3.4%
Respiratory Therapy Degree		
Responses	145	100%
BS or MS in Respiratory Therapy	43	29.7%
No BS or MS in Respiratory Therapy	102	70.3%

Bachelor's or Graduate Degree (any degree)		
Responses	145	100%
Bachelor's or Graduate Degree	93	64.1%
No Bachelor's or Graduate Degree	52	35.9%

Note: Participants may have obtained both a BSRT and MSRT, which would result in the difference between the degrees earned and number of participants who hold a BS or MS in Respiratory Therapy.

Demographic Profile of Credentials

There are currently two respiratory therapy credentials that allow a respiratory therapist entry-to-practice in the field: the certified respiratory therapist (CRT) credential and the registered respiratory therapist (RRT) credential. Previously, there were separate examinations the candidate would have to pass, with the first being the CRT exam. Once the candidate passed the examination, he or she was eligible to move on to the RRT written exam, and finally a clinical simulation exam. The process has now changed to one exam to achieve the CRT with the possibility of scoring high enough to be eligible for the clinical simulation examination. If the candidate passed the simulation examination, then he or she would earn the RRT credential. At this time, it is up to the state licensure boards or employers to require the CRT or RRT credential. Most employers prefer the RRT credential, which has become a major contributor to the increasing number of RRT versus CRT respiratory therapists. Recently, the AARC has announced its goal for all entry-to-practice respiratory therapists to achieve the RRT credential by 2030 (AARC, 2019). In this study, 93.8% of participants reported achieving their RRT credential. Respiratory therapists also have the opportunity to earn specialty credentials in a number of different areas. Table 10 shows 55.9% of participants have earned a specialty

credential with 24% being the neonatal pediatric specialist and 22% earning the adult critical care specialist credential.

Table 10

Demographic Profile of Credentials

Profile of Credentials

Highest Respiratory Therapy Credential		
	N	Response %
Responses	145	100%
Certified Respiratory Therapist	9	6.2%
Registered Respiratory Therapist	136	93.8%
Specialty Credential (any)		
Responses	145	100%
Yes	81	55.9%
No	64	44.1%
Specialty Credential (specific)		
Neonatal/Pediatric Specialty (NPS)	36	24.8%
Adult Critical Care Specialty (ACCS)	33	22.8%
Certified Pulm Function Tech (CPFT)	20	13.8%
Registered Pulm Function Tech (RPFT)	20	13.8%
Other	14	9.7%
Certified Asthma Educator (AE-C)	11	7.6%
Sleep Disorders Specialty (SDS)	2	1.4%
Registered Polysomnographic Tech (RPSGT)	1	0.7%

Demographic Profile of Workplace

Overall, the majority of respiratory therapists work in the inpatient hospital setting. However, there are a number of opportunities for respiratory therapists to work in other settings such as clinics, rehabilitation, academia, and industry. Table 11 shows the participants in this study mostly worked at inpatient teaching hospitals, which accounted for 40% of the responses. Non-teaching inpatient hospital positions were the second most reported work setting at 33.8%. Most respiratory therapists reported working with either a mix of patient populations or only adult patients with both reporting 43.4% each.

Table 11

Demographic Profile Place of Work

Demographic Variable	Primary Work Location	
	N	Response %
Responses	145	100%
Teaching Hospital, Inpatient	58	40.0%
Non-teaching Hospital, Inpatient	49	33.8%
Other	10	6.9%
Teaching Hospital, Outpatient	6	4.1%
Physician Office	5	3.4%
Academic	4	2.8%
Non-teaching Hospital, Outpatient	3	2.1%
Industry Related	3	2.1%
Rehabilitation Facility	3	2.1%

Skilled Nursing Facility	3	2.1%
Assisted Living or Continuing Care	1	0.7%
Primary Patient Population Served		
Responses	145	100%
Mix of patient populations	63	43.4%
Adults	63	43.4%
Pediatrics	18	12.4%
Geriatric	1	0.7%

Scoring the Safety Attitudes Questionnaire

The SAQ is divided into six subscales that include teamwork climate, safety climate, job satisfaction, stress recognition, perceptions of management, and working conditions. Based upon the original author scoring recommendations, there are five questions that are not part of the scale and are not included in the data analysis (Sexton et al., 2006). Three survey questions of the SAQ were negatively worded, which required reverse scoring prior to data analysis. The questionnaire utilizes a 5-point Likert scale ranging from 1 to 5 for all items on the survey. Based upon the original authors scoring recommendations, the 5-point Likert scale ranging from 1 to 5 was converted to a 100-point scale (Sexton et al., 2006). This scale was changed by converting the data with the following formula: 1 = 0, 2 = 25, 3 = 50, 4 = 75, and 5 = 100 to complete statistical analysis with the author recommended 100-point scale. Any answers above 75 are considered to be a positive attitude towards the survey question.

Internal Consistency

Cronbach's alpha method was used to determine internal consistency of the SAQ-USRT survey responses. Internal consistency is determining the reliability of the survey to measure the intended scale items. The Cronbach's alpha method is the most commonly used method in determining reliability with a Likert scale questionnaire (Laerd Statistics, 2015). The SAQ-USRT overall had a very high level of internal consistency with a Cronbach's alpha of 0.933 when assessing all 36 scale items. When individually assessing the scale items, the results showed good internal consistency with all domains reaching the accepted value of 0.7 or greater. The questionnaire was employed to measure different, underlying scale items. One domain, "teamwork climate," consisted of six questions. The scale had an acceptable level of internal consistency, as determined by a Cronbach's alpha of 0.796. The domain "safety climate" consisted of six questions. The scale had a high level of internal consistency, determined by a Cronbach's alpha of 0.839. The domain "job satisfaction" consisted of five questions. The scale had a high level of internal consistency, determined by a Cronbach's alpha of 0.851. "Stress recognition" consisted of four questions. The scale had a high level of internal consistency, determined by a Cronbach's alpha of 0.830. "Perceptions of management" consisted of 10 questions. This scale also had a high level of internal consistency, determined by a Cronbach's alpha of 0.919. Lastly, "working conditions" consisted of four questions and also showed an acceptable level of internal consistency, determined by a Cronbach's alpha of 0.758. Each Cronbach's alpha value and number of questions in the domain are listed in Table 12.

Table 12

Cronbach's Alpha for Each Domain

Domain	Number of Questions	Cronbach's Alpha
Teamwork Climate	6	0.796
Safety Climate	6	0.839
Job Satisfaction	5	0.851
Stress Recognition	4	0.830
Perceptions of Management	10	0.919
Working Conditions	4	0.758

Safety Attitudes Questionnaire Results

When analyzing the mean and median results for each of the individual questions, the responses were assessed for positive and negative responses based upon the criteria of a score of 75 or greater indicating a positive response. A score of less than 75 correlates with a negative response. In the teamwork climate scale item questions, all median scores were above 75, which is interpreted as an overall positive score for the scale item. The mean for scale question SAQ 2 and SAQ 3 were each deemed negative with scores of 73.45 and 74.66. The safety climate scale item questions also had reported medians that were all above 75, signifying the responses were positive. The mean, however, showed SAQ 11 with a mean of 68.62 and SAQ 13 with a mean of 71.38, which would be considered a negative response to the question. The job satisfaction climate had values above 75 for both the median and the mean except for SAQ 19. SAQ 19, which assesses morale, had a median score of 50 and a mean score of 56.55. The stress recognition scale item section had two questions that scored positive and two questions that scored

negative when assessing the median scores. All mean scores for this scale item question were negative. The lowest scored question was question SAQ 23: “Fatigue impairs my performance during emergency situation.” This question may have had a negative outcome because of the frequency at which respiratory therapists are placed in emergency situations. The perceptions of management section resulted in eight out of the 10 questions being positive when assessing the median scores. Only three questions were positive when assessing the mean values for the questions. The lowest score question of this group was SAQ 27b: “Problem personnel are dealt with constructively by our institution management.” This question had a mean score of 55.86. For working conditions, all but one question was positive when looking at the median score. For the mean scores of working conditions, all questions scored less than 75, signifying a negative response. The lowest scored question with a mean of 50.69 was SAQ 29: “The levels of staffing in this institution are sufficient to handle the number of patients.”

Table 13 shows the total results broken down into the scale item questions. When assessing the mean values for each scale item, teamwork climate (81.64), safety climate (80.17), and job satisfaction (79.07) all resulted in positive responses. Stress recognition (58.15), perceptions of management (68.76), and working conditions (63.75) all scored negatively. Stress recognition was the lowest scoring scale item, while teamwork climate was the highest scoring scale item.

Table 13

SAQ Results of Total Scale Items

SAQ Score of Scale Item

	N	Mean
Teamwork Climate	145	81.64
Safety Climate	145	80.17
Job Satisfaction	145	79.07
Perceptions of Management	145	68.76
Working Conditions	145	63.75
Stress Recognition	145	58.15

Normality Testing

The Shapiro-Wilk test was used to determine normality of the data. Each domain item was assessed for normality with values greater than 0.05 being considered normally distributed data. None of the six domain items met this threshold. A Shapiro-Wilk test for each climate showed a significant departure from normality with the following results: teamwork climate, $W(145) = .900$, $p = <0.001$; safety climate, $W(145) = .895$, $p = <0.001$; job satisfaction, $W(145) = ..886$, $p = <0.001$; stress recognition, $W(145) = .968$, $p = 0.002$; perceptions of management, $W(145) = .951$, $p = <0.001$; and working conditions, $W(145) = .970$, $p = 0.003$. Because of the items failing to reach a value greater than 0.05, the Mann-Whitney U test was selected for this data. Table 14 lists the values from the Shapiro-Wilk test for normality.

Table 14

Test of Normality Shapiro-Wilk

Domain	Statistic	df	Sig.
Teamwork Climate	.900	145	$p < 0.001$
Safety Climate	.895	145	$p < 0.001$
Job Satisfaction	.886	145	$p < 0.001$
Stress Recognition	.968	145	0.002
Perceptions of Management	.951	145	$p < 0.001$
Working Conditions	.970	145	0.003

Hypothesis Testing

Following the results of the Shapiro-Wilk testing, the decision was made to use the Mann-Whitney U test to test the hypotheses of the study. The Mann-Whitney U test was selected due to the data being nonparametric determined by the normality testing. The Mann-Whitney U test is the preferred test with nonparametric data and the use of a 5-point Likert scale survey. SPSS statistical testing models were utilized to answer the six research questions and their associated hypotheses. A regression model was employed to determine what attribute was the most significant in determining a positive patient safety attitude.

Research Questions and Hypotheses

Research Question 1: What attributes of respiratory therapists determine a more positive attitude towards a teamwork climate?

Findings: A Mann-Whitney U test was run to determine if there were differences in teamwork climate between respiratory therapists who have 10 or more years of experience, are 40 years old or older, obtained a BSRT or graduate degree in respiratory therapy, achieved a specialty credential, obtained RRT credential, or have earned a bachelor's or graduate degree not specific to respiratory therapy. Table 15 lists the results of each hypothesis and statistical analysis. The only attribute to reach statistical significance in the teamwork climate was respiratory therapists who are 40 years old or older, $U = 2338$, $z = 2.117$, $p = .034$. This requires rejecting the null hypothesis; respiratory therapists who are 40 years old or older will have a more positive attitude towards a teamwork climate.

Table 15

Hypothesis Test and Summary for Research Question 1

RQ1: What attributes of respiratory therapists determine a more positive attitude towards a teamwork climate?

Null Hypothesis	Mann-Whitney U	Z-score	Sig.	Decision
$H1.1_o$: Respiratory therapists who have at least 10 years of experience will not have a more positive attitude towards a teamwork climate.	2085	1.542	.123	Fail to reject the null hypothesis
$H1.2_o$: Respiratory therapists who are 40 years old or older will not have a more positive attitude	2338	2.117	.034*	Reject the null hypothesis

towards a teamwork climate.				
$H1.3_o$: Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will not have a more positive attitude towards a teamwork climate.	1786	-1.770	.077	Fail to reject the null hypothesis
$H1.4_o$: Respiratory therapists who have achieved a specialty certification will not have a more positive attitude towards a teamwork climate.	2864	1.089	.276	Fail to reject the null hypothesis
$H1.5_o$: Respiratory therapists who have achieved the RRT credential will not have a more positive attitude towards a teamwork climate.	780	1.389	.165	Fail to reject the null hypothesis
$H1.6_o$: Respiratory therapists who have achieved any bachelor's degree or higher will not have a more positive attitude towards a teamwork climate.	2155	-1.088	.276	Fail to reject the null hypothesis

Note. *p< 0.05

Research Question 2: What attributes of respiratory therapists determine a more positive attitude towards a safety climate?

Findings: A Mann-Whitney U test was run to determine if there were differences in safety climate between respiratory therapists who have 10 or more years of experience, are 40 years old or older, obtained a BSRT or graduate degree in respiratory therapy, achieved a specialty credential, obtained RRT credential, or have earned a bachelor's or graduate degree not specific to respiratory therapy. Table 16 lists the results of each hypothesis and statistical analysis. Respiratory therapists who have 10 years or more experience reached statistical significance in the safety climate domain, $U = 2184$, $z = 2.019$, $p = .043$. With a p value less than 0.05, the null hypothesis is rejected; respiratory therapists who have at least 10 years of experience will have a more positive attitude towards a safety climate. Respiratory therapists who have a specialty credential also reached statistical significance, $U = 3110$, $z = 2.071$, $p = .038$. This results in accepting the alternative hypothesis; respiratory therapists who have achieved a specialty certification will have a more positive attitude towards a safety climate.

Table 16

Hypothesis Test and Summary for Research Question 2

RQ2: What attributes of respiratory therapists determine a more positive attitude towards a safety climate?

Null Hypothesis	Mann-Whitney U	Z-score	Sig.	Decision
$H2.1_o$: Respiratory therapists who have at least 10 years of experience will not have a more positive	2184	2.019	.043*	Reject the null hypothesis

attitude towards a safety climate.				
$H2.2_o$: Respiratory therapists who are 40 years old or older will not have a more positive attitude towards a safety climate.	2267	1.781	.075	Fail to reject the null hypothesis
$H2.3_o$: Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will not have a more positive attitude towards a safety climate.	2003	-.826	.409	Fail to reject the null hypothesis
$H2.4_o$: Respiratory therapists who have achieved a specialty certification will not have a more positive attitude towards a safety climate.	3110	2.071	.038*	Reject the null hypothesis
$H2.5_o$: Respiratory therapists who have achieved the RRT credential will not have a more positive attitude towards a safety climate.	728	.954	.340	Fail to reject the null hypothesis
$H2.6_o$: Respiratory therapists who have achieved any bachelor's degree or	2167	-1.039	.299	Fail to reject the null hypothesis

	higher will not have a more positive attitude towards a safety climate.			

Note. *p< 0.05

Research Question 3: What attributes of respiratory therapists determine a more positive attitude towards job satisfaction?

Findings: A Mann-Whitney U test was run to determine if there were differences in job satisfaction between respiratory therapists who have 10 or more years of experience, are 40 years old or older, obtained a BSRT or graduate degree in respiratory therapy, achieved a specialty credential, obtained RRT credential, or have earned a bachelor's or graduate degree not specific to respiratory therapy. Table 17 lists the results of each hypothesis and statistical analysis. Respiratory therapists who are 40 years old or older reached statistical significance in the job satisfaction domain, U = 2374, z = 2.287, p = .022. With a p value less than 0.05, the null hypothesis is rejected; respiratory therapists who are 40 years old or older will have a more positive attitude towards job satisfaction.

Table 17

Hypothesis Test and Summary for Research Question 3

RQ3: What attributes of respiratory therapists determine a more positive attitude towards job satisfaction?

Null Hypothesis	Mann-Whitney U	Z-score	Sig.	Decision
$H3.1_0$: Respiratory therapists who have at least 10 years of experience will not	2114	1.684	.092	Fail to reject the null hypothesis

have a more positive attitude towards job satisfaction.				
$H3.2_o$: Respiratory therapists who are 40 years old or older will not have a more positive attitude towards job satisfaction.	2374	2.287	.022*	Reject the null hypothesis
$H3.3_o$: Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will not have a more positive attitude towards job satisfaction.	1995	-.863	.388	Fail to reject the null hypothesis
$H3.4_o$: Respiratory therapists who have achieved a specialty certification will not have a more positive attitude towards job satisfaction.	3017	1.705	.088	Fail to reject the null hypothesis
$H3.5_o$: Respiratory therapists who have achieved the RRT credential will not have a more positive attitude towards job satisfaction.	711	.820	.412	Fail to reject the null hypothesis
$H3.6_o$: Respiratory therapists who have achieved any	1961	-1.894	.058	Fail to reject the null hypothesis

bachelor's degree or higher will not have a more positive attitude towards job satisfaction.				

Note. *p< 0.05

Research Question 4: What attributes of respiratory therapists determine a more positive attitude towards stress recognition?

Findings: A Mann-Whitney U test was run to determine if there were differences in stress recognition between respiratory therapists who have 10 or more years of experience, are 40 years old or older, obtained a BSRT or graduate degree in respiratory therapy, achieved a specialty credential, obtained RRT credential, or have earned a bachelor's or graduate degree not specific to respiratory therapy. Table 18 lists the results of each hypothesis and statistical analysis. Respiratory therapists who have earned a specialty credential reached statistical significance in the stress recognition domain, U = 2041, z = -2.20, p = .028. With a p value less than 0.05, the null hypothesis is rejected; respiratory therapists who have achieved a specialty certification will have a more positive attitude towards stress recognition.

Table 18

Hypothesis Test and Summary for Research Question 4

RQ4: What attributes of respiratory therapists determine a more positive attitude towards stress recognition?

Null Hypothesis	Mann-Whitney U	Z-score	Sig.	Decision
$H4.1_o$: Respiratory therapists who have at least 10 years of	2089	1.560	.119	Fail to reject the null hypothesis

experience will not have a more positive attitude towards stress recognition.				
$H4.2_o$: Respiratory therapists who are 40 years old or older will not have a more positive attitude towards stress recognition.	1983	.449	.653	Fail to reject the null hypothesis
$H4.3_o$: Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will not have a more positive attitude towards stress recognition.	2069	-.536	.592	Fail to reject the null hypothesis
$H4.4_o$: Respiratory therapists who have achieved a specialty certification will not have a more positive attitude towards stress recognition.	2041	-2.20	.028*	Reject the null hypothesis
$H4.5_o$: Respiratory therapists who have achieved the RRT credential will not have a more positive attitude towards stress recognition.	652	.329	.742	Fail to reject the null hypothesis
$H4.6_o$: Respiratory therapists who have	2424	.027	.979	Fail to reject the null hypothesis

achieved any bachelor's degree or higher will not have a more positive attitude towards stress recognition.	

Note. *p< 0.05

Research Question 5: What attributes of respiratory therapists determine a more positive attitude towards perceptions of management?

Findings: A Mann-Whitney U test was run to determine if there were differences in perceptions of management between respiratory therapists who have 10 or more years of experience, are 40 years old or older, obtained a BSRT or graduate degree in respiratory therapy, achieved a specialty credential, obtained RRT credential, or have earned a bachelor's or graduate degree not specific to respiratory therapy. Table 19 lists the results of each hypothesis and statistical analysis. Respiratory therapists who have at least 10 years of experience was statistically significant in perceptions of management domain, U = 2353, z = 2.831, p = .005. These values result in rejecting the null hypothesis; respiratory therapists who have at least 10 years of experience will have a more positive attitude towards perceptions of management. Respiratory therapists who are 40 years old or older also reached statistical significance in the perceptions of management domain, U=2587, z = 3.272, p = .001. These values result in accepting the alternative hypothesis; respiratory therapists who are 40 years old or older will have a more positive attitude towards perceptions of management. Respiratory therapists who have earned a specialty credential also reached statistical significance in the perceptions of management domain, U = 3102, z = 2.033, p = .042. With a p value less than 0.05, the

null hypothesis is rejected; respiratory therapists who have achieved a specialty certification will have a more positive attitude towards perceptions of management.

Table 19

Hypothesis Test and Summary for Research Question 5

RQ5: What attributes of respiratory therapists determine a more positive attitude towards perceptions of management?

Null Hypothesis	Mann-Whitney U	Z-score	Sig.	Decision
$H5.1_o$: Respiratory therapists who have at least 10 years of experience will not have a more positive attitude towards perceptions of management.	2353	2.831	.005**	Reject the null hypothesis
$H5.2_o$: Respiratory therapists who are 40 years old or older will not have a more positive attitude towards perceptions of management.	2587	3.272	.001**	Reject the null hypothesis
$H5.3_o$: Respiratory therapists who have achieved a bachelor's degree or higher in respiratory therapy will not have a more positive attitude towards perceptions of management.	2012	-.784	.433	Fail to reject the null hypothesis
	3102	2.033	.042*	

$H5.4_o$: Respiratory therapists who have achieved a specialty certification will not have a more positive attitude towards perceptions of management.				Reject the null hypothesis
$H5.5_o$: Respiratory therapists who have achieved the RRT credential will not have a more positive attitude towards perceptions of management.	694	.677	.499	Fail to reject the null hypothesis
$H5.6_o$: Respiratory therapists who have achieved any bachelor's degree or higher will not have a more positive attitude towards perceptions of management.	2592	.720	.471	Fail to reject the null hypothesis

Note. *p< 0.05. **p< 0.01

Research Question 6: What attributes of respiratory therapists determine a more positive attitude towards working conditions?

Findings: A Mann-Whitney U test was run to determine if there were differences in working conditions between respiratory therapists who have 10 or more years of experience, are 40 years old or older, obtained a BSRT or graduate degree in respiratory therapy, achieved a specialty credential, obtained RRT credential, or have earned a bachelor's or graduate degree not specific to respiratory therapy. Table 20 lists the results of each hypothesis and statistical analysis. Respiratory therapists who have at least 10

years of experience was statistically significant in the working conditions domain, U = 2177, z = 1.988, p = .047. These values result in rejecting the null hypothesis; respiratory therapists who have at least 10 years of experience will have a more positive attitude towards working conditions. Respiratory therapists who are 40 years old or older also reached statistical significance in the working conditions domain, U = 2539, z = 3.057, p = .002. These values result in accepting the alternative hypothesis; respiratory therapists who are 40 years old or older will have a more positive attitude towards working conditions.

Table 20

Hypothesis Test and Summary for Research Question 6

RQ6: What attributes of respiratory therapists determine a more positive attitude towards working conditions?

Null Hypothesis	Mann-Whitney U	Z-score	Sig.	Decision
$H6.1_o$: Respiratory therapists who have at least 10 years of experience will not have a more positive attitude towards working conditions.	2177	1.988	.047*	Reject the null hypothesis
$H6.2_o$: Respiratory therapists who are 40 years old or older will not have a more positive attitude towards working conditions.	2539	3.057	.002**	Reject the null hypothesis
$H6.3_o$: Respiratory therapists who have	2195	.009	.993	Fail to reject the null hypothesis

achieved a bachelor's degree or higher in respiratory therapy will not have a more positive attitude towards working conditions.				
$H6.4_o$: Respiratory therapists who have achieved a specialty certification will not have a more positive attitude towards working conditions.	3058	1.865	.062	Fail to reject the null hypothesis
$H6.5_o$: Respiratory therapists who have achieved the RRT credential will not have a more positive attitude towards working conditions.	784	1.419	.156	Fail to reject the null hypothesis
$H6.6_o$: Respiratory therapists who have achieved any bachelor's degree or higher will not have a more positive attitude towards working conditions.	2399	-.077	.939	Fail to reject the null hypothesis

Note. *p< 0.05. **p< 0.01

Research Question 7: When all demographic variables of interest are assessed by using a multiple regression model for each subscale, which attribute will be the most significant predictor of a positive safety attitude among respiratory therapists?

Findings: Research question 7 required a multiple regression model for each subscale to determine if there was an attribute that would be a predictor of a positive safety attitude among the respiratory therapists who participated in the study. The multiple regression model showed a significant amount of variance in total scores with the variables included in the regression equation. The specialty credential accounted for 12.9% of the variation in patient safety attitude scores as determined by an $R^2 = .129$, which is considered a medium size effect. The results of the ANOVA testing showed having a specialty credential statistically significantly predicted having a higher patient safety attitude, F (8, 135) = 2.506, p = .014. Table 21 shows the results of the multiple regression model and the decision to reject the null hypothesis, which resulted in a demographic variable of interest being predictive of a positive safety attitude among respiratory therapists, using a multiple regression model of each subscale.

Table 21

Hypothesis Test and Summary for Research Question 7

RQ7: When all demographic variables of interest are assessed by using a multiple regression model for each subscale, which attribute will be the most significant predictor of a positive safety attitude among respiratory therapists?

Model Summary

	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
	0.129	.078	14.02	2.04

Coefficients

	Unstandardized Coefficient β	Unstandardized Coefficient Std. Error	Standardized Coefficient β	Sig.
Constant	48.172	9.334		.000**
Age	.299	.180	.233	.099

40 Years Old or Older	1.651	4.920	.048	.738
10 Years of Exp or More	1.817	3.720	.051	.626
Sex	-.614	2.455	-.020	.803
BSRT or Higher	.111	3.024	.003	.971
Bachelors or Higher (any)	-1.592	2.858	-.053	.578
RRT Credential	6.924	4.960	.115	.165
Specialty Credential	4.929	2.415	.168	.043*

Hypothesis Test and Summary

Null Hypothesis	df	F	Sig.	Decision
$H7.1_o$**:** There will be no demographic variable of interest that is predictive of a positive safety attitude among respiratory therapists, using a multiple regression model of each subscale.	8	2.506	.014*	Reject the null hypothesis

Note. *p< 0.05. **p< 0.001

Table 21 shows the model summary, which presents information on the proportion of variance explained. The R^2 value represents the proportion of variance in the dependent variable that is explained by the difference in the independent variable (Laerd Statistics, 2015). This study shows an R^2 value of 12.9%, which represents the percentages of variance between the SAQ mean scores for the scale items and the demographic variables of interest (Laerd Statistics, 2015). The adjusted R^2 value corrects

for the positive bias, which helps to determine a value that would be expected in the population (Laerd Statistics, 2015). The adjusted R^2 value is also an estimate of the effect size; in this study, the effect size is 7.8%, which is associated with a medium size effect (Laerd Statistics, 2015). The F-ratio from the ANOVA table determines if the overall regression model is an acceptable fit for the data (Laerd Statistics, 2015). This study shows the independent variables statistically significantly predict the dependent variable determined by the ANOVA analysis, F (8, 135) = 2.506, p = .014 (Laerd Statistics, 2015).

The unstandardized coefficients indicate the amount of variance between the dependent variables with the independent variable when all the other independent variables are held constant (Laerd Statistics, 2015). The results show having a specialty credential resulted in a 4.929 increase in total mean scale item score. This results in nearly a 5-point higher total score for those who have a specialty credential compared to those who do not have a specialty credential.

The coefficients table shows the attributes that were assessed for research question 7. The attributes analyzed were age, 40 years old or older, 10 or more years of experience, sex, bachelor's or higher in respiratory therapy, bachelor's or higher in any field, RRT credential, and specialty credential. Having a specialty credential was the only significant factor in the regression for having a positive patient safety attitude among respiratory therapists who participated in the study. The linear regression model established that obtaining a specialty credential could significantly predict having a higher patient safety attitude, F (8, 135) = 2.506, p = .014. The results determined having a specialty

credential accounted for 12.9% of the explained variability in patient safety attitudes score. **Summary of Results**

A total of 145 responses were obtained for statistical analysis in the research study, with a median age of 51 years old. Of the participants, the majority were female, which consisted of over 60% of the responses. Less than 30% of the participants reported having a baccalaureate or graduate degree in respiratory therapy. However, 65% reported having a baccalaureate or graduate degree. This included both respiratory therapy specific degrees and non-respiratory therapy degrees. The majority of participants had obtained the RRT credential, with over 90% meeting this criterion. Surprisingly, over 50% of the respiratory therapists who completed this survey reported having a specialty credential. Data gathered on all respiratory therapists in Virginia and reported in Table 5 showed about 20% had obtained a specialty credential at that time (VDHP, 2018). This could be explained by the participants in this study being a more motivated group of individuals by being members of the professional association and also volunteering to complete the survey. Over 75% of the respiratory therapists in this study also reported having at least 10 years of experience. The results of the demographic section were consistent with demographic data collected and reported by the Virginia Department of Health Professions on all respiratory therapists (VDHP, 2018).

The survey data were determined to have a high overall internal consistency with a Cronbach's alpha of 0.933 when assessing all scale item questions. Scale item questions were analyzed during this study and used to determine patient safety attitudes of respiratory therapists. However, the most significant result of this study was the results of

the multiple regression model used to determine which patient safety attitude resulted in having a more positive patient safety attitude score.

This study explained the relationship between obtaining a specialty credential and respiratory therapists having a more positive patient safety attitude. This was discovered by comparing the attributes of age, 40 years old or older, 10 or more years of experience, sex, bachelor's or higher in respiratory therapy, bachelor's or higher in any field, RRT credential, and specialty credential. using a multiple regression model. Other findings of this study include respiratory therapists having a positive attitude toward the patient safety domains of teamwork climate, safety climate, and job satisfaction based upon a mean score above 75, which would correlate on the Likert scale of at least "Agree Slightly."

Respiratory therapists who were 40 years old or older had a statistically significant difference in having a positive patient safety attitude in the domains of teamwork climate, job satisfaction, perceptions of management, and working conditions. Respiratory therapists who had 10 years of experience or more had a statistical significance in having a positive patient safety attitude in the domains of safety climate, perceptions of management, and working conditions. Lastly, respiratory therapists who had achieved a specialty credential had a statistically significant difference in having a positive patient safety attitude in the domains of safety climate, stress recognition, and perceptions of management.

These results are statistically significant as the data shows earning a specialty credential leads to a more positive patient safety attitude. There continues to be discussion among respiratory therapists, employers, and the professional association as to

the importance of advancing the education and credentialing to improve patient care and outcomes. Prior studies have shown the importance of having a positive patient safety attitude and its correlation to improved patient outcomes and improved job satisfaction. At this time, this seems to be the first study to report on the significance of obtaining a specialty credential in respiratory therapy.

Chapter V

Discussion

The results of this study suggest the most important attribute of having a positive patient safety attitude of respiratory therapists is obtaining a specialty credential. The findings also suggest respiratory therapists have a positive patient safety attitude in the domains of teamwork, safety, and job satisfaction. However, this study did discover a negative perception of patient safety in the domains of stress recognition, perceptions of management, and working conditions. This study is significant because it shows the importance of obtaining a specialty credential, while many people in the field debate the relevance of specialty credentials.

There are a number of specialty credentials available for respiratory therapists to obtain in areas such as adults, pediatrics, or disease conditions such as an asthma educator. At the time of the study, it is up to the individual to obtain a specialty credential for personal or professional fulfillment, unless it is mandated by his or her employer as part of one's job requirement or to become a more preferable job applicant. The findings of this study confirm there is a difference in respiratory therapists who have obtained a specialty credential. This is significant as only 20% of all respiratory therapists in Virginia have obtained a specialty credential (VDHP, 2018). The results of this study also align with research found in the nursing literature on specialty credentials in the nursing profession.

Research data from the nursing literature shows those who have obtained a specialty credential have an increase in job satisfaction and positive patient safety outcomes (Boev et al., 2015; Wade, 2009). As aforementioned, this study also found

similar results for respiratory therapists who have obtained a specialty credential. While there needs to be further research into patient outcomes with specialty credentials, there is an assumption that increase in skill and knowledge, demonstrated by obtaining a specialty credential, should result in overall improved patient outcomes (Lim et al., 2020). The findings of this study help to associate the similarities between respiratory therapists and the nursing literature in obtaining specialty credentials.

The results also showed respiratory therapists had a positive patient safety attitude towards teamwork, safety climate, and job satisfaction, suggesting respiratory therapists appreciate the team in which they most closely work and associate as their team. This could be their respiratory therapy colleagues or the multidisciplinary team they are a part of to provide safe patient care. Overall, the respiratory therapists who completed the survey showed a positive attitude towards patient safety, which signifies their understanding of the importance in providing an environment of safe patient care. Respiratory therapists having a positive patient safety attitude towards job satisfaction is also a significant finding of this study. Many factors are associated with having a positive attitude towards job satisfaction, such as enjoying the work itself, autonomy, and skill significance. This is a positive influence for potential career seekers into the profession and also respiratory therapy programs to market enrollment.

The negative perceptions of patient safety were identified in the areas of stress recognition, perceptions of management, and working conditions. It is not surprising stress recognition was an area that scored low on the survey. Respiratory therapists are often in high stress situations working in intensive care units of hospitals or responding to medical emergency events such as cardiac arrests. These situations result in high stress

working conditions. It will be important to further investigate these results and develop strategies to prevent respiratory therapists from experiencing compassion fatigue, which affects many healthcare workers across all disciplines. Management can play a significant role in identifying these stressors and establishing a plan to alleviate some of the stress burden. This could help increase the perceptions of management, which had a negative score in this study. If participants had a negative perception of management, it could also explain the dissatisfaction in their working conditions. If respiratory therapists are in high stress environments without getting the necessary support from management or having a plan to reduce the burden of stress, this environment will continue to result in negative perceptions of patient safety in the areas of stress recognition, perceptions of management, and working conditions.

As stated previously, as of this writing, it appears this is the first study in the United States to specifically look at patient safety attitudes of respiratory therapists using the SAQ-USRT. When comparing the results of this study with the Taiwan SAQ-RT study, which looked at patient safety attitudes using a similar SAQ research tool and found low positive attitudes towards patient safety (Shie et al., 2011). The Taiwan SAQ-RT study reported on the percentage of positive scores and not the mean values. This study reported the mean values and did not convert the percentage of positive scores, and therefore cannot be directly compared. However, the Taiwan SAQ-RT study reported low positive patient safety attitudes in all six of the safety domains. This SAQ-USRT study reported positive patient safety attitude scores in three of the six safety domains. The Taiwan SAQ-RT study attributed their results to having a high workload, being managed by non-respiratory therapy professions, and low job satisfaction.

As described, the SAQ-USRT study reported low positive patient safety attitudes in stress recognition, perceptions of management, and working conditions. Some of the negative perception results could be from higher than usual workload demands due to COVID-19. The study recruitment period was during the COVID-19 pandemic. However, respiratory therapist autonomy differs greatly between hospitals, which could contribute to the lower positive patient safety attitude scores in those scale items. Expected workloads also vary between hospitals along with training and education requirements, which could lead to lower scores in the scale item question of working conditions. Generally, hospitals have nursing and physician patient ratios that require restricting new patients if those ratios have been met. However, respiratory therapists are not typically included in this decision, which could result in unsafe workloads and further compromise safety. In times of high acuity, the availability of respiratory therapists should be considered when determining adequate staffing for patients.

This study included participants who were members of their professional association. Respiratory therapists who choose to be members of the professional association may already have a more positive outlook on their profession, which could lead to higher patient safety attitude scores. Until further research is completed on both professional association members and nonprofessional association members, this cannot be ruled out as bias in the data. As stated previously the data collection occurred during the COVID-19 pandemic. This could also lead to some participants reporting more positive responses due to the recognition being received or decreased positive responses due to higher workload demands.

The limitations of this study include only enrolling respiratory therapists in Virginia who are members of their professional association. This limitation could have impacted the final results of the study. This could have resulted in the difference between the Taiwan study and this study. Members of the professional association could have an overall higher patient safety attitude than nonmembers. One of the goals of the study was to determine if there is a difference between the Certified Respiratory Therapist and the Registered Respiratory Therapist. However, there were only nine participants in this study who held the Certified Respiratory Therapist credential compared to 136 who held the Registered Respiratory Therapist credential. Given the low enrollment of the Certified Respiratory Therapist, this study was not able to determine if there is a difference in patient safety attitudes between the two credentials, given the low response rate of the Certified Respiratory Therapists. Further investigation is necessary between the Registered Respiratory Therapist and the Certified Respiratory Therapist to determine if there is a significant difference in patient safety attitudes. Another limitation of this study was the response rate of 13%. This is consistent with other studies recruiting healthcare workers for electronic survey data. The original goal of the research study was to achieve a 30% response rate. This response rate could have an effect on the final data results.

An expected difference between respiratory therapists who hold a baccalaureate degree or graduate degree in respiratory therapy compared to those respiratory therapists without a baccalaureate degree or graduate degree in respiratory therapy did not occur in this study's results. This could be due to the sample size of the study or the inclusion of only members of the professional association. Alternatively, it could also be explained by

the high percentage of participants who hold a baccalaureate degree or graduate degree but is not specific to respiratory therapy.

Further research should be conducted to determine the importance of earning a specialty credential, obtaining a baccalaureate or graduate degree in respiratory therapy, as well as obtaining the RRT credential. Using the SAQ-USRT could be an effective tool in measuring the differences in these attributes on a larger scale. This research could lead to advancing the entry-to-practice requirements along with improving patient outcomes. Investigation into these attributes on a national level could help to provide evidence-based recommendation for education and credentialing for entry-to-practice in the profession and beyond.

Chapter VI

Conclusion

Positive patient safety attitudes of healthcare providers are linked to increased nurse retention, reduced medication errors, and a decrease in intensive care unit (ICU) length of stay (Sexton, Thomas, & Pronovost, 2005). There are a number of published studies that use the SAQ to assess patient safety attitudes of caregivers in a variety of ways. Research from Taiwan regarding hospital safety culture has shown healthcare workers with positive patient safety attitudes assessed by a SAQ survey were more likely to have good collaboration with coworkers and more likely to encourage safety among others (Lee et al., 2010). There are studies describing patient safety attitudes among physicians, nurses, and interdisciplinary teams (Brasaite et al., 2016; Källberg et al., 2017; Modak et al., 2007). At this time, there is only one study outside of the United States that specifically looks at patient safety attitudes among respiratory therapists (Shie et al., 2011). This research study looked to fill a research void by assessing patient safety attitudes of respiratory therapists located in the United States.

This study used a non-experimental, cross-sectional study design to collect electronic response for the SAQ survey. Participants in this study were members of the Virginia Society for Respiratory Care (VSRC). VSRC members were targeted due to access of electronic communication and an address mailing list. Participants were notified of the study by using an online message board that generated an email, VSRC social media announcement, and a postcard mailer. A total of 145 responses were obtained for data analysis. This resulted in an overall response rate of 13%. This sample size provided

a margin of error of 8% with a confidence interval of 96%, and a 50% response distribution.

The results of this study showed a high-level internal consistency determined by a Cronbach's alpha score of 0.933 when analyzing all scale items. When assessing mean scores of the subscale items, the domains of teamwork (81.64), safety climate (80.17), and job satisfaction (79.07) were found to have a positive patient safety attitude score. The domains of perceptions of management (68.76), working conditions (63.75), and stress recognition (58.15) did not meet the criteria of 75 to be considered a positive patient safety attitude.

The scale items were further assessed by each domain and the attributes of having 10 or more years of experience, being 40 years old or older, obtaining a baccalaureate degree or higher in respiratory therapy, obtaining a baccalaureate degree or higher in any field, obtaining the RRT credential, and obtaining a specialty credential. The most frequent attributes determined to have statistical significance were being 40 years old or older, having 10 or more years of experience, and obtaining a specialty credential.

The final research question required a multiple regression model for each subscale to determine if there was an attribute that would be a predictor of a positive safety attitude among the respiratory therapists who participated in the study. The multiple regression model showed a significant amount of variance in total scores between the attributes included in the regression equation. Having a specialty credential accounted for 12.9% of the variation in patient safety attitude scores. This research data shows achieving a specialty credential results in about a 5-point increase in patient safety domain scores.

Prior to this study, there is no known data to this researcher that specifically investigates patient safety attitudes of respiratory therapists in the United States. A version of the SAQ was used to determine patient safety attitudes of respiratory therapists and attributes that would lead to a more positive patient safety attitude. This study discovered respiratory therapists had a positive patient safety attitude towards the domains of teamwork climate, safety climate, and job satisfaction. Negative perceptions of patient safety were identified in the domains of stress recognition, perceptions of management, and working conditions. The attributes of being 40 years old or older, having 10 or more years of experience, and achieving a specialty credential reached statistical significance for having a positive patient safety attitude in some of the specific scale item domains. Overall, a multiple regression analysis determined that achieving a specialty credential was the most significant attribute when determining a positive patient safety attitude of respiratory therapists.

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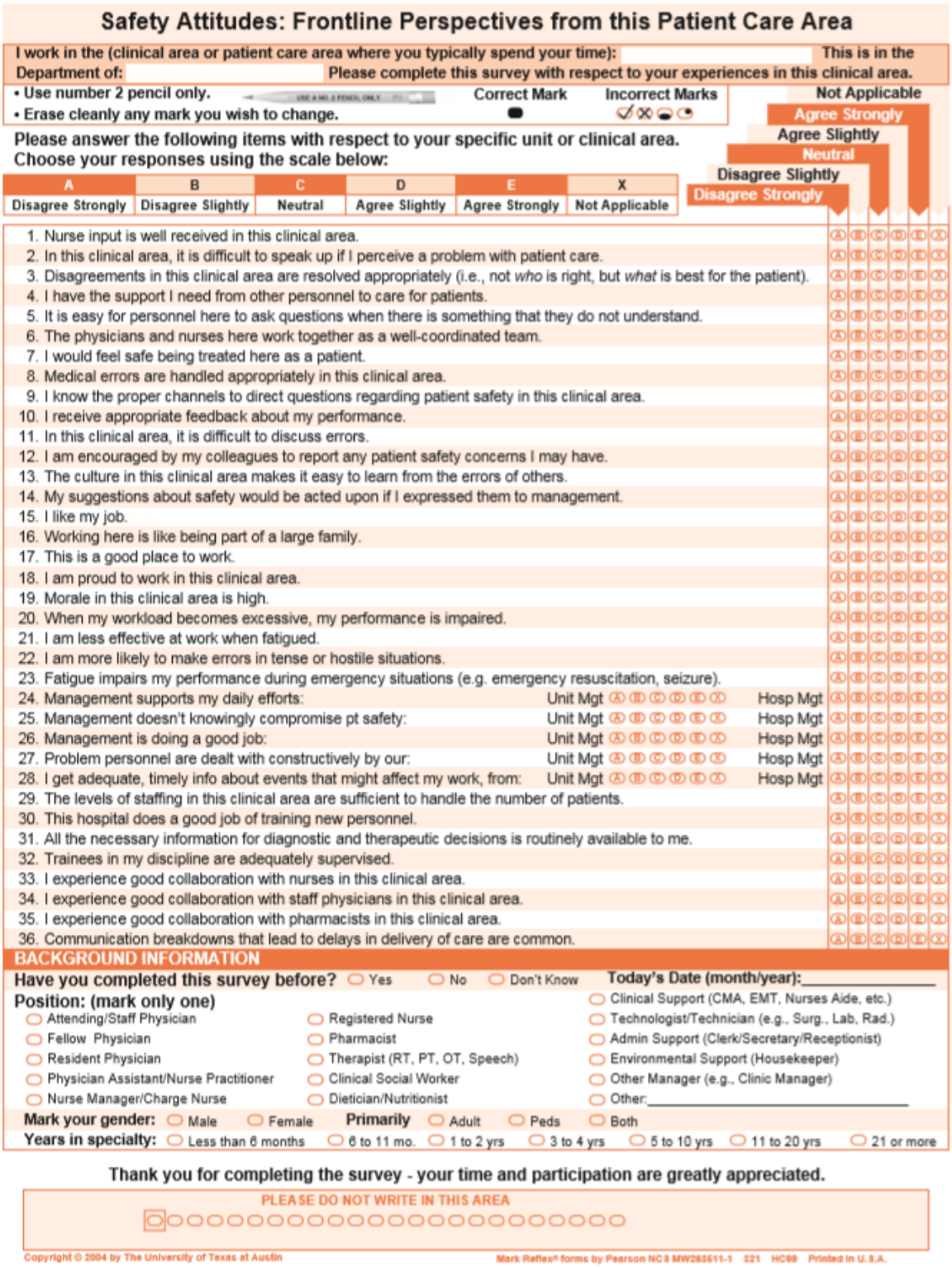
Appendix A

Safety Attitudes: Frontline Perspective from this Patient Care Area



Safety Attitudes: Frontline Perspectives from this Patient Care Area

I work in the (clinical area or patient care area where you typically spend your time): This is in the
Department of: Please complete this survey with respect to your experiences in this clinical area.

- Use number 2 pencil only.
- Erase cleanly any mark you wish to change.

Correct Mark ● Incorrect Marks ✓ ⊗ ◒ ◔

Please answer the following items with respect to your specific unit or clinical area.
Choose your responses using the scale below:

A	B	C	D	E	X
Disagree Strongly	Disagree Slightly	Neutral	Agree Slightly	Agree Strongly	Not Applicable

Not Applicable
Agree Strongly
Agree Slightly
Neutral
Disagree Slightly
Disagree Strongly

1. Nurse input is well received in this clinical area.
2. In this clinical area, it is difficult to speak up if I perceive a problem with patient care.
3. Disagreements in this clinical area are resolved appropriately (i.e., not *who* is right, but *what* is best for the patient).
4. I have the support I need from other personnel to care for patients.
5. It is easy for personnel here to ask questions when there is something that they do not understand.
6. The physicians and nurses here work together as a well-coordinated team.
7. I would feel safe being treated here as a patient.
8. Medical errors are handled appropriately in this clinical area.
9. I know the proper channels to direct questions regarding patient safety in this clinical area.
10. I receive appropriate feedback about my performance.
11. In this clinical area, it is difficult to discuss errors.
12. I am encouraged by my colleagues to report any patient safety concerns I may have.
13. The culture in this clinical area makes it easy to learn from the errors of others.
14. My suggestions about safety would be acted upon if I expressed them to management.
15. I like my job.
16. Working here is like being part of a large family.
17. This is a good place to work.
18. I am proud to work in this clinical area.
19. Morale in this clinical area is high.
20. When my workload becomes excessive, my performance is impaired.
21. I am less effective at work when fatigued.
22. I am more likely to make errors in tense or hostile situations.
23. Fatigue impairs my performance during emergency situations (e.g. emergency resuscitation, seizure).
24. Management supports my daily efforts: Unit Mgt Hosp Mgt
25. Management doesn't knowingly compromise pt safety: Unit Mgt Hosp Mgt
26. Management is doing a good job: Unit Mgt Hosp Mgt
27. Problem personnel are dealt with constructively by our: Unit Mgt Hosp Mgt
28. I get adequate, timely info about events that might affect my work, from: Unit Mgt Hosp Mgt
29. The levels of staffing in this clinical area are sufficient to handle the number of patients.
30. This hospital does a good job of training new personnel.
31. All the necessary information for diagnostic and therapeutic decisions is routinely available to me.
32. Trainees in my discipline are adequately supervised.
33. I experience good collaboration with nurses in this clinical area.
34. I experience good collaboration with staff physicians in this clinical area.
35. I experience good collaboration with pharmacists in this clinical area.
36. Communication breakdowns that lead to delays in delivery of care are common.

BACKGROUND INFORMATION

Have you completed this survey before? ○ Yes ○ No ○ Don't Know Today's Date (month/year):_____

Position: (mark only one)

- ○ Attending/Staff Physician
- ○ Fellow Physician
- ○ Resident Physician
- ○ Physician Assistant/Nurse Practitioner
- ○ Nurse Manager/Charge Nurse
- ○ Registered Nurse
- ○ Pharmacist
- ○ Therapist (RT, PT, OT, Speech)
- ○ Clinical Social Worker
- ○ Dietician/Nutritionist
- ○ Clinical Support (CMA, EMT, Nurses Aide, etc.)
- ○ Technologist/Technician (e.g., Surg., Lab, Rad.)
- ○ Admin Support (Clerk/Secretary/Receptionist)
- ○ Environmental Support (Housekeeper)
- ○ Other Manager (e.g., Clinic Manager)
- ○ Other:_____

Mark your gender: ○ Male ○ Female Primarily ○ Adult ○ Peds ○ Both

Years in specialty: ○ Less than 6 months ○ 6 to 11 mo. ○ 1 to 2 yrs ○ 3 to 4 yrs ○ 5 to 10 yrs ○ 11 to 20 yrs ○ 21 or more

Thank you for completing the survey - your time and participation are greatly appreciated.

PLEASE DO NOT WRITE IN THIS AREA

Mark Reflex® forms by Pearson NCS MW283611-1 321 HC99 Printed in U.S.A.

Appendix B

Personal Communication for Use and Edit Questions to the SAQ

REPLY REPLY ALL FORWARD ...

Gochenour, Daniel *HS
Tue 2/4/2020 1:55 PM
Sent Items

Mark as unread

To: utpatientsafety@gmail.com;

Hello,

I have submitted a request through the online section to obtain permission to use your SAQ questionnaire for my doctoral project. I want to focus on patient safety with respiratory therapists. Could I have your permission to change question 1 and 6 to be more targeted towards respiratory therapists?

Thank you,

Daniel Gochenour, MSc, RRT-ACCS, NPS, AE-C, CPPS
Lead Pulmonary Diagnostic Respiratory Therapy Shift
University of Virginia Medical Center

Thomas, Eric <Eric.Thomas@uth.tmc.edu>
Tue 2/4/2020 2:55 PM

Mark as unread

Hi, you have permission to use the survey and edit some items. Thank you for your interest in the survey.

Eric

Eric J Thomas MD MPH
Professor of Medicine
Associate Dean for Healthcare Quality
Director, UT Houston - Memorial Hermann Center for Healthcare Quality and Safety
6410 Fannin UTPB 1100.44
Houston TX 77030
713-500-7958

Appendix C

SAQ-USRT Questions

SAQ-USRT Survey Questions

1. Respiratory Therapy input is well received in this institution.

2. In this institution, it is difficult to speak up if I perceive a problem.

3. Disagreements in this institution are resolved appropriately (i.e., not who is right, but what is best for the patient).

4. I have the support I need from other personnel to care for patients or complete my work goal.

5. It is easy for personnel here to ask questions when there is something that they do not understand

6. The physicians, nurses, and respiratory therapist here work together as a well-coordinated team.

7. I would feel safe being treated here as a patient or client.

8. Medical errors are handled appropriately in this institution.

9. I know the proper channels to direct questions regarding patient safety in this institution.

10. I receive appropriate feedback about my performance.

11. In this institution, it is difficult to discuss errors.

12. I am encouraged by my colleagues to report any patient safety concerns I may have.

13. The culture in this clinical area makes it easy to learn from the errors of others.

14. My suggestions about safety would be acted upon if I expressed them to management.

15. I like my job.

16. Working here is like being part of a large family.

17. This is a good place to work.

18. I am proud to work in this institution.

19. Morale in this institution is high.

20. When my workload becomes excessive, my performance is impaired.

21. I am less effective at work when fatigued.

22. I am more likely to make errors in tense or hostile situations.

23. Fatigue impairs my performance during emergency situations (e.g. emergency resuscitation, seizure).

24. Management supports my daily efforts: Frontline Mgt, Institution Mgt

25. Management doesn't knowingly compromise patient safety: Frontline Mgt, Institution Mgt

26. Management is doing a good job: Frontline Mgt and Institution Mgt

27. Problem personnel are dealt with constructively by our: Frontline Mgt, Institution Mgt

28. I get adequate, timely info about events that might affect my work, from: Unit Mgt, Institution Mgt

29. The levels of staffing in this institution are sufficient to handle the number of patients.

30. This institution does a good job of training new personnel.

31. All the necessary information for decision making is routinely available to me.

32. Trainees in my discipline are adequately supervised.

33. I experience good collaboration with nurses in this institution.

34. I experience good collaboration with staff physicians in this institution.

35. I experience good collaboration with other health professions in this institution.

36. Communication breakdowns that lead to delays in delivery of care or workflow are common.

Appendix D

Personal Communication from July 2020 with a Representative from the AARC

On Jul 6, 2020, at 10:52 AM, Amanda Feil <amanda.feil@aarc.org> wrote:

Hi, Daniel!

Only 47 of your members have opted out of email notifications. A reminder that these people can still view the community postings by navigating to the community. I don't anticipate a lot of people do this, but I wanted to remind you that it is an option.

Thanks!

American Association for Respiratory Care | Amanda Feil, CAE | Membership Development Manager
9425 N. Macarthur Blvd. Suite 100 Irving, TX 75063-4706 | 972-243-2272 | amanda.feil@aarc.org | www.aarc.org

Join the Resources for COVID-19 AARConnect Community!

...

Appendix E

Requirements to Obtain Licensure in Virginia as a Respiratory Therapist

Requirements of Licensure as a Respiratory Therapists in Virginia

An applicant for licensure shall submit the following on forms provided by the board:

1. A completed application and a fee.
2. Verification of professional education in respiratory care as required.
3. Verification of practice as required on the application form.
4. Evidence of passage of the national examination as required.
5. If licensed or certified in any other jurisdiction, documentation of active practice as a respiratory therapist or documentation of 20 hours of continuing education within the 24-month period immediately preceding application and verification that there has been no disciplinary action taken or pending in that jurisdiction.

Educational requirements:

1. Be a graduate of an accredited educational program for respiratory therapists;

<u>or</u>

2. Hold current credentialing as a Certified Respiratory Therapist (CRT) or a Registered Respiratory Therapist (RRT) from the NBRC or any other credentialing body determined by the board to be equivalent.

Examination requirements:

1. An applicant for a license to practice as a licensed respiratory therapist shall submit to the board evidence that the applicant has passed the NBRC entry level examination for respiratory care, or its equivalent as approved by the board.

Appendix F

Requirements for Admission to the National Board for Respiratory Care

Requirements for Admission to NBRC Exam

1. Be 18 years of age or older.

and

2. Be a graduate of and have a minimum of an associate degree from a respiratory therapy education program supported or accredited by the Commission on Accreditation for Respiratory Care (CoARC).

or

3. Be a CRT for at least four years prior to applying for the examinations associated with the RRT credential. In addition, the applicant shall have at least 62 semester hours of college credit from a college or university accredited by its regional association or its equivalent. The 62 semester hours of college credit must include the following courses: anatomy and physiology, chemistry, micro-biology, and mathematics.

or

4. Be a CRT for at least two years prior to applying for the examinations associated with the RRT credential. In addition, the applicant shall have earned a minimum of an associate degree from an accredited entry-level respiratory care education program.

or

5. Be a CRT for at least two years prior to applying for the examinations associated with the RRT credential. In addition, the applicant shall have earned a baccalaureate degree in an area other than respiratory care and shall have at least 62 semester hours of college credit from a college or university accredited by its regional association or equivalent. The 62 semester hours of college credit must include the following courses: anatomy and physiology, chemistry, microbiology, and mathematics.

or

6. Hold the Canadian Society of Respiratory Therapists (CSRT) RRT credential.

Appendix G

First Request on AARConnect Requesting Survey Participation

Hello colleagues,

Will you spend 10-15 minutes ***for the good of the profession?***

Now more than ever it is important to understand the patient safety attitudes of respiratory therapists. Especially, during the COVID-19 outbreak people outside of the medical community started to know what a respiratory therapist does and the value we bring to our patients. Please help the profession by participating in this research study!

I am Daniel Gochenour, a doctoral student in the Radford University Doctor of Health Sciences program. For my doctoral project I am investigating patient safety attitudes of respiratory therapists in Virginia. Having a positive patient safety attitude has been linked to improved outcome measures. Determining patient safety attitudes of the profession could continue to show the value respiratory therapy brings to the care of our patients.

Would you please take a moment to click on the survey link and complete a brief survey on patient safety?

http://radford.qualtrics.com/jfe/form/SV_3ghSlzD7trPOczX

The survey should only take 10-15 minutes to complete and will lead to a better understanding of patient safety attitudes of the profession. This survey is optional and anonymous. As an incentive to complete the survey the research project is offering a $100 lottery incentive to 3 random respondents to the survey.

Thank you in advance for taking the time to complete the survey!

Daniel Gochenour, MSc, RRT-ACCS, RRT-NPS, AE-C, CPPS
Research Student, Doctorate of Health Sciences
Radford University Carilion

Radford University IRB
Approval Date: 17-June-2020

Appendix H

Second Request on AARConnect Requesting Survey Participation

Hello colleagues,

Do you have 10-15 minutes to help show the value of the profession?

Please help me to show the value of respiratory therapists! I am reaching back out to you as a reminder to please complete the survey if you have not already done so. Your answers will help to close a gap in the literature on patient safety attitudes of respiratory therapists.

I am Daniel Gochenour, a doctoral student in the Radford University Doctor of Health Sciences program. For my doctoral project I am investigating patient safety attitudes of respiratory therapists in Virginia. Having a positive patient safety attitude has been linked to improved outcome measures. Determining patient safety attitudes of the profession could continue to show the value respiratory therapy brings to the care of our patients.

Would you please take a moment to click on the survey link to participate in this research study?

The survey can be found at below link and ***should only take 10-15 minutes*** to complete.

http://radford.qualtrics.com/jfe/form/SV_3ghSlzD7trPOczX

As an incentive to complete the survey the research project is offering a $100 lottery incentive to 3 random respondents to the survey.

Thank you in advance for taking the time to complete the survey!

Daniel Gochenour, MSc, RRT-ACCS, RRT-NPS, AE-C, CPPS
Research Student, Doctorate of Health Sciences
Radford University Carilion

Radford University IRB
Approval Date: 17-June-2020

Appendix I

Third Request on AARConnect Requesting Survey Participation

Hello colleagues,

Will you help to improve the respiratory therapy profession?

I am hoping to receive a few more responses to the survey on patient safety attitudes. If you have not already completed the survey please consider taking the time to participate in this research study. Your answers will help to close a gap in the literature on patient safety attitudes of respiratory therapists.

I am Daniel Gochenour, a doctoral student in the Radford University Doctor of Health Sciences program. For my doctoral project I am investigating patient safety attitudes of respiratory therapists in Virginia. Having a positive patient safety attitude has been linked to improved outcome measures. Determining patient safety attitudes of the profession could continue to show the value respiratory therapy brings to the care of our patients.

The survey can be found at below link and *should only take 10-15 minutes* to complete. As an incentive to complete the survey the research project is offering a $100 lottery incentive to 3 random respondents to the survey.

Would you please take a moment to click on the survey link to participate in this research study?

http://radford.qualtrics.com/jfe/form/SV_3ghSlzD7trPOczX

Thank you in advance for taking the time to complete the survey!

Daniel Gochenour, MSc, RRT-ACCS, RRT-NPS, AE-C, CPPS
Research Student, Doctorate of Health Sciences
Radford University Carilion

Radford University IRB
Approval Date: 17-June-2020

Appendix J

Radford University Consent Cover Letter

RADFORD
UNIVERSITY

You are invited to participate in a research survey, entitled **"Assessment of Patient Safety Attitudes of Respiratory Therapists who are Members of the Professional Association in Virginia."** The study is being conducted by Daniel Gochenour a student in the Doctor of Health Sciences Program at Radford University. The purpose of this study is to examine patient safety attitudes of respiratory therapists in Virginia who are members of the professional association. Your participation in the survey will contribute to a better understanding of the safety climate in the respiratory therapy profession. We estimate that it will take about **10 to 15 minutes** of your time to complete the questionnaire. You are free to contact the investigator at the below email address to discuss the survey.

We anticipate that your participation in this survey presents no greater risk than everyday use of the Internet. The research team will work to protect your data to the extent permitted by technology. It is possible, although unlikely, that an unauthorized individual could gain access to your responses because you are responding online. This risk is similar to your everyday use of the internet. IP addresses will not be collected for this research project. All research data will be kept for a minimum of three years. A limited number of research team members will have access to the data during data collection. Identifying information will be stripped from the final dataset.

Your participation in this survey is voluntary. You may decline to answer the survey and you have the right to withdraw from participation at any time without penalty. If you wish to withdraw from the study or have any questions, contact the investigator listed above. If you choose not to participate or decide to withdraw, there will be no impact on you.
If you have any questions send an email to dugocheno@radford.edu. You may also request a hard copy of the survey from the contact information above.

This study was approved by the Radford University Committee for the Review of Human Subjects Research. If you have questions or concerns about your rights as a research subject or have complaints about this study, you should contact Ben Caldwell, Institutional Official and Dean of the College of Graduate Studies and Research, Radford University, bcaldwell13@radford.edu, (540) 831-5723.

If you agree to participate, please select "yes" below to open the survey. Otherwise use the X at the upper right corner to close this window and disconnect.

This research project is offering a $100 lottery incentive to 3 random respondents to the survey. In order to be eligible for the $100 lottery prize you must meet the requirements of the survey which includes completing the survey, being a respiratory therapist, AARC member, and over the age of 18. Each participant is only eligible to take the survey one time and only eligible for one entry into the random lottery selection. At the end of the survey in the comments section you must provide your name and email address to be eligible for the random selection. This information will only be used to contact the lottery prize winners and not be kept or used for research purposes. If the information is not included or the survey is not completed the person will no longer be eligible for the lottery

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incentive.

Thank you in advance for taking the time to complete the survey!

Daniel Gochenour, MSc, RRT-ACCS, RRT-NPS, AE-C, CPPS
Research Student, Doctorate of Health Sciences
Radford University Carilion

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Approval Date: 17-June-2020

Appendix K

Postcard Proof Mailed to VSRC Members

Respiratory Therapy Research Survey Request

Will you spend 10-15 minutes for the good of the profession?

By taking the survey you could enter to win $100!

Your participation is needed to show the value of respiratory therapy and patient safety!

An email has been sent to you from Shawna Strikland via AARConnect. You can click on the survey from the email or go to AARConnect Virginia Society message board.

Included here is a QR code to the survey link.

Thank you for your help!

Daniel Gochenour, RRT

Appendix L

Social Media Announcement #1

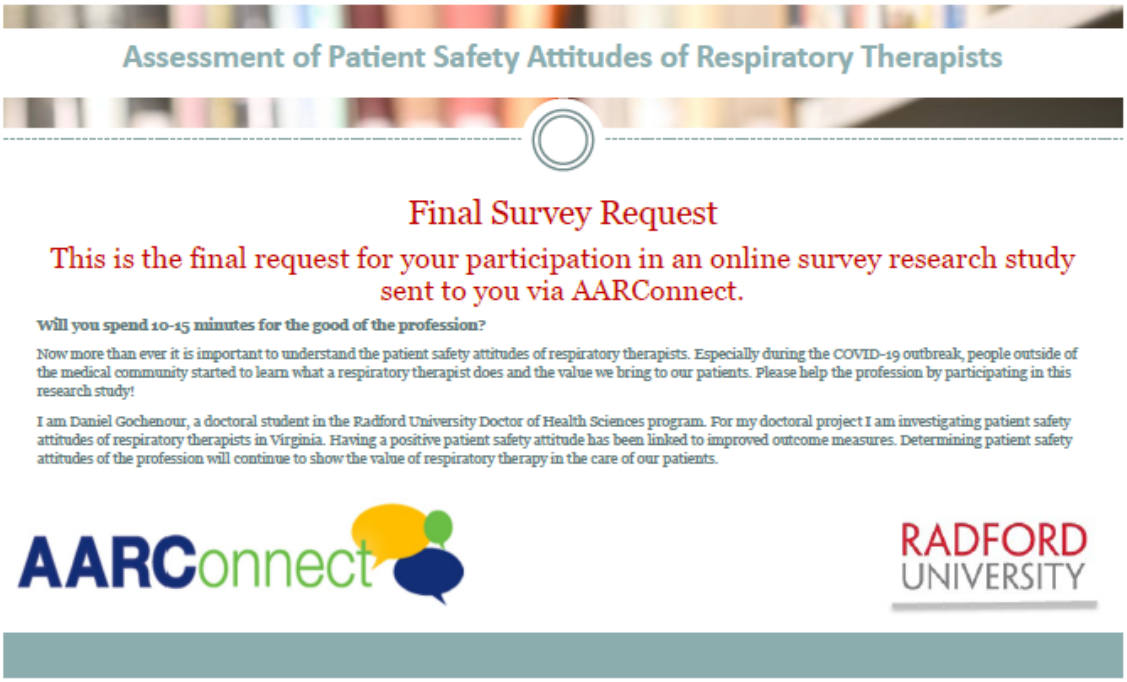
Appendix M

Social Media Announcement #2

HTTPS://CONNECT.AARC.ORG/HOME

Appendix N

Social Media Announcement #3



Appendix O

Radford University Approval IRB Letter

RADFORD UNIVERSITY

Radford University's Institutional Review Board
P.O. Box 7015 Radford, VA 24142 / Phone: (540) 831-5290 / irb-iacuc@radford.edu

17-June-2020

TO:	Frances Everhart, Ph.D.
RE:	Initial Exempt Approval
STUDY TITLE:	Assessment of Patient Safety Attitudes of Respiratory Therapists who are Members of the Professional Association in Virginia
IRB REFERENCE #:	2020-179 / FY20-115
SUBMISSION TYPE:	Initial Submission
ACTION:	Approved
APPROVAL DATE:	17-June-2020

The above-referenced study has been approved by Radford University's Institutional Review Board (IRB). Please note that if your research includes stamped materials, they will be provided with this letter and must be used when conducting your research.

Your study has been approved under Exempt Category 2: Educational tests, surveys, interviews, or observation of public behavior with limited IRB review.

Should you need to make changes in your protocol, you must submit a request for amendment for review and approval before implementing the changes. Amendments must be submitted via the IRBManager system. Please contact our office for assistance, if needed.

As the principal investigator for this project, you are ultimately responsible for ensuring that your study is conducted in an ethical manner. You are also responsible for filing all reports related to this project.

A copy of your approved IRB protocol is available for your records in IRBManager under your dashboard of active protocols.

If you have any questions, please contact the Research Compliance Office at 540.831.5290 or irb-iacuc@radford.edu. Please include your study title and reference number in all correspondence with this office.

Good luck with this project!
Anna Marie Lee
Anna Marie Lee, MHA, CPIA
Research Compliance Manager
Radford University
Irb-iacuc@radford.edu
https://www.radford.edu/content/research-compliance/home.html

Radford University IRB
Approval Date: 17-June-2020

Appendix P

AARC Approval Letter

AMERICAN ASSOCIATION FOR RESPIRATORY CARE
9425 N. MacArthur Blvd, Suite 100, Irving, TX 75063-4706
(972) 243-2272, Fax (972) 484-2720
http://www.aarc.org, E-mail: info@aarc.org

June 25, 2020

Daniel Gochenour, MSc, RRT-ACCS, RRT-NPS, AE-C, CPPS
Research Student, Doctorate of Health Sciences
Radford University Carilion

Dear Mr. Gochenour

Thank you for your interest in sending the survey "Assessment of Patient Safety Attitudes of Respiratory Therapists" to AARC members in Virginia via the AARConnect member-only networking platform. The AARC Board of Directors has considered your request and has approved the survey and recruitment materials as submitted. We will post this message on your behalf on AARConnect in the Virginia Society community, comprised of only AARC members who belong to the Virginia Society for Respiratory Care.

The AARConnect posting schedule is as follows:

- Wednesday, July 1, 2020: First recruitment communication posted
- Wednesday, July 8, 2020: Second recruitment communication posted
- Wednesday, July 15, 2020: Third recruitment communication posted
- Wednesday, July 22, 2020: Fourth recruitment communication posted

The posts will be initiated by AARC staff and then the communication thread will be closed for comment. The potential participants will be redirected to contact you directly for questions about the survey. Please do not post about the survey on AARConnect during the recruitment period. Any direct posts by the research team will be removed from the platform.

Please let me know if you have questions or concerns.

Shawna Strickland PhD CAE RRT RRT-NPS RRT-ACCS AE-C FAARC
Associate Executive Director
shawna.strickland@aarc.org

Appendix Q

Code Book for SPSS

Code Book for SPSS Data Analysis

Question	Variable Name	Values	Data Type
Q1. Age	AGE	18 to N	Numerical (Discrete)
1A. Over 40	Over_40	1=Yes 2= No	Categorical, (Ordinal, Dichotomous)
Q2. Sex	Sex	1=Female 2=Male 3=Prefer not to answer	Categorical (Nominal)
Q3. Years of experience	NYEARS_EXP	0 to N	Numerical (Discrete)
Q3A. 10 or more years of experience	YEARS_Exp10	1= Yes 2= No	Categorical, (Ordinal, Dichotomous)
Q4. Earned Degree (Select all that apply)	EDLEVEL	1=Associate Degree in Respiratory Therapy 2=Associate Degree (non-RT) 3=Bachelor's Degree in Respiratory Therapy 4=Bachelor's Degree (non-RT) 5=Master's Degree in Respiratory Therapy 6=Master's Degree (non-RT) 7= Doctoral Degree	Categorical (Ordinal)
Q4A.Bachelor's degree or higher	BACHELOR_Higher	1= Yes 2= No	Categorical, (Ordinal, Dichotomous)

Q4B. Bachelor's degree or higher in RT	BACHELOR_RT	1=Yes 2=No	Categorical, (Ordinal, Dichotomous)
Q5. Highest level of certification	CERT_LEVEL	1=Certified Respiratory Therapist (CRT) 2=Registered Respiratory Therapist (RRT)	Categorical, (Ordinal, Dichotomous)
Q5A. RRT certification	RRT	1= Yes 2= No	Categorical, (Ordinal, Dichotomous)
Q6. Specialty Certification	SPECIALITY_CRED	1=None 2=Neonatal/Pediatric Specialty (NPS) 3=Adult Critical Care Specialty (ACCS) 4=Certified Pulmonary Function Technologist (CPFT) 5=Registered Pulmonary Function Technologist (RPFT) 6=Registered Polysomnographic Technologist (RPSGT) 7=Certified Asthma Educator (AE-C) 8=Sleep Disorders Specialty (SDS) 9=Other	Categorical (Nominal)
Q6a.	SPEC_CRED	1=Yes 2=No	Categorical (Nominal, Dichotomous)
Q7. Primary work location	WORKLOCATION	1=Teaching Hospital, Inpatient 2=Teaching Hospital, Outpatient 3=Nonteaching Hospital, Inpatient 4=Nonteaching Hospital, Outpatient 5=Industry related	Categorical (Nominal)

		6=Rehabilitation Facility 7=Physician Office 8=Sleep Center 9=Assisted Living or Continuing Care Facility 10=Skilled Nursing Facility 11=Academia 12=Research 1=Other	
Q8. Primary role working with	PRIMARYPOP	1=Pediatrics 2=Adults 3=Geriatric 4=Mix of patient population	Categorical (Nominal)
Q9. Respiratory Therapy input is well received in this institution.	SAQ1	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q10. In this institution, it is difficult to speak up if I perceive a problem with patient care.	SAQ2	5=100 (Disagree Strongly) 4=75 (Disagree Slightly) 3=50 (Neutral) 2=25 (Agree Slightly) 1=0 (Agree Strongly)	Categorical (Ordinal)
Q11. Disagreements in this institution are resolved appropriately (i.e., not who is right, but what is	SAQ3	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)

best for the patient).			
Q12. I have the support I need from other personnel to care for patients.	SAQ4	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q13. It is easy for personnel here to ask questions when there is something that they do not understand.	SAQ5	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q14. The physicians, nurses, and respiratory therapist here work together as a well-coordinated team.	SAQ6	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q15. I would feel safe being treated here as a patient or client.	SAQ7	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q16. Medical errors are handled appropriately in this institution.	SAQ8	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral)	Categorical (Ordinal)

		4=75 (Agree Slightly) 5=100 (Agree Strongly)	
Q17. I know the proper channels to direct questions regarding patient safety in this institution.	SAQ9	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q18. I receive appropriate feedback about my performance.	SAQ10	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q19. In this institution, it is difficult to discuss errors.	SAQ11	5=100 (Disagree Strongly) 4=75 (Disagree Slightly) 3=50 (Neutral) 2=25 (Agree Slightly) 1=0 (Agree Strongly)	Categorical (Ordinal)
Q20. I am encouraged by my colleagues to report any patient safety concerns I may have.	SAQ12	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q21. The culture in this institution	SAQ13	1=0 (Disagree Strongly)	Categorical (Ordinal)

makes it easy to learn from the errors of others.		2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	
Q22. My suggestions about safety would be acted upon if I expressed them to management.	SAQ14	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q23. I like my job.	SAQ15	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q24. Working here is like being part of a large family.	SAQ16	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q25. This is a good place to work.	SAQ17	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)

Q26. I am proud to work in this institution.	SAQ18	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q27. Morale in this institution is high.	SAQ19	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q28. When my workload becomes excessive, my performance is impaired.	SAQ20	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q29. I am less effective at work when fatigued.	SAQ21	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q30. I am more likely to make errors in tense or hostile situations.	SAQ22	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)

Q31. Fatigue impairs my performance during emergency situations (e.g. emergency resuscitation, seizure).	SAQ23	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q32A. Management supports my daily efforts: A. Frontline Mgt	SAQ24A	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q32B. Management supports my daily efforts: B. Institution Mgt	SAQ24B	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	
Q33A. Management doesn't knowingly compromise patient safety: A. Frontline Mgt	SAQ25A	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q33A. Management doesn't knowingly compromise patient safety:	SAQ25B	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly)	Categorical (Ordinal)

B. Institution Mgt		5=100 (Agree Strongly)	
Q34A. Management is doing a good job: A. Frontline Mgt	SAQ26A	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q34B. Management is doing a good job: B. Institution Mgt	SAQ26B	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q35A. Problem personnel are dealt with constructively by our: A. Frontline Mgt	SAQ27A	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q35B. Problem personnel are dealt with constructively by our: B. Institution Mgt	SAQ27B	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q36A. I get adequate, timely info about events that	SAQ28A	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral)	Categorical (Ordinal)

might affect my work, from: A. Frontline Mgt		4=75 (Agree Slightly) 5=100 (Agree Strongly)	
Q36B. I get adequate, timely info about events that might affect my work, from: B. Institution Mgt	SAQ28B	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q37. The levels of staffing in this institution are sufficient to handle the number of patients.	SAQ29	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q38. This institution does a good job of training new personnel.	SAQ30	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q39. All the necessary information for decision making is routinely available to me.	SAQ31	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q40. Trainees in my discipline	SAQ32	1=0 (Disagree Strongly) 2=25	Categorical (Ordinal)

are adequately supervised.		(Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	
Q41. I experience good collaboration with nurses in this institution.	SAQ33	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q42. I experience good collaboration with staff physicians in this institution.	SAQ34	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q43. I experience good collaboration with other health professions in this institution.	SAQ35	1=0 (Disagree Strongly) 2=25 (Disagree Slightly) 3=50 (Neutral) 4=75 (Agree Slightly) 5=100 (Agree Strongly)	Categorical (Ordinal)
Q44. Communication breakdowns that lead to delays in delivery of care or workflow are common.	SAQ36	5=100 (Disagree Strongly) 4=75 (Disagree Slightly) 3=50 (Neutral) 2=25 (Agree Slightly) 1=0 (Agree Strongly)	Categorical (Ordinal)