EVALUATING THE EFFECTS OF AN EDUCATIONAL INTERVENTION ON IMPROVING TEAMWORK USING THE *TEAMSTEPPS*® CURRICULUM

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DEDICATION

I would like to dedicate this dissertation to my husband, children, parents, in-laws, and close friend as they have stood by and supported me over the past six years throughout this journey. Without their love and support, I would not be where I am today.

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ABSTRACT

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AUGUST 2020

Purpose of the Study: The purpose of this study was to determine if an educational intervention using the *TeamSTEPPS*® curriculum improved nurses' attitudes toward teamwork, communication, and patient safety.

Procedure: Using a quasi-experimental design, nurses (N = 69) from six patient care units were randomly assigned by unit to an intervention group or a comparison group. The intervention group participated in a 6-hour workshop on teamwork and communication guided by the *TeamSTEPPS*® curriculum and the comparison group participated in a 6-hour workshop on bullying and incivility guided by the Civility Toolkit from the Robert Wood Johnson Foundation.

Data Results: The overall mean scores on the *TeamSTEPPS*® Teamwork Attitude Questionnaire (T-TAQ) improved within groups from pre-test (Intervention group M =123.18, SD = 8.85; Comparison group M = 123.67, SD = 8.29) to posttest (Intervention group M = 130.09, SD = 7.91; Comparison group M = 130.25, SD = 8.81; $p < .001$). There was no significance ($p > .05$) found between groups. However, there was no significance ($p > .05$) found between groups and the 12-week posttest scores were not sustained at the level of the posttest.

Conclusion: Educational interventions have the potential to improve nurses' attitudes toward patient safety although more work needs to be done. Increased focus on the development of educational interventions that will achieve improved teamwork and communication among nurses has the potential to positively influence the safety of patients.

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CHAPTER I

INTRODUCTION

Nurses are the largest group of providers in the health care industry and have more contact with the patients they encounter than any other healthcare providers (US Department of Labor, 2018). While caring for patients, nurses must continually strive to maintain a safe environment. One way that nurses work to maintain patient safety is through collaborating with health care professionals and functioning as a team. Teamwork and collaboration are important factors in maintaining patient safety and improving patient outcomes and nurses play a significant role in these two activities. To date, most of the work on improving patient safety has focused on errors of commission and omission (Laws & Hughes, 2018). However, in healthcare, teamwork demands reliable communication, cooperation, and coordination to maintain safe patient care (Gluyas, 2015). The literature supports a gap in patient safety education in nursing curricula and student nurses' perspectives of how patient safety is taught and implemented (Bedgood & Mellott, 2018). Without adequate emphasis on patient safety in nursing education, focusing on teamwork and communication, nurses may enter the workforce lacking the skills necessary to effectively communicate and work in teams. As a result, there are implications for educating nurses in these areas to improve patient safety.

To effectively educate nurses on the importance of teamwork and communication, it is necessary to have a specific curriculum emphasizing teamwork. The Agency for Healthcare Research and Quality (AHRQ) and the Department of Defense (DoD) tested and developed the *TeamSTEPPS*® curriculum to address the assessment, education, and evaluation processes for teamwork and collaboration among healthcare providers and other high reliability organizations. The *TeamSTEPPS*® curriculum has been tested and utilized in healthcare organizations, aviation, military operations and nuclear power (AHRQ, 2019). The goal of this curriculum is to promote individual and organizational reflection on current teamwork and collaboration practices, educate individuals on the standards of effective teamwork and collaboration while providing tools to improve personal standards, and to evaluate the effectiveness of education on teamwork and collaboration on improving overall safety. This study assessed the effectiveness of the *TeamSTEPPS*® curriculum for improving staff nurses' attitudes towards teamwork and communication.

Problem of Study

Patient safety has been emphasized in healthcare over the past two decades at the organizational, national, and international level in an effort improve overall health outcomes for patients (Bedgood & Mellott, 2018; Tella et al., 2015). Healthcare providers share the common goal of error prevention resulting in increased concentration on patient safety. To *Err is Human* was a report issued by the Institute of Medicine (IOM) in 1999 to underscore the significance of errors made in the healthcare setting (Bedgood &

Mellott, 2018; Jones, 2013; Kohn, Corrigan, & Donaldson, 2000). In 2005, the Quality and Safety Education for Nurses (QSEN) initiative was started in the United States to improve the integration of quality care and patient safety in nursing to develop nurse's knowledge, skills, and attitudes towards patient safety (Bedgood & Mellott, 2018; QSEN, 2018). The QSEN initiative delineated six areas of focus: (1) Patient-Centered Care, (2) Teamwork and Collaboration, (3) Evidence-based Practice, (4) Quality Improvement, (5) Safety, and (6) Informatics (QSEN, 2018). Within each of these categories, individual competencies were established to facilitate educators in the process of evaluating nurses and nursing students' knowledge, skills, and attitudes toward patient safety (QSEN, 2018).

As a result of work of the IOM and QSEN initiatives, there has been an increasing emphasis placed on assessment and evaluation of patient safety culture in nursing (QSEN, 2018). Patient safety culture is a set of shared values and beliefs within an organization that guides the expected organizational behaviors to promote a safe environment for patients (Singer, Lin, Falwell, Gaba, & Baker, 2009). A culture is developed over time and is multifaceted, demanding buy-in from its stakeholders. Culture cannot be established overnight. Sammer, Lykens, Singh, Mains, and Lackan (2010) identified seven subcultures within patient safety culture to be emphasized when culture change is warranted. These subcultures include leadership, teamwork, evidence, communication, learning, Just culture, and patient-centered care (Sammer et al., 2010). Due to the complexity of safety culture, an investigation of individual components such

as teamwork and communication, could affect overall safety culture within a healthcare organization.

Nurses spend a significant amount of time in direct patient care, and therefore have the unique opportunity to ensure that patients are cared for safely through effective communication and teamwork (Bedgood & Mellott, 2018). As identified by Sammer et al. (2010), teamwork and communication are both integral subcultures that should be developed to maintain a safe environment for all patients. Nurses must be able to safely communicate within the health care team, which includes patients and their families, to ensure a safe patient environment. Educators and healthcare administrators should not assume that nurses possess the tools to effectively communicate and work in teams but should share the responsibility for safe patient care through intentionally teaching patient safety concepts such as communication and emphasizing importance of teamwork and system safety while guiding nurses to develop a culture of safety (Cronenwett et al., 2007; Jones, 2013; Vaismoradi, Salsali, & Marck, 2011).

It is estimated there are approximately 50,000 inpatient nursing teams in the US, which calls attention to the affect nursing providers, working in teams, have on patient safety and quality care (Kalisch, Aebersold, McLaughlin, Tschannen, & Lane, 2015). In 2015, The Joint Commission identified poor communication as the third leading root cause for medical errors in healthcare (Joint Commission, 2017). Therefore, poor teamwork and communication have a significant role in sentinel events where preventable errors occurred, leading to patient harm (Hughes et al., 2016; Joint

Commission, 2014). Team training is one strategy identified throughout the literature to assist nurses and healthcare providers in developing teamwork and communication skills necessary to provide safe patient care and decrease preventable medical errors (Blakeney et al., 2018; Clapper et al., 2019; Hughes et al., 2016). To this effect, it is evident that as medical errors continue to occur in healthcare, more work needs to be done to assist nurses in developing improved teamwork and communication skills.

Rationale for the Study

The purpose of this quasi-experimental study was to investigate whether an educational intervention, using the *TeamSTEPPS*® curriculum, focusing on teamwork and communication improved nurses' attitudes toward patient safety, and thus improved patient safety. To assess the effectiveness of the educational intervention on teamwork and communication, a two-group experiment is was conducted where the comparison group participated in an educational intervention on the identification and prevention of workplace bullying. Including a comparison group would improve the primary investigator's ability to identify whether educating the intervention group on effective communication and teamwork was affecting nurses' attitudes about communication and teamwork. Many studies in the literature lack a control group which potentially affects the internal validity of the studies.

Conceptual Framework

The reciprocal safety culture model is an adaptation of Bandura's (1978) conceptual model of reciprocal determinism and was designed to reflect the concept of

safety culture. Reciprocal determinism focuses on factors of the individual, the environment, and the behaviors of the individual. Bandura believes that the environment plays a role in learned behavior through observation, modeling, self-reflection, and mediation (McLeod, 2016). The term reciprocal implies multidirectional interactions between individuals and their environment in contrast to earlier ideas of unidirectional interactions (Bandura, 1978). In other words, behavior, cognition, and environmental influences fluidly interact with one another as individuals encounter life experiences (Bandura, 1978). Determinism claims that events in an individual's environment lead to cognitive processing resulting in individual responses (Bandura, 1978). According to Bandura's (1978) conceptual model, reciprocal determinism takes on a triangular shape to depict the multidirectional interactions that occur between the individual, their environment, and their behavior. Therefore, individuals learn behaviors from others, model these behaviors, reflect on their actions and adapt learned behaviors as their self-efficacy increases (Cooper, 2000).

Likewise, the reciprocal safety culture model has three components: internal factors (self/person), observable behaviors (job/behavior), and objective situational features (organizational safety management; Cooper, 2000). Reciprocal safety culture was born out of the identification that organizational structures have limitations which can affect the overall corporate culture in offshore, nuclear and shipping industries, inherently high-risk safety environments (Cooper, 2000). Safety culture has been defined several ways but is essentially made up of an organization's shared beliefs that merge

together to achieve the common goal of maintaining safety. The reciprocal safety model was developed with the same triangulation as Bandura's model of reciprocal determinism through similarities in the process of learning in children to that of safety culture in an organization in three ways. First, there is strength in the relationships that people gain from interactions with each other during varying situations (Cooper, 2000). Next, safety culture is dynamic as are human interactions within the environment. Finally, the triangular structure of reciprocal determinism mirrors that of reciprocal safety culture. This triangulation lends itself to multi-level analysis and ongoing evaluation of personal, environmental, and organizational influences on safety culture.

The reciprocal safety culture model guided the development of this study as the three components have been previously researched making safety culture quantifiable (Cooper, 2000). In this study, the nurse contributed his/her own personal knowledge, skills, and attitudes regarding teamwork and communication demonstrating the person/ perceptual aspect of the model. During the educational intervention, nurses demonstrated knowledge, skills, and attitudes toward teamwork and communication which reflected the behavioral portion of the model. The results of the study have implications for educational strategies to improve teamwork and communication, occurring at the organizational level of the conceptual model.

Assumptions

Three assumptions contributed in the development of this study.

1. Nurses need to improve their teamwork and communication skills in the patient care environment.
2. Nurses have a desire to improve teamwork and communication to enhance patient safety outcomes.
3. Safety is a shared goal among individuals and healthcare organizations.

Hypothesis

This two-group quasi-experimental design pre-post study sought to evaluate the effects of an educational workshop, using the *TeamSTEPPS*® curriculum from the AHRQ, on improving nurses' attitudes about teamwork and communication with a goal of improving patient safety. The comparison group participated in an educational workshop on workplace bullying and completed the same pretest and posttest as the intervention group. The hypothesis for this study was:

H1: Licensed nurses participating in an interactive workshop on teamwork and communication will have significantly improved attitudes regarding teamwork and communication as measured by the *TeamSTEPPS*® Teamwork Attitude Questionnaire (T-TAQ) than licensed nurses participating in an interactive workshop on workplace bullying.

Definition of Terms

The terms of this study are defined below.

1. *Licensed nurses:* Licensed nurses are licensed practical nurses and registered nurses who have received a license to practice nursing from the state.

Operationally, licensed nurses are those staff nurses employed in a regional health care facility in southcentral Texas who agree to participate in the study.

2. *Interactive workshop on teamwork and communication: TeamSTEPPS®* is a set of evidence-based tools used by healthcare professionals, focused on promoting improved patient outcomes through effective communication and teamwork skills (AHRQ, 2019). Operationally, the *TeamSTEPPS®* curriculum will include the critical elements of the *TeamSTEPPS®* curriculum taught in a one-day workshop.
3. *Interactive workshop on workplace bullying*- The Civility Toolkit is a resource that provides healthcare leaders the necessary resources to identify, intervene, and prevent bullying in the workplace (PACERS, 2015). Operationally, the Civility Toolkit will provide the resources and curriculum to implement a one-day workshop on bullying identification and intervention.
4. *Attitudes regarding teamwork and communication:* Attitude is a mental state, whether conscious or unconscious that predisposes individuals to certain behaviors or actions based on values, beliefs, or feelings (Altmann, 2008). Operationally, these attitudes will be measured by scores on the *TeamSTEPPS®* Teamwork Attitude Questionnaire (T-TAQ).

Limitations

There were several potential limitations of this study. These potential limitations included small population to sample from, history, attrition, testing, and time commitment (Polit & Beck, 2012). The organization supporting the research study has a

smaller number of nurses to select from in comparison to sampling nurses from a variety of organizations. There are approximately 229 nurses working in direct patient care at the selected facility, resulting in a smaller population to sample. Another potential limitation was history which involved the possibility of external events occurring after the initial intervention, before the 12-week posttest, that might have affected the participants responses to the final survey. Following the intervention, the participants may have been exposed to additional information through outside sources that the researcher was unable to control. Attrition was another risk to internal validity that must was accounted for as a possible study limitation. This study involved a 12-week posttest which may have decreased the groups comparability (Polit & Beck, 2012). To minimize this potential limitation, the researcher used multiple modes of follow up to encourage participants to complete their final posttest such as email, text, and telephone reminders.

As with any pretest/posttest design, there was a risk for the pretest to influence the results of the posttest. According to Polit and Beck (2012), this is especially prevalent when testing attitudes. Given that this research study investigated nurses' attitudes toward teamwork and communication, this was likely a study a limitation. Another possible limitation was that participants self-reported their attitudes towards teamwork and communication. Self-reporting could have resulted in inflated or deflated results on the T-TAQ. Finally, due to the nature of the educational curriculum for the intervention and comparison groups, participants were required to attend a 6-hour workshop and complete a 12-week follow up survey for the study. Although increased time with the participants

may have improved the richness of the intervention, time away from the bedside may have limited the number of nurses willing to participate in the study.

Summary

Teamwork and collaboration are essential to maintaining a culture of safety for all patients. Nurses must be able to work as a team and effectively communicate within the interdisciplinary healthcare team. Nurses may not realize they lack knowledge of the tools to facilitate teamwork and communication that ultimately improve the safety of their patients. The IOM, QSEN, and AHRQ are all organizations that have invested much time into identifying the gaps in patient safety education and the needs of healthcare providers related to improving patient safety. Recognition of the need for improved teamwork and communication has led to the development of tools and strategies to meet the goal of improving these two components of patient safety. Education may be able to fill these knowledge gaps and provide healthcare providers with the tools necessary to provide safe patient care.

CHAPTER II

THE ROLE OF EDUCATION IN DEVELOPING A CULTURE OF SAFETY THROUGH THE PERCEPTIONS OF UNDERGRADUATE NURSING STUDENTS: AN INTEGRATIVE LITERATURE REVIEW

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Abstract

Objectives: This integrative literature review seeks to examine research-based knowledge about the role of education in developing a culture of safety through the perspectives of undergraduate nursing students.

Methods: An integrative literature review of nursing and health databases was conducted and literature from 2009–2018 were reviewed. Studies focusing on patient safety education in undergraduate nursing students were analyzed to identify the current state of safety education in academia. The results and findings from the articles reviewed were included in the final synthesis of the literature.

Results: A total of 336 articles were identified from the onset and 14 were selected for inclusion in the review. There were three qualitative studies, eight quantitative studies, and three mixed methods research studies included. Four themes emerged: students

perceive patient safety education is important, safety education in the curriculum is important, students are afraid to speak up, and students perceive a lack of knowledge and support for speaking up.

Conclusions: The results of this integrative literature review demonstrate that nursing education plays an integral role in creating a culture of safety among nursing students. Nursing students lack a strong understanding of their role in patient safety. This translates into a need for dedicated patient safety curriculum to establish a culture of safety in nursing education.

INTRODUCTION

Patient safety is pivotal in healthcare and education is the link connecting patient safety concepts to nurses to decrease patient harm and create a culture of safety.[1] Emphasizing a culture of safety has been shown to result in better patient outcomes.[2] Culture is the shared values, goals, and attitudes of individuals, groups, or organizations.[2] Therefore, student nurses must be taught a culture of safety to carry the culture into their practice as a professional nurse. Nursing educators share the responsibility of preparing nurses with the skills necessary to ensure patients are cared for safely.[3] To prepare nursing students to provide safe patient care, they must be taught the principles of patient safety during their nursing education and be given the opportunity to implement these principles in the clinical environment.[4-6]

The provision of safe patient care has been in the healthcare spotlight at the organizational, national, and international levels to improve the care patients receive.[7] One of the primary reasons for the concentration on patient safety is related to the overarching goal of healthcare providers and organizations to prevent errors in healthcare. The Institute of Medicine published its seminal work, To Err is Human, in 1999 to highlight the magnitude of errors made in the healthcare setting.[8,9] In 2005, the Quality and Safety Education for Nurses (QSEN) initiative was started in the United States to improve the integration of quality care and patient safety in nursing curricula in an effort to develop nursing student's knowledge, skills, and attitudes of patient safety.[10] This initiative outlined five areas of focus: (1) Patient-Centered Care, (2) Teamwork and

Collaboration, (3) Evidence-based Practice, (4) Quality Improvement, (5) Safety, and (6) Informatics.[10] Specific competencies were developed in each category to assist the educator in evaluation of the student's knowledge, skills, and attitudes toward patient safety.[10]

As a result of the work of the Instituted of Medicine and the QSEN initiative, educators heightened their focus on assessment and evaluation of patient safety in nursing education.[10] With the significant amount of time that nurses spend in direct patient care, they are challenged with a large portion of the responsibility for patient safety. Through initiatives to strengthen patient safety, it has become evident that this process is multifaceted and bedside nurses should not bear the sole burden of the responsibility.[11] Nurse educators and administrators realize that patient safety must be built into nursing curricula focusing on system safety as well as guiding nursing students to develop a culture of safety.[5,8]

The aim of this literature review is to integrate research-based knowledge about effective nursing education, on safe practices, to better understand student perceptions of their role in supporting a culture of safety.

METHODS

Methodological Design

The integrative literature review method outlined by Whittemore and Knafl was utilized to survey the literature.[12] This method allows for inclusion of diverse research methods, which potentially increases the applicability of the findings to nursing

practice.[12,13] The steps to an integrative literature review include problem identification, literature search, data evaluation, data analysis, and presentation of findings.[12,14] This comprehensive review of research studies requires the clear synthesis of the literature to determine whether a researchable problem exists.[12,14]

Search Strategy

A review of the literature was conducted using Cumulative Index for Nursing Allied Health Literature (CINAHL) and PubMed with different combinations of the search terms *under-reporting, nursing students, medication errors, and safety education, and patient safety.* An ancestry approach was utilized by manually reviewing the citations of each article, and three additional references were found. Initially, 339 articles were discovered, 282 were excluded because they were not full-text articles, or they were not peer reviewed. Another limitation applied was a date range of 2009 to 2018. This date range was chosen because in 2009 Phase III of the QSEN project was launched in response to the receipt of $4.25 million in grants awarded to the American Association of Colleges of Nursing (AACN) and the University of North Carolina School of Nursing, by the Robert Wood's Johnson Foundation.[15] These grants were awarded to enable the continuation of the development of programs to prepare nursing students to provide safe quality care that would ultimately affect healthcare systems around the nation.[15]

After the first round of exclusions, there were 57 articles left to be screened, and 43 were excluded because they were not specific to the education of nursing students or

they were not research reports. The final number of articles for this literature review was established at 14 (see Figure 1, Appendix A).

Inclusion criteria

1. Must be original research.
2. Must published in the English language between 2009-2018.
3. Must demonstrate major focus on patient safety education in nursing students.

Exclusion criteria

1. There was no discussion of a patient safety intervention.
2. Not an academic or peer reviewed journal.
3. That it was an abstract or opinion piece.

Data Abstraction and Synthesis

An excel spreadsheet was used to abstract and synthesize the data. Fourteen research studies were analyzed for content, themes, and relevance. A combination of a methodologic and results matrix was used to organize the literature. The matrix was organized chronologically by year and included author, framework, aim, design, findings, and themes (see Table 1, Appendix B). This method was beneficial in sorting literature to identify trends and patterns linking the literature together to substantiate the importance of education and patient safety. Key findings were synthesized under the headings of student perceptions, integrating patient safety into education and research, and conflicting evidence.

RESULTS

Of the 14 studies in this literature review, 6 were from the US, 4 were from Canada, 2 were from the UK, 1 was from Australia, and 1 was from Iran. The total number of students involved in the 14 research studies was 2928 undergraduate students. The students were either at the Associate or Baccalaureate degree level. After a detailed review of each full article, 4 themes emerged in the literature reviewed: (1) Students are afraid to speak up, (2) Students perceive a lack of knowledge and support for speaking up, (3) Students perceive patient safety education is important, and (4) Integrating patient safety education into the curriculum is important.

Student Perceptions

Students are afraid to speak up

Fear of speaking up was a common theme that emerged throughout the literature. In a study exploring the development of a culture of safety, a co-curricular inter-professional simulation was designed pairing nursing students with a preceptor who was purposely making mistakes. The simulation was run nine times with different inter-professional groups including nursing (n = 67), pharmacy (n = 16), medicine (n = 6), physical therapy (n = 8), and nutrition (n = 3). During the simulation, none of the nursing students ever spoke up about the errors that the nurses were making.[17] Students reported one of their reasons for not speaking up was "fear of negative consequences".[17] In a longitudinal study, researchers found that over a 3-year period of assessing nursing

students' perceived level of comfort with patient safety, students ranged from 37% to 43% when asked if they felt comfortable approaching someone who was engaging in unsafe behavior.[19]

In a qualitative study on student perspectives of patient safety, focus group interviews were conducted to evaluate individual perceptions of patient education curriculum integration to strengthen and develop the nursing curriculum.[21] As a result, it was identified that the current curriculum did not encourage reporting errors and students were ultimately fearful of retribution leading to lack of error reporting.[21]

Students perceive a lack of knowledge and support for speaking up

Another theme that was identified was that students believe they lack the knowledge or support to recognize or speak up when errors occur. Students concluded that they did not have the knowledge to identify patient safety errors or violations on their own and that mentors in the clinical setting could play a more significant role in helping them increase knowledge attainment.[21] In comparison, students in a simulated environment were fearful of speaking up about safety breaches made by a role-played nurse because they assumed they lacked sufficient knowledge to identify the nurse's errors.[17]

Students perceive patient safety education is important

Despite intentional inclusion of safety concepts in education, there continue to be variations in students' perceptions of learning patient safety. In a cross-sectional study comparing Finnish and British students' perceptions about patient safety, Finnish nursing

students had more emphasis on individual errors as opposed to system errors when compared to British students, and Finnish students had fewer experiences with safety in the clinical setting ($P \leq 0.001$).[7] Although there were differences in their safety education experiences, both groups of students believed that role modeling safety in the educational setting was important to their overall knowledge acquisition.[7] In an exploration of Iranian nursing students, researchers investigated nursing student's perceptions of nursing education in providing safe patient care and found students were uncomfortable with safety concepts and that better integration of safety in education was needed.[21] Canadian nursing students' perspectives on patient safety in the nursing curriculum were examined and it was discovered that students believe that patient safety education needs to be more structured within the curriculum.[11]

Safety education in the curriculum is important

Education has a positive impact on improving student's safety awareness.[22] As students learn more about patient safety concepts, their overall awareness has been shown to go up, but their confidence in their ability to manage safety concerns went down.[22] From the perspective of an inter-professional course in patient safety, nursing students and students from other healthcare disciplines were equally able to attain safety knowledge and develop increased awareness about patient safety concepts and their importance in healthcare.[16] Educational interventions were also shown to improve student's perceptions of safety awareness when monitoring for medication errors.[18]

Integrating Patient Safety Education and Research

Six of the 14 studies utilized QSEN as a foundation for their research and referred to the significance of the work being conducted by QSEN to influence safety education in nursing. For example, one study sought to investigate student perceptions of their acquisition of knowledge, skills, and attitudes critical to the development of competencies outlined by QSEN.[4] The competencies most frequently reported by the students as present in the curriculum were patient-centered care (81%–95%, n = 565), evidence based practice (81%, n = 565), and safety (40%–79%, n = 565).[4] Jones[8] conducted a study to evaluate student comprehension of safety before entering the clinical setting and then again at the end of their clinical experiences. This study was built around the integration of QSEN competencies into the fundamental's courses of a nursing program. Another study designed a research tool, based on QSEN, entitled *The Student Perceptions of Safety and Quality Knowledge, Skills, and Attitudes Questionnaire*. The tool was administered to nursing students at the beginning of the semester and then again at the completion of the semester to evaluate and compare the effects of classroom and clinical instruction on patient safety.[24]

Conflicting Evidence

Although there were many common threads found throughout the literature, there were conflicts in the evidence as well. One difference was noted in a longitudinal study of baccalaureate nursing students (n = 716) who self-reported their confidence in learning

patient safety declined as they progressed through the nursing program.[19] Declining confidence despite progression in the nursing program was likely a result of inconsistencies in what was taught or a differing emphasis placed by the faculty on the importance of patient safety.[19] Another piece of conflicting evidence in the literature involved a study in which nursing faculty intentionally delivered patient safety content in the classroom, utilizing a case study format, with an intervention group and a control group.[22] The outcome revealed that student nurses in the control group showed more positive change related to their perceptions of safety and medical errors and positive perceptions of safety competencies ($P = 0.007$).[22]

CONCLUSION

This integrated review of the literature revealed that there were relationships, patterns and conflicting evidence regarding teaching patient safety to nursing students. The literature consistently suggested that intentionally integrating patient safety into the nursing curriculum improves nursing student's culture of safety and patient safety knowledge. Nursing students have reported that educational interventions surrounding patient safety have been effective.[24] Nursing students also responded positively to an educational intervention using QSEN safety competencies in the clinical setting by becoming more aware and effective in safety assessment and interventions.[8]

Findings from this literature review support the need for further investigation of patient safety education in nursing to facilitate the development of a culture that supports safe patient care. Educators have a responsibility to prepare nursing students for entry

into practice with the knowledge, skills, and attitudes to manage complex patients' healthcare needs while focusing on safe patient care.[20,23] The goal of any nursing educator should be to develop a curriculum that emphasizes the importance of patient safety.[18] The literature revealed several different methods for the development of a patient safety curriculum. However, further development is needed.

QSEN plays a significant role in nursing education in the United States and is appropriate as a curriculum framework.[8] QSEN competencies can be used to benchmark students' progress toward improved safety knowledge, skills, and attitudes. Through the utilization of the QSEN safety competency teaching strategies, student learning related to creating a culture of safety in nursing has been shown to improve.[8] Teaching patient safety has often been limited to the classroom setting, yet there are significant benefits to carrying this education into the lab/simulation and clinical settings.[4] Sullivan et al[4] reported that results of the QSEN Student Evaluation Survey indicate students believe they are missing the connection between theoretical teaching and clinical experiences relating to patient safety and error reporting. Again, this further supports the implications for continued research in teaching patient safety to nursing students.

Several gaps were apparent in the literature. First, there was limited available research to guide the development of a strong patient safety curriculum that bridges the gap between theoretical teaching and clinical teaching.[6] Second, there were a limited number of available research studies that focused on nursing education related to patient safety. Finally, there was a lack of published research identifying nursing faculty

perceptions of how patient safety is being taught in the curriculum. Most faculty believe they are teaching safety competencies, however, either the curriculum is not strong enough, or students are not able to apply the information to the clinical environment.[21] Based on the identified evidence, there is more work to be done closing the gaps in teaching patient safety and creating a culture of safety in nursing education. Patient safety is multifactorial and should not be limited to the education of nursing students or curricular structure. However, continued research on creating a culture of safety in nursing education is necessary to increase awareness and acceptance of the importance of this topic across academic settings.

There were several limitations of this literature review including small sample size, the population being studied (nursing students), and the limited number of research studies available for review. Eight of the 14 studies included in this literature review stated that small sample sizes were a limitation of their study. A conclusion drawn from this pattern was that all study participants were nursing or healthcare related students who are coordinating multiple demands in a field of study that tends to be very time-consuming. Finally, there were a limited number of available research studies that focused on nursing education related to patient safety.

Patient safety is critical to the future of nursing as well as the health outcomes of all patients. Through further research, there may be an increased awareness of the importance of integrating patient safety competencies and concepts into nursing curricula. An integration of safety competencies could ensure the acquisition of

knowledge through reinforcement in the clinical setting. Based on these findings and suggestions, nurse researchers must continue to investigate how patient safety competencies and concepts are integrated into the nursing curriculum and their impact on creating a culture of safety. This literature review has led the author to begin a formal research study to identify whether an educational intervention will change the perceptions of nurses regarding patient safety. With an increased awareness and modified perceptions of the importance of patient safety, comes an impetus for change that has the potential to significantly affect the future health and safety of all patients.

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Chapter III

LITERATURE REVIEW

Introduction

Patient safety is the cornerstone of healthcare and the overarching goal of nurses and healthcare agencies. Maintaining safe patient care requires effective teamwork and communication (AHRQ, 2019). Nurses are key in the delivery of safe patient care and essential contributors to the process of teamwork and collaboration involved in providing patient care (Abbott et al., 2012). The literature indicates that a gap exists in patient safety education in nursing curricula and student nurses' perspectives of how patient safety is taught and implemented (Bedgood & Mellott, 2018).

TeamSTEPPS® is a nationally recognized curriculum that has been tested and validated in various settings and has shown to be an effective tool to guide the education of nurses on improving patient safety through increasing awareness of the significance of effective teamwork and communication (AHRQ, 2019). Historically, many nursing schools have reported utilizing curriculum from the Quality and Safety Education for Nurses developed by the Robert Wood Johnson Foundation. In a survey conducted to evaluate utilization of QSEN competencies in nursing programs, it was discovered that out of 2,037 nursing faculty respondents, 86% stated they were currently using QSEN in some manner, however 69% believed they lacked effective training on proper implementation of QSEN competencies, which points to the need for improved integration in nursing education (Altmiller & Armstrong, 2017). In addition, it is

important to note that only one component of QSEN emphasizes improved teamwork and collaboration. To address the needs of improved patient safety by eliminating individual errors through effective teamwork and collaboration, the Institute of Medicine has reported a shift in focus on errors from a problem with "bad people" to "bad systems" emphasizing the need to improve teamwork and communication (Libson et al., 2016).

With an apparent gap in nursing students' educational experiences regarding patient safety competencies including teamwork and collaboration, new nurses are transitioning into practice with insufficient experience to confidently work collaboratively with the team. In addition, healthcare leaders report an increased need for improved interprofessional collaboration among nurses and healthcare providers to positively impact patient safety (Abbott et al., 2012). New nurses also report a lack of confidence in teamwork (Lukewich et al., 2015). The IOM has also established a goal for the nursing profession addressing the educational needs for improved interprofessional collaboration skills among new nurses (Abbott et al., 2012).

Significant concern for the provision of safe patient care involves the prevention of medical errors including medication errors. Although medication administration is a standard practice for nurses, there are many team factors that are integrated into this task. Nurses may be adequately trained in administering medications, but they must understand that effective communication is imperative to quality in the medication administration process (Popescu, Currey, & Botti, 2011).

To date, most of the work on improving patient safety has focused on errors of commission and omission (Laws & Hughes, 2018). Errors of commission involve doing something wrong, such as administering the wrong medication. On the other hand, errors of omission, or missed nursing care include any portion of care that was not completed (Kalisch et al., 2015). One of the predictors of missed nursing care was ineffective teamwork (Kalisch et al., 2015). Errors of omission can have notable effects on patient care and often occur during hand-off reports (Laws & Hughes, 2018). Kalisch et al. (2015) suggest several strategies for improved teamwork in nursing including team training, enhanced face to face shift reporting, and the use of standardized reporting tools such as SBAR (Situation, Background, Assessment, and Recommendation). *TeamSTEPPS*® training is a curriculum tool that addresses teamwork and communication that may be able to affect shift reporting and the use of standardized reporting tools.

In healthcare, teamwork demands reliable communication, cooperation, and coordination to maintain safe patient care (Gluyas, 2015). Barriers to effective teamwork and communication include ineffective leadership, poor communication, and a lack of mutual support (Gluyas, 2015). Overcoming these barriers requires an organizational commitment to improved teamwork and communication processes. One-way organizations have implemented change is through training programs focused on improving teamwork and communication, such as *TeamSTEPPS*®, while gaining insight into the organization's barriers to effective teamwork and communication, including differing communication styles (Gluyas, 2015). If *TeamSTEPPS*® training is effective in

improving teamwork and communication among nurses and other healthcare providers, and communication has been shown to be a leading cause of adverse events in healthcare, then educating nurses and healthcare providers on strategies to enhance teamwork and collaboration is the next step to improving the overall safety of patients in the healthcare system (Libson et al., 2016).

Methods

Whittemore and Knafl's (2005) integrative literature review method was utilized to survey the literature. This method increases the applicability of the findings to nursing practice while allowing for inclusion of diverse research methods (Bedgood & Mellott, 2018; Broome, 2000; Whittemore & Knafl, 2005). An integrative literature review includes problem identification, a complete literature search, data evaluation, data analysis, and presentation of findings (Bedgood & Mellott, 2018; Polit & Beck, 2012; Whittemore & Knafl, 2005). Using an integrative literature review method requires the clear synthesis of the literature to identify whether a researchable problem exists (Bedgood & Mellott, 2018; Polit & Beck, 2012; Whittemore & Knafl, 2005).

Search Strategy

A review of the literature was conducted using *Cumulative Index for Nursing Allied Health Literature* (CINAHL) and PubMed with different combinations of the search terms *TeamSTEPPS®, TeamSTEPPS® and educational intervention, TeamSTEPPS® and nurses, TeamSTEPPS® and communication and teamwork.* Initially, 170 articles were discovered, 11 were excluded because they were duplicates and 122

were excluded because they were not peer reviewed articles. Another limitation applied was a date range of 2015–2019. After the first round of exclusions, there were 36 articles left to be screened, and 26 were excluded because they were not specific to nursing, they were not research reports, or they did not include an educational intervention. Finally, one article was added after further investigation of the databases. The final number of articles for this literature review was established at 11 (see Appendix C).

Inclusion criteria

1. Must be original research.
2. Must be published between 2015–2019.
3. Must demonstrate major focus on patient safety education for nurses.

Exclusion criteria

1. There was no discussion of a patient safety intervention.
2. Not an academic or peer reviewed journal.
3. Was only an abstract or opinion piece.

Data Abstraction/Synthesis

Using an excel spreadsheet to abstract and synthesize the data, ten research studies were analyzed for content, themes, and relevance. A combination of a methodologic and results matrix was used to organize the literature. The matrix was organized alphabetically by author/date/level of evidence, framework, research question/hypothesis, design/sample, independent and dependent variables, tools, summary of findings, study limitations, and main concepts (see Appendix D). This

method assisted with sorting literature to discern trends and patterns linking the literature together to validate the significance of effective teamwork and communication to improve patient safety. Key findings were synthesized under the headings of teamwork and communication, education, and conflicting evidence.

Results

Teamwork and Communication

Effective teamwork and communication can improve patient safety. Effective teamwork demands skills in communication, situation monitoring, leadership, and mutual support (AHRQ, 2019). Working as a team is a skill that not all healthcare providers demonstrate on an ongoing basis and may require education to reinforce their significance and influence on patient safety (Ballangrud et al., 2017; Blakeney et al., 2018; Clapper et al., 2018; Clapper et al., 2019; Dahl et al., 2017; Kalisch et al., 2015; Sonesh et al., 2015). The literature supports that strong teamwork and communication can lead to improved patient satisfaction (Blakeney et al., 2018). Clapper et al. (2018) conducted a qualitative study, comparing pediatric team members on day and night shifts, to explore a team's focus and the sharing of information. The researcher identified that team members often worked in silos based on their environment and focused heavily on the task at hand (Clapper et al., 2018). Many team members in this study were ineffective in sharing information and were more concerned with focusing solely on themselves and their patient, failing to emphasize teamwork (Clapper et al., 2018). Patient safety is reliant on the views and observations of team members and they must feel comfortable

speaking up to facilitate improved outcomes for the team and patient (Clapper et al., 2018). Healthcare provider behavior is dependent on their perception of the environment and many of the providers fixated on individual situations rather than speaking up when concerns were noted within their team (Clapper et al., 2018). Failure to speak up can be affected by knowledge of issues and strategies to promote better integrated teamwork (Clapper et al., 2018).

The *TeamSTEPPS*® curriculum was used in this study to encourage improved situation monitoring and communication to address the importance of speaking up and maintaining responsibilities within the team (Clapper et al., 2018). Utilizing the strategies outlined by the *TeamSTEPPS*® curriculum, team members were more empowered to recognize potential errors and speak up about their concerns within their team (Clapper et al., 2018).

Teamwork is a key feature to maintaining patient safety, however challenges exist in healthcare environments related to varying perceptions of patient safety (Ballangrud et al., 2017). Ballangrud et al. (2017) developed a quasi-experimental study using an interprofessional teamwork intervention guided by the *TeamSTEPPS*® Model of Change on a surgical ward that targeted patients and frontline healthcare providers. Patients were required to be at least 18 years old, understand the Norwegian language, and be mentally and physically capable of participating (Ballangrud et al., 2017). Patients perception of quality care during their hospital stay were requested using the questionnaire, Quality from Patient's Perspectives (Ballangrud et al, 2017). The provider population included

624 frontline healthcare providers, including physicians, registered nurses, assistant nurses, midwives, physiotherapists, and occupational therapists (Ballangrud et al., 2017). The goal of sampling this group was to ascertain their perceptions of teamwork in hospitals and to explore the impact of a *TeamSTEPPS*® intervention on inter-professional teamwork in a surgical ward using four hours of classroom instruction and two hours of high-fidelity simulation (Ballangrud et al., 2017).

The study included two phases (Ballangrud et al., 2017). In Phase 1, focus group sessions were conducted with 19 healthcare providers, prior to the intervention and after the intervention at 6 and 12 months (Ballangrud et al., 2017). In Phase 2, patients will complete the Quality from Patient's Perspectives questionnaire before the intervention and after the intervention at 6 months and 12 months (Ballangrud et al., 2017). During Phase 1, participating healthcare provider's (N = 19) perception of teamwork, team decision making, safety culture, and attitudes toward teamwork were evaluated before the intervention and after at 6 and 12 months (Ballangrud et al., 2017). The intervention and first phase of data collection has occurred as per this citation, however the results of Phase 1 of the study have not yet been published.

Administrative support affects the perceptions of importance of teamwork and communication. An organizational commitment to achieving positive patient outcomes is critical to maintaining patient safety and must include effective communication among healthcare teams and patients (Blakeney et al., 2018). Blakeney et al. (2018) carried out a study in which a small interprofessional team (N = 100),

representing six groups of healthcare providers (patient service specialists, registered nurses, social workers, pharmacists, advanced practice providers, and physicians) from two inpatient cardiology units at a 450 bed academic medical center, worked with advanced heart failure inpatients to identify challenges in teamwork that affected communication, areas for improvement when working as teams with this population, and to assess whether implementing team training processes using the *TeamSTEPPS*® strategies would improve communication and outcomes. Participants were asked to complete a validated web-based relational coordination survey before the intervention and 1 year later to evaluate the effects of the intervention (Blakeney et al., 2018).

Following the baseline relational coordination survey healthcare providers began to meet quarterly to discuss the survey results and how to facilitate improved scores (Blakeney et al., 2018). The intervention also included quarterly leadership workshops that focused on change management strategies, including shifting to structured inter-professional bedside rounding instead of shift reporting outside of the patient rooms, *TeamSTEPPS*® training, and simulated practice of structured inter-professional bedside rounding (Blakeney et al., 2018). Each healthcare team member was required to complete one 4-hour *TeamSTEPPS*® training session and simulations focusing on the structured inter-professional bedside rounding process (Blakeney et al., 2018). It was discovered that the healthcare team did need training on how to improve teamwork, communication, and mutual support (Blakeney et al., 2018). Of all those surveyed, 100 participants completed the survey at the baseline and then 1 year later. The means between the first

survey and the last survey were significantly different ($p < 0.02$) for all categories (frequent communication, timely communication, accurate communication, problem-solving communication, shared goals, shared knowledge, and mutual respect) of the relational coordination survey except for shared knowledge ($p = 0.125$; Blakeney et al., 2018). With adequate organizational support for training, the findings revealed improved team communication and relationships among team members caring for advanced heart failure patients (Blakeney et al., 2018). The study results demonstrated an effect on patient, nurse, and provider satisfaction as the inpatient acute heart failure care team reported improved satisfaction in their work (Blakeney et al., 2018).

Falco and Balmer (2018) conducted an ethnographic study where 23–27 individuals in 4–5 teams, on an inpatient pediatric unit, were observed over periods of up to 4 days. The study investigated the roles that pediatric team members assume in real-life settings and how team members conduct teamwork practices on family-centered rounds (Falco & Balmer, 2018). Following 25 hours of observations of family-centered rounds, the participants were invited to take part in one on one interviews to discuss how team members worked together during family-centered rounds (Falco & Balmer, 2018). Only 13 participants agreed to the interviews (Falco & Balmer, 2018). The interviews were recorded and transcribed verbatim and both field notes and recordings were analyzed concurrently using grounded theory principles to guide the analysis (Falco & Balmer, 2018). The results demonstrated the need to have senior leaders on the healthcare team empower other team members to speak up when potential safety risks were noted

and embrace pooling information to improve shared decision making in order to reap the benefits of shared knowledge (Falco & Balmer, 2018).

Finally, a multilevel quantitative study was conducted with 43 clinical obstetric team members (registered nurses, nurse managers, licensed practical nurses, nurse educators, and resident physicians) at a 2,338-bed teaching hospital in the southeastern US to determine whether a non-technical training program improved teamwork, situation awareness, decision making, cognitive bias, and patient outcomes (Sonesh et al., 2015). A pre-post design, using Kirk-Patrick's training evaluation framework, was utilized and included a 6-item survey to evaluate participant satisfaction with the training as well as situational-judgement test to determine if there was a change in skills post training (Sonesh et al., 2015). The Teamwork Perceptions Questionnaire was also administered to assess the perceptions of teamwork transfer on the unit and 40 hours of pre and post-training observations by six trained independent observers was completed (Sonesh et al., 2015). Finally, chart reviews were conducted to evaluate the effect of training on patient outcomes (Sonesh et al., 2015). The researchers modified the *TeamSTEPPS*® curriculum and developed an interactive 85-minute intervention that was divided into two modules focusing on cognitive bias and teamwork competencies using lecture, discussion, videos, and interactive practice (Sonesh et al., 2015).

The results were divided into four categories, reactions, learning, transfer (Teamwork Perceptions Questionnaire, situational-judgement test, and behavioral outcomes), and patient outcomes (Sonesh et al., 2015). The reaction of trainees was

positive with 90% agreeing that they were likely to use the tools learned in the training and 85% reporting that they enjoyed the training (Sonesh et al., 2015). The data did not show a significant improvement in situational awareness ($p > 0.05$), teamwork perception ($p > 0.05$), or situational judgement ($p > 0.05$). There was a significant improvement in pre-training and post-training on decision accuracy ($p < 0.05$) (Sonesh et al., 2015). Finally, patient outcomes were noted to be marginally improved ($p = 0.07$) following chart reviews (Sonesh et al., 2015). Despite insignificant results in some areas, participants had a positive reaction to the *TeamSTEPPS*® training, showed improved knowledge of communication, and behavioral indicators pointed to improved decision accuracy (Sonesh et al., 2015). It was also discovered that the transfer of trained competencies after teamwork training is dependent on the unit culture and reinforcement of behaviors, both of which can be directly influenced by administration (Sonesh et al., 2015). This study shows promise in that decision accuracy can improve through training and has implications for future research to include practice through role-play to improve situational judgement to affect teamwork and overall patient outcomes (Sonesh et al., 2015). Each of these studies demonstrate the need for effective leadership from administration, educators, and leaders to support a culture of speaking up and working together as a team to influence the overall effectiveness of teamwork and communication among healthcare providers.

Education

Training programs are an important component of building effective teamwork and collaboration among healthcare team members as it is often assumed that team members enter the profession with these skills in place. However, many do not have the necessary teamwork and communication skills to function safely and effectively in a team environment. The *TeamSTEPPS*® curriculum is recognized throughout the literature as a reliable method for educating healthcare professionals on how to improve teamwork and communication skills to improve patient safety (AHRQ, 2019; Amiri, Khademian, & Nikandish, 2018; Ballangrud et al., 2017; Clapper et al., 2018, Clapper et al., 2019; Falco & Balmer, 2018; Libson et al., 2016; Sonesh et al., 2015).

The only randomized control trial discovered in the literature within the last 5 years was conducted by Amiri, Khademian, and Nikandish (2018), investigating the effects of a nurse empowerment program on patient safety culture. In this study, 80 nurses and 20 supervisors were selected through proportionally stratified sampling and randomly placed in an experimental or control group and 61 completed the study (experimental group $n = 30$, control group $n = 31$; Amiri et al., 2018). The experimental group participated in a 2-day workshop guided by the *TeamSTEPPS*® curriculum while the control group did not receive any intervention (Amiri et al., 2018). Both groups completed the Persian version of the Hospital Survey on Patient Safety Culture, a 42-item questionnaire with 5-point Likert scale items, prior to the intervention and 3 months after the intervention (Amiri et al., 2018). The pre-test means from both groups were not

statistically different, however the posttest means in the experimental group were significantly higher than the control group ($p < 0.001$; Amiri et al., 2018). The experimental group demonstrated significantly higher scores in 5 out of 12 categories ($p < 0.001$) including teamwork within units, manager expectations and actions promoting patient safety, organizational learning and continuous improvement, communication openness, and handoffs and transitions (Amiri et al., 2018). On the other hand, there was no significant change in the control group mean scores (Amiri et al., 2018). This randomized control trial provides evidence that an educational intervention using *TeamSTEPPS*® can improve teamwork and collaboration among nurses while improving patient safety culture (Amiri et al., 2018).

Lisbon et al. (2016) conducted a study among multidisciplinary providers, within an emergency department, at an academic hospital to investigate whether interprofessional education combined with specific *TeamSTEPPS*® tools would increase the knowledge of *TeamSTEPPS*® principles, attitudes, and behaviors. The *TeamSTEPPS*® knowledge test and the AHRQ's Hospital Survey on Patient Safety were used to evaluate the effectiveness of the educational intervention (Lisbon et al., 2016). The multidisciplinary group consisted of 113 physicians, resident physicians, nurses, and ancillary personnel (Lisbon et al., 2016). All participants completed 4 hours of *TeamSTEPPS*® training including didactic instruction, video vignettes, and small group discussion (Lisbon et al., 2016). The 21 question *TeamSTEPPS*® knowledge test was completed by the participants prior to the training and 45 and 90 days after the training

(Lisbon et al., 2016). The results showed statistically significant improvement in *TeamSTEPPS*® knowledge ($p < .05$) on all 21 questions at Day 45 (Lisbon et al., 2016). At Day 90, the results showed sustained knowledge ($p < .05$), but no statistical improvement from day 45 (Lisbon et al., 2016). The Hospital Survey on Patient Safety demonstrated improved attitudes toward communication in all areas at Day 45 ($p < .05$) and remained consistent at Day 90 (Lisbon et al., 2016).

In a mixed-method pilot study, examining new nurses' assimilation into practice, researchers assessed the results of a *TeamSTEPPS*® implementation plan on 23 new nurses', at an urban academic teaching hospital, ability to function as a member of the healthcare team using a 20-item pre and posttest (Clapper et al., 2019). New nurses each participated in one five-hour *TeamSTEPPS*® training session followed by a simulation led by *TeamSTEPPS*® Master Trainers (Clapper et al., 2019). Participants were then given the opportunity to practice what they had observed through written case studies, video clinical cases, and high-fidelity simulation (Clapper et al., 2019). Nurses were assessed pre- and post-training on team performance and demonstrated higher scores in the post-assessment than on the pre-assessment (Clapper et al., 2019). Statistically significant scores on the posttest means compared to the pretest means ($p < 0.001$) were noted indicating that *TeamSTEPPS*® knowledge following the training sessions using an educational course, observation, and participation in simulation were beneficial in improving teamwork and collaboration (Clapper et al., 2019).

As previously discussed, Sonesh et al. (2015) conducted a quantitative, repeated measures study with obstetric nurses to assess the effectiveness of a team training intervention on improving the transfer of teamwork in obstetric emergencies. The primary emphasis of this study was to look at situation awareness, one component of the *TeamSTEPPS*® curriculum, to determine if decision making and patient outcomes were improved following education on *TeamSTEPPS*® strategies (Sonesh et al., 2015). Behavior observations demonstrated improved decision-making accuracy by 21.36% and following an analysis with a paired *t*-test between pre-intervention and post-intervention, a significant difference was noted (t (104) = 2.333, $p < .05$, Cohen's $d = .470$; Sonesh et al., 2015). Finally, patient outcomes were marginally improved, yet clinically significant, as evidenced by chart reviews showing a decreased length of stay for infants from 3.85 days (SD = 5.17) to 2.83 days (SD = 1.44, $p = .07$, Cohen's $d = .27$; Sonesh et al., 2015). This study demonstrated that education does have a positive influence on behaviors related to communication and teamwork to effect overall patient outcomes.

Falco and Balmer (2018) used *TeamSTEPPS*® and its tools as a lens from which to assess healthcare providers teamwork during inpatient rounds at a pediatric facility and found that teamwork education effects teamwork and communication. Barriers were faced in this study as physicians needed more education on the *TeamSTEPPS*® tools and often used grass roots routines that they had developed to round on patients (Falco & Balmer, 2018). These routines had difficulty aligning with teamwork tools suggested by the *TeamSTEPPS*® curriculum and some providers believed the tools were too rigid at

times (Falco & Balmer, 2018). However, the study revealed that education does affect teamwork and communication positively as it facilitates the identification of overlapping roles within a team and the importance of team collaboration to ultimately improve patient outcomes (Falco & Balmer, 2018).

A limitation of each of the quantitative studies presented is that none had a control group in their design. Without a control group it is difficult to ascertain the cause of the outcomes (Polit & Beck, 2012). A control group would have decreased the threat to their internal validity to identify whether the independent variable led the dependent variable (Polit & Beck, 2012). The studies discussed did not speak to the effect that maturation or pre-testing had on the study results. Attrition was addressed in that several study's final number of participants decreased as the number that initially took the pre-test did not complete the post-test and their data had to be removed from the overall study results. In summation, implementing a control group would have decreased threats to internal validity and thus increasing the strength of the studies reviewed.

Both educational interventions and simulation have been used to educate and evaluate healthcare providers' ability to improve teamwork and communication (Clapper et al., 2018). *TeamSTEPPS*® is the primary educational intervention utilized throughout the literature to assist healthcare providers in improving their teamwork and communication skills (Ballangrud et al., 2017). Following a triphasic educational model as suggested by the *TeamSTEPPS*® curriculum, researchers established that this curriculum can effectively guide a quality education program (Ballangrud et al., 2017).

Conflicting Evidence

Although research showed that knowledge of teamwork strategies and behavioral actions improved following interventions, situation judgment tests assessing for situation awareness did not improve (AHRQ, 2019; Amiri et al., 2018; Ballangrud et al., 2017; Clapper et al., 2018; Clapper et al., 2019; Falco & Balmer, 2018; Libson et al., 2016; Sonesh et al., 2015). In some situations, *TeamSTEPPS*® principles aligned with current teamwork practices in hospital settings, one study found that these principles may be too rigid to align with the reality of the everyday work environment (Falco & Balmer, 2018). Finally, despite evidence that *TeamSTEPPS*® strategies improve the healthcare team's ability to function effectively as a team, teamwork knowledge was not always significantly improved statistically (Kalisch et al., 2015).

Conclusion

Despite scant amounts of conflicting evidence found in the literature, education on teamwork and communication using the *TeamSTEPPS*® curriculum remains a viable option for improving nurses' ability to function effectively in teams. As the literature supports the implementation of *TeamSTEPPS*® training to improve teamwork and collaboration and effective teamwork being shown to minimize system errors, it can be concluded that *TeamSTEPPS*® training is applicable strategy to improve patient safety (Lisbon et al., 2016). However, there are several gaps in the literature that exist. First, after leveling the evidence it is apparent that there is a need for research studies with stronger internal validity to increase the level of evidence. Using the Johns Hopkins

Nursing Evidence-Based Practice Evidence Level and Quality Guide (2018), it was noted that the majority of the literature was classified as level III B or C (see Appendix D) indicating that there is a lack of strength and/or experimental designs in the published research supporting the use of *TeamSTEPPS*® interventions, Another gap is the lack of studies focusing solely on implementing *TeamSTEPPS*® strategies with only nurses. Since nurses make up the bulk of the healthcare workforce, it is important to investigate nurses' attitudes toward teamwork and collaboration while working within the healthcare team as nurses play a significant role in the health outcomes of patients. Implementing a quasi-experimental study with a control group focusing on *TeamSTEPPS*® strategies to improve teamwork and collaboration will add strength to the body of research. Hence, ongoing research is needed to gather strong evidence regarding the effects of team training programs as educators must use outcomes to justify training (Clapper et al., 2018). Further development and evaluation of the integration of educational interventions is important to the safety of all patients. The *TeamSTEPPS*® curriculum has been tested and validated and is therefore a solid starting point for the development of educational interventions to improve teamwork and communication to positively affect the safety of patients in the healthcare environment.

CHAPTER IV

METHODOLOGY

Procedure For Collection And Treatment Of Data

The purpose of this 2-group quasi-experimental study was to evaluate the effects of an educational intervention, using the *TeamSTEPPS*® curriculum from the AHRQ, on nurses' attitudes toward teamwork and collaboration. Quasi-experimental studies are intervention studies that are done when there is an inability to randomly assign participants to study groups. With a 2-group quasi experimental design, the intervention group received education concerning teamwork and collaboration, while the comparison group received education on the identification and prevention of workplace bullying. Both groups completed the same pretest, posttest, and 12-week posttest (T-TAQ; see Appendix E). This chapter presents the chosen methods and design for this 2-group quasi experimental study.

Pilot Study

A pilot study was conducted to test the implementation and data collection for this research experiment. A total of five participants were recruited during the pilot, three from obstetrics and two from the intensive care unit. The obstetrics unit was assigned to the intervention group and the intensive care unit was assigned to the comparison group. Due to the small sample size, the researcher was not able to analyze the results, however several things were learned during the piloting process. First, the initial time allotment of

eight hours for the workshops was too long. Four fifteen-minute breaks were scheduled throughout the eight hours with an additional 45 minutes allowed for lunch. It was discovered that this amount of time was not needed. After reviewing the schedule, the researcher was able to decrease the amount of time to approximately six hours to cover the content. The other lesson learned from the piloting experience was that alternate times of the day and week need to be offered for the workshop to meet the needs of the nurses and improve participation. Finally, more time and effort were needed for the recruitment process with the inclusion of text message reminders and updates to reach the participants and keep their interest level high.

Setting

The setting was a 125-bed hospital in South Central Texas with 5,300 admissions annually serving more than 144,750 residents of the county and surrounding areas through in-patient care, the emergency department, outpatient treatments, and its birthing center. The facility had five inpatient units that employed nurses including medical, surgical, inpatient rehabilitation, intensive care, and obstetrics and three outpatient units including the emergency department, endoscopy, and the operating room. For this study, the intensive care unit and obstetrics were excluded as these two units participated in a pilot for this study. The units that were part of the setting are medical, surgical, inpatient rehabilitation, the operating room, emergency department, and endoscopy.

Population and Sample

The target population for this study was licensed nurses within the selected hospital, including nurses from the medical unit, surgical unit, inpatient rehabilitation, operating room, endoscopy, and emergency department. A convenience sample was drawn from the target population. Interested participants were screened for inclusion and assigned to the intervention or the comparison group based on their primary unit of employment. Inclusion criteria included that participants must be:

1. A current Registered Nurse or Licensed Practical Nurse with an unencumbered license in the state of Texas.
2. Employed at the selected facility and work at least 20 hours per week.
3. Employed at the selected facility for at least 90 days.

The rationale for using nursing units versus mixing participants among different units is that physically separating units will minimize the risk of contamination between the intervention and the comparison groups. After reviewing the current literature for studies with similar designs, a randomized controlled trial using the *TeamSTEPPS*® curriculum was identified that had an effect size of 0.5, power of 0.80, and an alpha of 0.05 (Amiri et al., 2018). Based on this information and applying the same effect size, it was determined that the minimum sample size is 64 participants per group for a total of 128 participants.

Protection of Human Subjects

This study was approved by the Institutional Review Board at Texas Woman's University as an exempt educational study. Prior to initiating the study, study procedures were reviewed with each participant and a study consent form was signed. There were two potential threats to participants that were identified. First was a loss of time. The time commitment for the workshop was 6 hours and 15 minutes. The principal investigator (PI) adhered closely to this time frame to ensure that participants were not kept any longer than the allotted time. Participants were notified prior to starting the study what the expected time commitment was to be well informed. Second, there was a risk of loss of confidentiality. In order to protect the participants from this risk, no identifying data was collected as part of the pretest-posttest results. Each survey was coded with a unique number to correspond with the matching pre and posttests. The PI was the only person with access to the code sheet which will be kept in a locked file cabinet in the PI's office. Following each of these steps minimized the risk to all study participants.

Instruments

Two instruments were used for data collection, a demographic form and the *TeamSTEPPS*® Teamwork Attitudes Questionnaire. The demographic form was completed prior to participation in the education interventions. It was coded with numbers that correlate with the data from the T-TAQ. The demographic form included questions addressing age, years of experience, hours worked per week, years employed at the current facility, and their current unit of employment (see Appendix F).

The T-TAQ is a 30-item 5-point Likert style instrument that measures individual attitudes related to team structure, leadership, mutual support, situation monitoring, and communication that have all been shown to play a significant role in maintaining patient safety (see Appendix E). Participants were asked to rate their level of agreement, from strongly agree to strongly disagree, on each of the five subscales. The responses from each questionnaire were coded and scored. The instrument was administered immediately before and after the educational workshops and again 12-weeks after completion of the workshop. The T-TAQ is considered a reliable instrument based on Cronbach alpha scores ranging from .70–.83 (Baker, Krokos, & Amodeo, 2008). Content validity of the T-TAQ has been established through multiple factors including an extensive item-writing process with experienced item writers in teamwork and *TeamSTEPPS*® process and linkage of each item to specific *TeamSTEPPS*® curriculum modules with specific page numbers (Baker et al., 2008).

Data Collection

Prior to implementation of the intervention, the PI met with hospital administration and unit managers from all units, except for the two units that were included in the pilot study, explained the study protocol, and requested attendance at staff meetings to recruit participants for the study. Due to inconsistencies of when staff meetings occurred, the unit managers requested to inform their staff individually about the study and provide them with information for registration. The PI also received permission to post fliers on the units and went to each unit to recruit staff. Staff nurses

were informed about the study, were offered the opportunity to provide the PI with their contact information so that a screening tool, to be completed via Google forms, could be sent via email and text to determine their eligibility to participate. The screening tool asked five questions, including how long they have worked at their current place of employment, their unit of employment, highest level of education, and best contact method, to determine eligibility for participation.

Each of the units included in the study were randomly assigned to the intervention or the comparison group using a computerized random assignment generator. When eligibility was determined, participants were notified by email and text with more detailed information about the workshops and they had the opportunity to sign up for one of four workshop dates that were offered per topic. Multiple workshop dates and times per topic were offered to accommodate a variety of schedules. Once the final sample was identified, reminder emails and texts were sent out twice a week until 24 hours prior to the workshop. One incentive for participation was that 6.05 contact hours were offered for attendance at no expense to the participant.

The intervention group participated in an interactive workshop guided by the *TeamSTEPPS*® curriculum from the Agency for Healthcare Research and Quality and the Department of Defense developed to improve teamwork and patient safety. The tool was established using team performance and teamwork research as well as systems-based error prevention. The competencies of leadership, situation monitoring, mutual support,

and communication, served as the foundation for the curriculum to improve team performance, encourage safer practices and culture change.

The comparison group participated in an interactive workshop on the identification and prevention of workplace bullying; a significant problem in nursing that that has been recognized for more than two decades (Embree, Bruner, & White, 2013). Supportive relationships among nurses is an important factor in maintaining safe patient care; bullying can be detrimental to these relationships (Pfeifer & Vessey, 2017). The curriculum for the bullying workshop, the *Civility Toolkit*, was developed by a task force with the Robert Wood Johnson Foundation to help-nurses identify and prevent bullying in the workplace (PACERS, 2015). Participants in the comparison group took the T-TAQ before and after the educational intervention as described in the experimental group, to determine whether their attitudes toward teamwork and communication changed despite not participating in the *TeamSTEPPS*® workshop.

Each workshop was conducted by the PI who is a Registered Nurse with 22 years of experience as a nurse and holds a master's degree in nursing education. The researcher spent the last year developing an in-depth knowledge of the *TeamSTEPPS*® curriculum. During the workshops, all participants completed the T-TAQ and a demographic form before beginning the educational intervention or the comparison group intervention. The intervention group participated in a workshop with six hours of education using the *TeamSTEPPS*® curriculum as a guide. The comparison group participated in a workshop with six hours of education on workplace bullying. Immediately following the

educational intervention, both groups retook the T-TAQ. Finally, 12 weeks after the intervention both groups were electronically sent the T-TAQ through Psych Data to identify if a change in attitude has occurred since completing the first posttest following the teamwork and bullying educational workshops.

Treatment of Data

Data from the surveys were entered in SPSS and saved on an encrypted jump drive and an external hard drive. These two devices were kept in a locked file cabinet in the PI's office. The pretest scores were analyzed for significance between the two groups and if no significance was noted, these scores will not be included in the final analysis. Following completion of the immediate and 12-week posttests, repeated measures of variance (ANOVA) was run between the intervention and the comparison groups to assess for differences in the mean scores between the two groups. If the pretests were significant, then a repeated measures of co-variance (ANCOVA) using the pretest as the covariate would have been run to assess for significance among posttest measures. Then the results between the two groups were compared for differences between groups. Demographic frequencies from both groups were analyzed to better understand the population sample.

Chapter V

EVALUATING THE EFFECTS OF AN EDUCATIONAL INTERVENTION ON NURSES 'ATTITUDES TOWARD TEAMWORK AND COMMUNICATION USING *TEAMSTEPPS*®: A QUASI-EXPERIMENTAL STUDY

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Abstract

Objectives: The purpose of this study was to determine if an educational intervention using the *TeamSTEPPS*® curriculum improved nurses' attitudes toward teamwork, communication, and patient safety.

Methods: Using a quasi-experimental design, nurses (N = 69) from six patient care units were randomly assigned by unit to an intervention group or a comparison group. The intervention group participated in a 6-hour workshop on teamwork and communication guided by the *TeamSTEPPS*® curriculum and the comparison group participated in a 6-hour workshop on bullying and incivility guided by the Civility Toolkit from the Robert Wood Johnson Foundation.

Results: The overall mean scores on the *TeamSTEPPS*® Teamwork Attitude Questionnaire (T-TAQ) improved within groups from pre-test (Intervention group M = 123.18, SD = 8.85; Comparison group M = 123.67, SD = 8.29) to posttest (Intervention

group M = 130.09, SD = 7.91; Comparison group M = 130.25, SD = 8.81) ($p < .001$). However, there was no significance ($p > .05$) found between groups and the 12-week posttest scores were not sustained at the level of the posttest.

Conclusions: Educational interventions have the potential to improve nurses' attitudes toward patient safety although more work needs to be done. Increased focus on the development of educational interventions that will achieve improved teamwork and communication among nurses has the potential to positively influence the safety of patients.

Introduction

Nurses are the largest group of providers in the healthcare industry and have more contact with patients than any other healthcare providers (US Department of Labor, 2018). While caring for patients, nurses must continually strive to maintain a safe environment. One-way nurses work to maintain patient safety is through communication with healthcare professionals and functioning as a team member. Teamwork and communication are important factors in maintaining patient safety and improving patient outcomes. In healthcare, teamwork demands reliable communication, cooperation, and coordination to maintain safe patient care (Gluyas, 2015). In the past, safety, in general, and teamwork and communication specifically have been lacking in nursing education (Bedgood & Mellott, 2018). Without adequate emphasis on patient safety in nursing education focusing on teamwork and communication, nurses may enter the workforce lacking the skills necessary to effectively communicate and work in teams. As a result, there are implications for educating nurses in these areas to improve patient safety.

Over the past two decades, healthcare has emphasized patient safety at the organizational, national, and international levels to improve overall health outcomes for patients (Bedgood & Mellott, 2018; Tella et al., 2015). Healthcare providers share the common goal of error prevention resulting in increased concentration on patient safety. To *Err is Human,* a report issued by the IOM in 1999, underscored the significance of errors made in the healthcare setting (Bedgood & Mellott, 2018; Jones, 2013; Kohn et al., 2000). In 2005, the Quality and Safety Education for Nurses (QSEN) initiative was

started in the United States to improve the integration of quality care and patient safety in nursing through developing nurses' knowledge, skills, and attitudes towards patient safety (Bedgood & Mellott, 2018; QSEN, 2018). The QSEN initiative delineated six areas of focus: (1) Patient-Centered Care, (2) Teamwork and Collaboration, (3) Evidence-Based Practice, (4) Quality Improvement, (5) Safety, and (6) Informatics (QSEN, 2018). Within each of these categories, individual competencies were established to facilitate educators in the process of evaluating nurses' and nursing students' knowledge, skills, and attitudes toward patient safety (QSEN, 2018).

The IOM and the QSEN initiatives generated an increasing emphasis on assessment and evaluation of patient safety culture in nursing in which there are shared values and beliefs within an organization that guide safe patient care (QSEN, 2018; Singer et al., 2009). There are seven subcultures within patient safety culture including teamwork and communication (Sammer, Lykens, Singh, Mains, & Lackan, 2010).

Integral subcultures within patient safety, teamwork and communication, should be developed to maintain a safe environment for all patients (Sammer et al., 2010). Because nurses spend significant time in direct patient care, they have the unique opportunity to ensure that patients are safely cared for through effective communication and teamwork (Bedgood & Mellott, 2018). Educators and healthcare administrators should not assume that nurses possess the tools to effectively communicate and work in teams but should share the responsibility for safe patient care through intentionally teaching patient safety concepts, such as communication, emphasizing the importance of

teamwork and system safety while guiding nurses to develop a culture of safety (Cronenwett et al., 2007; Jones, 2013; Vaismoradi, et al., 2011).

With approximately 50,000 inpatient nursing teams in the US, nursing teams affect the safety and quality of patient care (Kalisch et al., 2015). In 2015 The Joint Commission identified poor communication as the third leading root cause for medical errors in healthcare (Joint Commission, 2017). Therefore, poor teamwork and communication have a significant role in sentinel events where preventable errors occurred (Hughes et al., 2016; Joint Commission, 2014). Team training is one strategy identified to assist nurses and healthcare providers in developing the teamwork and communication skills necessary to provide safe patient care and decrease preventable medical errors (Blakeney et al., 2018; Clapper et al., 2019; Hughes et al., 2016). With continued medical errors, more work needs to be done to assist nurses in improving teamwork and communication skills (Joint Commission, 2014).

Recognizing a need in education, the Agency for Healthcare Research and Quality (AHRQ) and the Department of Defense tested and developed the *TeamSTEPPS*® curriculum to address the assessment, education, and evaluation processes for teamwork and communication among healthcare providers and other high reliability organizations. The *TeamSTEPPS*® curriculum has been tested and utilized in healthcare, aviation, military operations and nuclear power (AHRQ, 2019). This curriculum promotes individual and organizational reflection on current teamwork and communication practices, educates individuals on the standards of effective teamwork and

communication while providing tools to improve personal standards, and evaluates the effectiveness of education on teamwork and communication to improve overall safety. This study assessed the effectiveness of the *TeamSTEPPS*® curriculum for improving staff nurses' attitudes towards teamwork and communication.

The reciprocal safety culture model, adapted from Bandura's conceptual model of reciprocal determinism, provided a framework for this study (Cooper, 2000). Cooper's (2000) model focuses on the multidirectional interactions of individuals, the environment, and the behaviors of individuals making safety culture more quantifiable. Hence, individuals learn behaviors from others, model these behaviors, reflect on their actions and adapt learned behaviors as their self-efficacy increases (Cooper, 2000). The findings of this study have implications for educational strategies to improve teamwork and communication, occurring at the organizational level.

Methods

This quasi-experimental study investigated whether an educational intervention, using the *TeamSTEPPS*® curriculum, would improve nurses' attitudes toward teamwork, communication, and patient safety. The study occurred from August 2019 through January 2020 using a convenience sample from six nursing units at a county hospital in South Central Texas. The intervention group participated in education concerning teamwork and collaboration guided by the *TeamSTEPPS*® curriculum, which was developed by the AHRQ and Department of Defense. The comparison group received education on the identification and prevention of workplace bullying. The curriculum for

the bullying workshop, the *Civility Toolkit*, was developed by a task force with the Robert Wood Johnson Foundation to assist nurses in identifying and preventing bullying in the workplace (PACERS, 2015). The curriculum for the intervention and comparison group as well as the research tool are accessible for free use in the public domain. Both groups completed the *TeamSTEPPS*® Teamwork Attitudes Questionnaire (T-TAQ) as a pretest, posttest, and 12-week posttest. A comparison group was used to improve the primary investigator's ability to better assess if the study outcome of attitudes about teamwork, communication, and patient safety was related to the *TeamSTEPPS*® intervention. Many studies in the literature lack a control group which potentially affects the internal validity of the studies.

Each workshop was conducted by the principal investigator who is a registered nurse with 22 years of experience and holds a master's degree in nursing education. The researcher spent the year prior to implementation developing an in-depth knowledge of the *TeamSTEPPS*® curriculum.

Participants/Setting

The setting was a 125-bed hospital in South Central Texas with 5,300 admissions annually serving more than 144,750 residents of the county and surrounding areas. The facility has five inpatient units including medical, surgical, inpatient rehabilitation, intensive care, obstetrics, and three outpatient units including the emergency department, endoscopy, and the operating room. Participants in this study were nurses selected from medical, surgical, inpatient rehabilitation, the operating room, emergency department,

and endoscopy units. The obstetrics and critical care units were excluded because they had previously participated in a pilot for this study. To minimize the risk of treatment diffusion influencing interested study participants, nursing units were randomly assigned, versus individuals, to either the intervention or comparison group after being screened for inclusion. Inclusion criteria included that participants were:

1. A current Registered Nurse or Licensed Practical Nurse with an unencumbered license in the state of Texas.
2. Employed at the selected facility and work at least 20 hours per week.
3. Employed at the selected facility for at least 90 days.

After reviewing the current literature for studies with similar designs, a randomized controlled trial using the *TeamSTEPPS*® curriculum was identified that had an effect size of 0.5, power of 0.80, and an alpha of 0.05 (Amiri et al., 2018). Based on this information and applying the same effect size, it was determined that the minimum sample size needed to achieve a similar power and effect was 64 participants per group for a total of 128 participants. While this study only recruited 69 participants, an effect size of 0.89 was achieved within groups.

Instrumentation

Two instruments were used for data collection, a demographic form and the T-TAQ tool. The demographic form assessed age, years of experience as a nurse, years employed at the selected healthcare facility, current unit of employment, and months on

their current unit. The T-TAQ is a 30-item 5-point Likert style instrument that measures individual attitudes of nurses on five subscales: Team Structure, Leadership, Mutual Support, Situation Monitoring, and Communication. These facets have been shown to play a significant role in maintaining patient safety. Participants were asked to rate their level of agreement from strongly agree to strongly disagree.

The T-TAQ is considered a reliable instrument based on Cronbach alpha scores ranging from .70–.83 (Baker et al., 2008). Content validity of the T-TAQ has previously been established through an extensive item-writing process with experienced item writers in teamwork and process, and linkage of each item to *TeamSTEPPS*® curriculum modules with specific page numbers (Baker et al., 2008). The responses from each questionnaire were coded and scored. Four items were reverse coded because they were negatively worded.

Data Collection

Following approval from the Texas Woman's University Institutional Review Board and permission from the health care facility, study implementation began. The principal investigator randomly assigned the units to either the intervention or the control group using a free online random generator. Once the units were assigned to a group, the principal investigator met with hospital administration and directors from all units to explain the study protocol and requested to recruit participants for the study. Hospital administration payed participants for an education day for study participation and they were given 6.05 contact hours from the Texas Nurses Association at no cost. The

principal investigator informed nurses about the study through word of mouth, on the ground recruitment, as well as fliers posted on the units. Interested participants were encouraged to register for participation through the Google Forms platform. The screening tool was used during registration to identify if potential participants met inclusion criteria for participation. Based on eligibility determination, the registration process was completed.

Following registration, participants were notified by email and text with more detailed information about the workshops and were given the opportunity to sign up for one of four workshop dates that were offered per group. Multiple workshop dates and times per topic were offered to accommodate a variety of schedules. When the final sample was identified, reminder emails and texts were sent out twice a week until 24 hours prior to the workshop.

The intervention group participated in an interactive 6-hour workshop guided by the *TeamSTEPPS*® curriculum developed to improve teamwork, communication, and patient safety. The competencies of leadership, situation monitoring, mutual support, and communication, served as the foundation for the curriculum to improve team performance, encourage safer practices, and culture change. The comparison group participated in an interactive 6-hour workshop on the identification and prevention of workplace bullying; a significant problem in nursing that that has been recognized for more than two decades (Embree et al., 2013). Participants in the both groups took the T-TAQ before and after education to determine whether their attitudes toward teamwork

and communication had changed. Finally, 12 weeks after the intervention both groups were electronically sent the T-TAQ, through Psych Data, to identify if a change in attitude had occurred since completing the first posttest.

Data Analysis

Following completion of the 12-week posttests, data were cleaned to identify impossible and missing values. Reliability using Cronbach's alpha showed good inter-item consistency for the total scale ($\alpha = .77$) and all subscales ($\alpha s = 0.60–0.85$; Table 1). Then, the sum scores for the total scale and subscales were computed. A series of independent t-tests were used to compare baseline variables between the two groups, and there was no significant difference at baseline between the groups. Therefore, repeated measures analysis of variance (ANOVA) were conducted to examine the changes on total scale and subscales between intervention and comparison groups across three time points. All analyses were completed in SPSS v 25.

Results

A total of 69 nurses from six different units at a hospital in South Central Texas participated in either the intervention or comparison group. Of the 69 participants that started out in the study, the final sample included 64 nurses from six nursing units with an attrition rate of 7% and a 92.7% completion rate as five participants did not return the 12-week posttest. There were 33 participants in the intervention group and 36 in the control group. Of the study participants, 63 nurses (91.3%) were female and six nurses (0.86%) were male. The mean age of the participants was 41.20 (SD = 11.79) with a

median age of 41. There was one outlier for age at 72 years of age. The participants had a mean of 11.13 (*SD* = 9.04) years of experience as a nurse with a median of 8 years of experience. The mean hours worked per week was 39.13 (*SD* = 8.77) hours with a median of 40 hours worked per week.

Table 1

Reliability testing at baseline for total score and each subscale

	Total Number of Items per Scale	***Cronbach Alpha***
Total Score	**30**	**.77**
Team Structure Subscale	**6**	**.60**
Leadership Subscale	**6**	**.64**
Situation Monitoring Subscale	**6**	**.85**
Mutual Support Subscale	**6**	**.65**
Communication Subscale	**6**	**.68**

Repeated measures ANOVA was run comparing the intervention and the comparison groups to assess the impact of the educational intervention on participant's scores on the T-TAQ at three different time points (pre-intervention, posttest, and 12-week posttest). When the ANOVA was run there were no significant differences ($p > .05$) at any time points between the intervention and comparison groups. However, when

examining the within group scores there was a significant difference between time of T-TAQ administration $f(2,61) = 25.23$, ($p < .001$) within groups. Post hoc testing using the Least Significant Difference test was conducted to determine differences between any two time points and revealed that there was an overall effect for time between the pretest and the posttest, however there was no effect between the posttest and the 12-week posttest. Specifically, for the intervention group the score significantly increased from baseline ($M = 4.52$, $SD = 0.35$) to posttest ($M = 4.73$, $SD = 0.24$), but the elevated score was not sustained at 12-week follow up ($M = 4.60$, $SD = .26$). The same findings were also observed in the comparison group (see Figure 1). Regardless of the intervention, both groups improved their posttest scores taken immediately after the education event and then experienced score decline at 12 weeks.

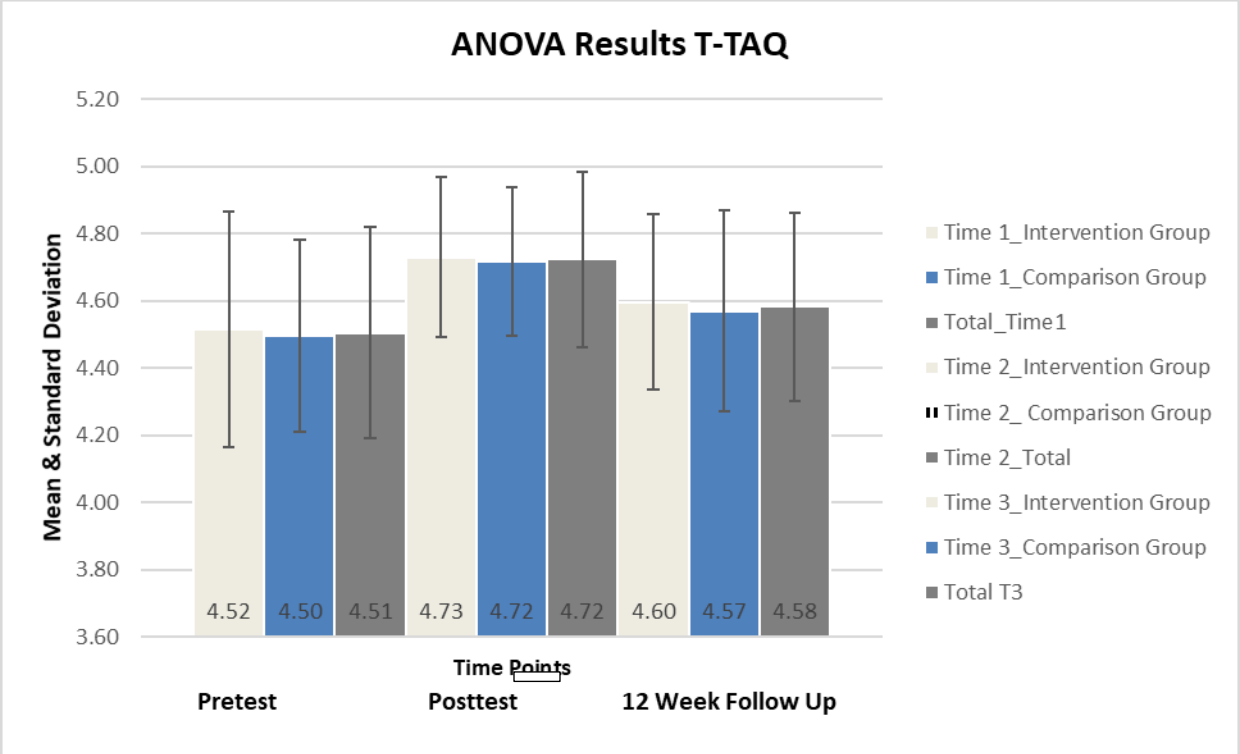

Figure 1. ANOVA results for the total T-TAQ scores showing M, SD, and changes of these scores at each time point.

The T-TAQ is divided into five subscales including Team Structure, Leadership, Situation Monitoring, Mutual Support, and Communication. Higher scores on each subscale indicates better attitudes. Repeated measures ANOVA was conducted on each of the five subscales. The results indicate that the Team Structure subscale showed no change in scores from pretest (M = 4.70, SD = 0.38) to posttest (M = 4.70, SD = 0.38) and then a slight decline on the 12-week posttest (M = 4.56, SD = 0.44; see Figure 2). Despite no significant change in scores on Team Structure, the scores for this subscale were high to begin with, in both groups, indicating that nurses generally had a positive attitude toward team structure.

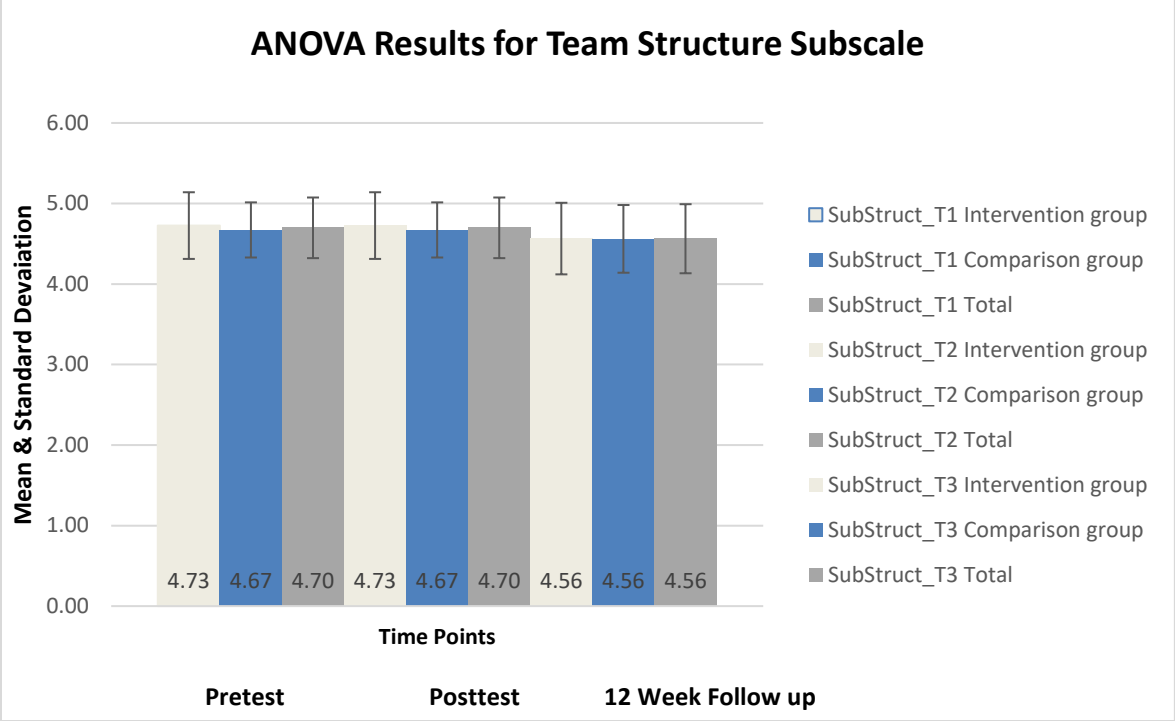

Figure 2. ANOVA results for the Team Structure Subscale showing M, SD, and changes of these scores at each time point.

Conversely, the Leadership subscale showed improvement from pretest (M = 4.65, SD = 0.29) to posttest (M = 4.85, SD = 0.29) with a slight decline on the 12-week posttest (M = 4.72, SD = 0.31), but this decline did not fall below the pretest scores indicating that improvement in attitudes toward leadership were maintained above baseline attitudes within groups (see Figure 3).

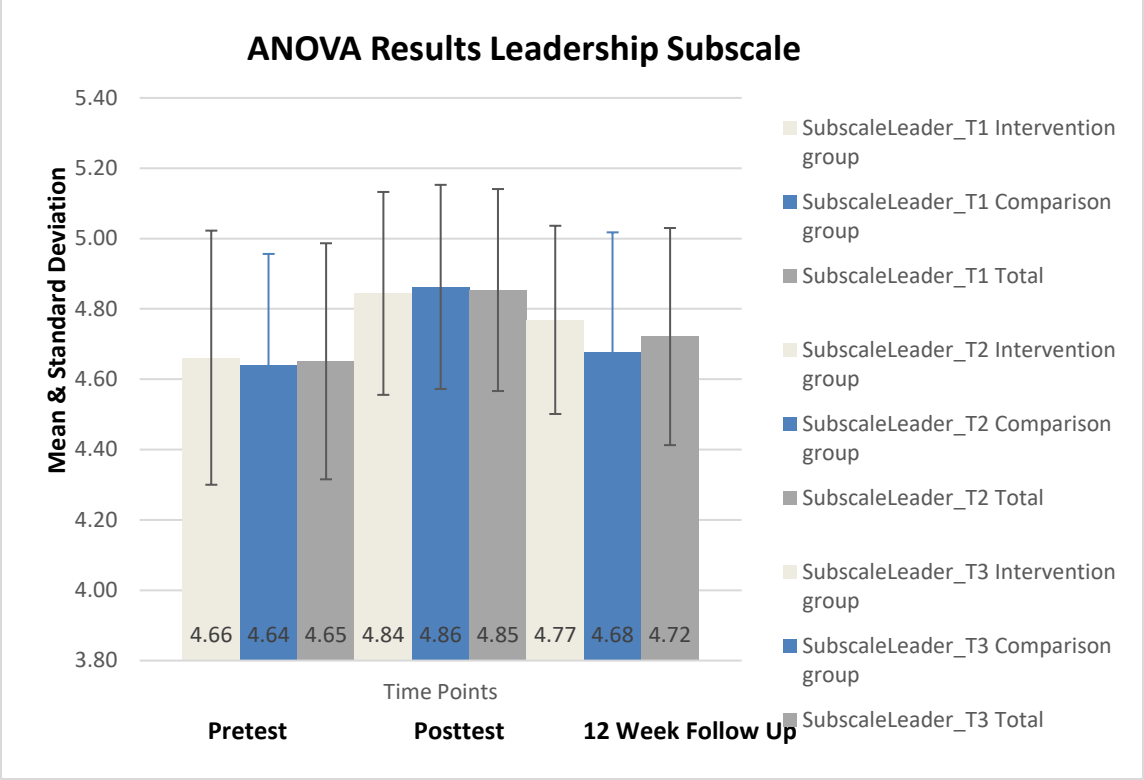

Figure 3. ANOVA results for Leadership Subscale showing M, SD, and changes of these scores at each time point.

The Situation Monitoring subscale was assessed and showed a slight improvement from pretest (M = 4.54, SD = 0.44) to posttest (M = 4.83, SD = 0.26) and then a slight decline on the 12-week posttest (M = 4.66, SD = 0.40; see Figure 4). As with the Leadership subscale, the 12-week posttest results for situation monitoring declined however they did not fall below the pretest scores in both groups showing retention of improved attitudes by the participants.

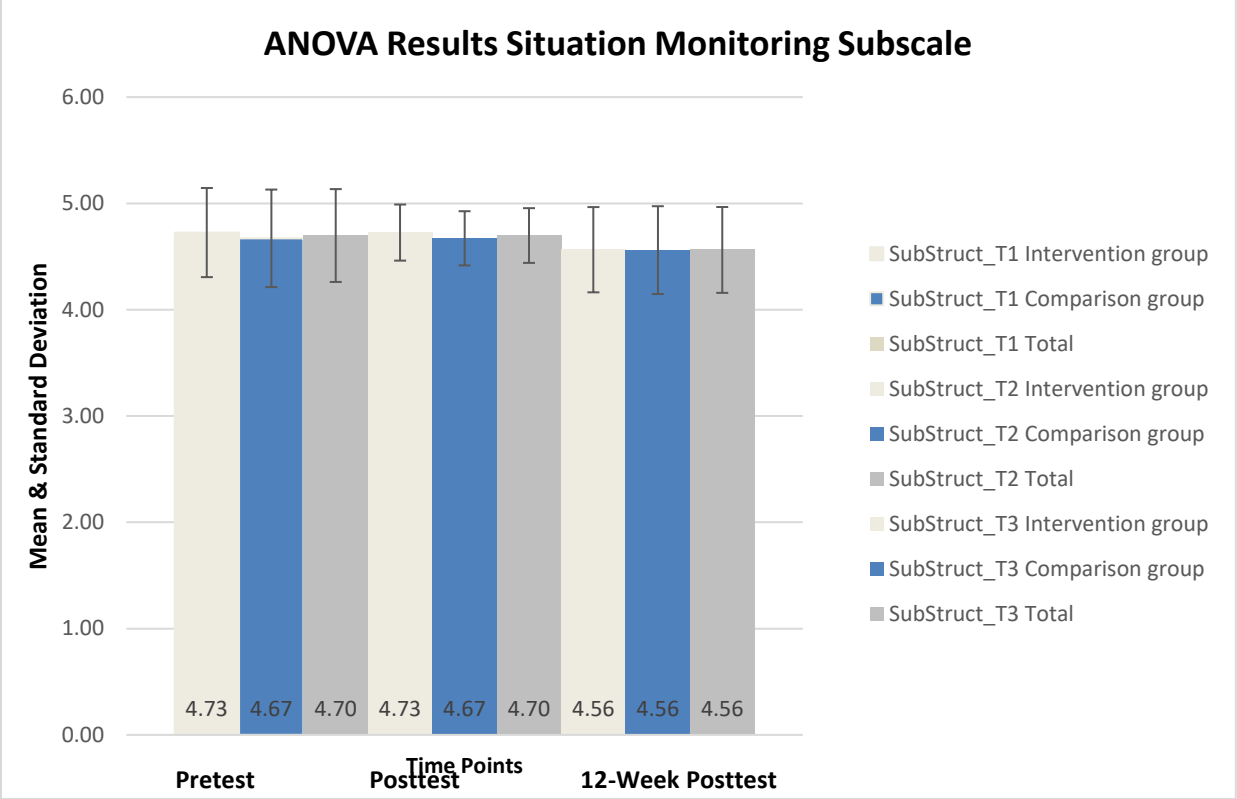

Figure 4. ANOVA results for the Situation Monitoring Subscale showing M, SD, and changes of these scores at each time point.

On the Mutual Support subscale, pretest scores increased (M = 4.54, SD = 0.44) from baseline to the posttest (M = 4.83, SD = 0.26) and then slightly declined on the 12-week posttest (M = 4.66, SD = 0.40) although they did not fall below the baseline results in either group (see Figure 5).

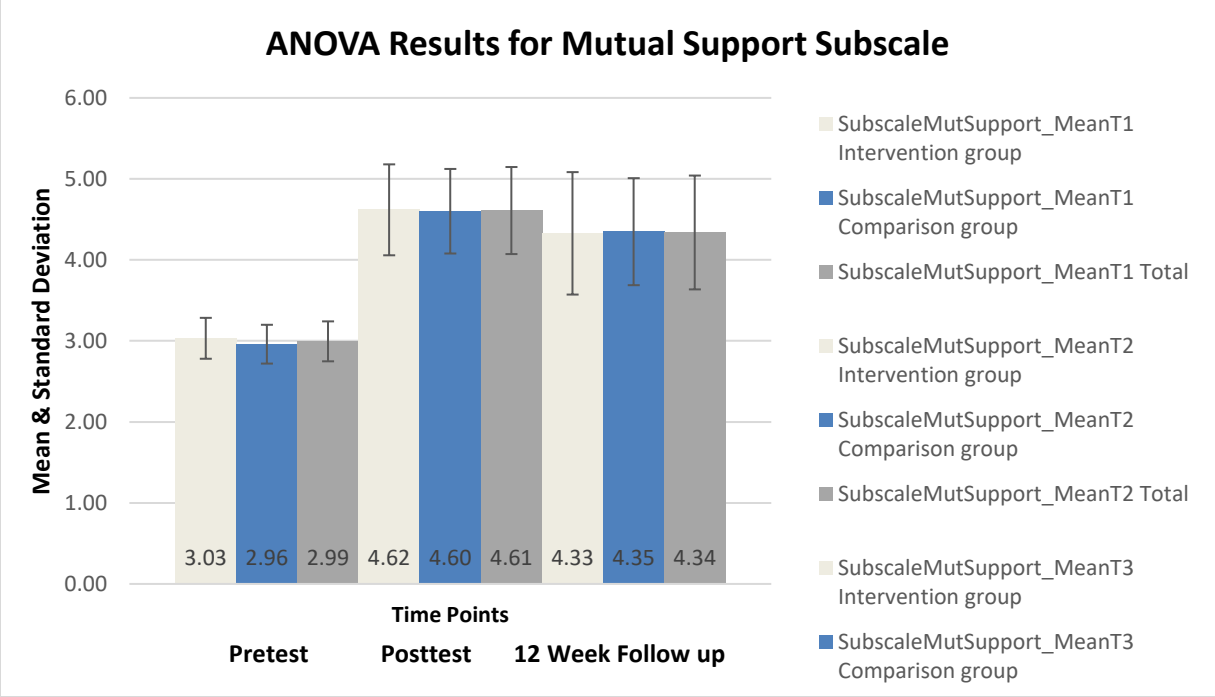

Figure 5. ANOVA results for the Mutual Support Subscale showing M, SD, and changes of these scores at each time point.

Finally, the Communication subscale showed similar trends except that the 12-week posttest (M = 4.35, SD = 0.43) fell below the pretest mean (M = 4.35, SD = 0.36) while there was a slight increase on the posttest for both groups (M = 4.64, SD = 0.37; see Figure 6).

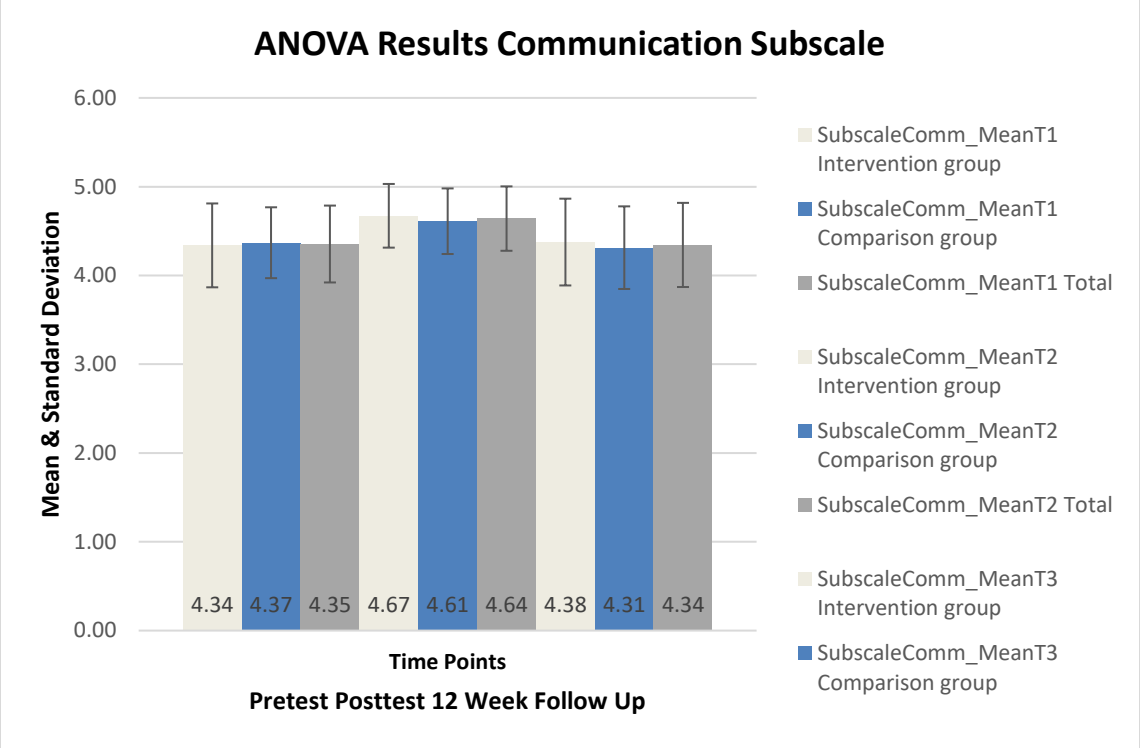

Figure 6. ANOVA results for the Communication subscale showing M, SD, and changes of these scores at each time point.

Discussion

In this study, an educational intervention aimed at improving nurses' attitudes toward teamwork and communication was investigated. Overall, findings indicated that nurses' attitudes are affected by education, but that it might be difficult to maintain improved attitudes over time with a one-time educational intervention. Ongoing support for improved teamwork and communication is supported by the reciprocal safety culture model which highlights the importance of multidirectional interactions of the individual, the environment, and behaviors that result in safety culture change (Cooper, 2000). According to this framework, nurses must learn behaviors from others, model these

behaviors, then have time to reflect on their actions while adapting the learned behaviors (Cooper, 2000). All nurses in this study, regardless of participating in the intervention or comparison group, demonstrated positive attitudes toward teamwork from the outset and showed improvement in overall posttest T-TAQ scores for the Leadership, Situation Monitoring, Mutual Support, and Communication subscales. Although there were declines in attitude scores on the 12-week posttest, only the communication subscale fell below the initial pretest score. Based on analysis of all data, there is a need to continue work on the development of an educational intervention that will strengthen the retention of nurses' attitudes toward patient safety to have lasting effects.

The findings suggest that education can improve nurses' attitudes toward patient safety concepts as noted by improvement in overall mean scores on the T-TAQ from pretest to post-test. However, the posttest scores were not sustained in the 12-week posttest indicating that in order to maintain improved attitudes about teamwork and communication, an intervention needs to be designed that is multifaceted with ongoing reinforcement past the 6-hour workshop. Although there was a moderate effect size within groups (d = .45) for this intervention, there was no effect between groups noted.

The data analysis revealed there was an improvement in nurses' attitudes toward teamwork and communication although the educational intervention was only moderately impactful on nurses' attitudes. However, time of exposure to the T-TAQ was significant ($p < .001$). As nurses were exposed to the content in the questionnaire during the pre-test, it is possible that attention was drawn back to basic principles of patient safety, which

then affected their responses on the posttest with only moderate impact stemming from the educational intervention. Consequently, the participants in the comparison group showed similar results which might indicate that exposure to the pretest was partly a result of the increase in scores from pretest to posttest. Another explanation regarding score improvement for both groups is that there may have been some overlap in concepts presented in the *TeamSTEPPS*® workshop and the bullying workshop which may have also resulted in score improvements in the comparison group.

Education on teamwork and communication to improve patient safety is needed, although how education is delivered needs further investigation. It is difficult to encourage nurses to participate in lengthy educational interventions as it takes them away from direct patient care. Despite offering free contact hours and educational pay from the healthcare organization, it remained difficult to recruit nurses into this study.

Based on the study findings and anecdotal reports from participants, nurses do believe that teamwork and communication are important in maintaining safe patient care. Nurses also understand the importance of keeping patient's safe, however discovering the best way to teach nurses on improving teamwork and communication remains a challenge as they have busy work schedules and it is difficult to recruit participants for a 6-hour workshop. Also, attitudes are not easily changed through an isolated event, but may take time to change with continuous reinforcement of patient safety concepts over an extended period that is congruent with Cooper's (2000) reciprocal safety culture model. This study has implications for further research including developing educational interventions that

are consistent, ongoing, and easy for nurses to access. It is critical to have administrative support and reinforcement to create a lasting change in attitudes regarding teamwork and communication (Amiri et al., 2018). It is important to note that despite administrative support for this study, only one administrative representative participated. Nurses need to see administrative presence and participation in teamwork and communication initiatives to support individual attitude changes.

There were several limitations of this study. These limitations included the small sample size obtained, self-reporting, and time commitment (Polit & Beck, 2012). The single study site had a small number of nurses in comparison to sampling nurses from a variety of organizations. There were approximately 229 nurses working in direct patient care at the selected facility, resulting in a smaller population to sample. This study involved a 12-week posttest which may have decreased the group's comparability (Polit & Beck, 2012). To minimize this limitation, the researcher utilized multiple modes of follow up to encourage participants to complete their final posttest such as email, text, and telephone reminders.

As with any pretest/posttest design, there is a risk for the pretest to influence the results of the posttest. According to Polit and Beck (2012), this is especially prevalent when testing attitudes. Given that the proposed research study investigated nurses' attitudes toward teamwork and communication, this was likely a study a limitation. Another limitation was that participants were self-reporting their attitudes towards teamwork and communication. Self-reporting could have resulted in inflated or deflated

results on the T-TAQ. Finally, due to the nature of the educational curriculum for the intervention and comparison groups, participants were required to attend a 6-hour workshop and complete a 12-week posttest. Although increased time with the participants may improve the richness of the intervention, time away from direct patient care may have limited the number of nurses willing to participate in the study. The results indicate that the curriculum made a difference in nurses' overall attitudes toward teamwork and communication despite both groups scores decreasing on the 12-week posttest. To sustain attitudinal change, ongoing reinforcement in nurses' everyday workload is needed.

Conclusions

This research study focused on educating nurses on teamwork and communication to improve nurses' attitudes towards patient safety. The *TeamSTEPPS*® curriculum used to educate nurses in this study was effective in improving nurses' attitudes about teamwork, communication, situation monitoring, mutual support, and leadership. The same results were noticed in the comparison group likely as a result of over lapping of the *TeamSTEPPS*® and the identification and prevention of bullying curriculum's focus on communication strategies. Despite nurses' inability to maintain or improve their scores on the T-TAQ at 12 weeks after the intervention, it is important to remain diligent in educating nurses on the components of effective teamwork and communication to prevent errors from occurring and maintain a safe environment for patients and their families. Given the seriousness of medical errors, healthcare providers must stay steadfast

in developing innovative methods for education to sustain improved attitudes toward teamwork, communication, and patient safety.

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Chapter VI

SUMMARY OF THE STUDY

Patient safety and error prevention are shared goals among health care providers that have been emphasized for the past two decades at organizational, national, and international levels (Bedgood & Mellott, 2018). Recognizing the concerns for a gap in nurses' teamwork and communication skills, the Agency for Healthcare Research and Quality developed a standardized curriculum, *TeamSTEPPS*®, to address the assessment, education, and evaluation of processes for teamwork and communication among healthcare providers (AHRQ, 2019). The goal of this curriculum is to encourage nurses and healthcare organizations to reflect on their attitudes and beliefs about teamwork and communication practices while providing tools to assist them in improving teamwork and communication skills.

Based on ongoing concerns related to teamwork, communication, and patient safety, this research study was developed to determine whether an educational intervention, using the *TeamSTEPPS*® curriculum, would improve nurses' attitudes toward teamwork and communication. The reciprocal safety culture model, adapted from Bandura's conceptual model of reciprocal determinism, provided a framework for this study (Cooper, 2000). This chapter provides a summary of the study followed by a discussion of the findings considering the theoretical model and literature. Conclusions, implications of findings, and recommendations for future research are presented.

Summary

Using a quasi-experimental, two-group research design, the principal investigator sought to identify whether an educational intervention, using the *TeamSTEPPS*® curriculum, would improve nurses' attitudes toward teamwork and communication and thus patient safety. The experimental group participated in a 6-hour workshop on teamwork and communication while the control group participated in a 6-hour workshop on the identification and prevention of workplace bullying. Both groups were asked to complete a pretest, posttest, and a 12-week posttest using the *TeamSTEPPS*® Teamwork Attitude Questionnaire. Nurses were recruited from a small county hospital in South Central Texas. Participants meeting inclusion criteria were randomly assigned to the intervention or control group based on their primary unit of employment. A total of eight workshops (four *TeamSTEPPS*® and four Bullying Identification) were conducted and nurses were asked to participate in one workshop depending on their assignment to the intervention or control group. Sixty-nine nurses participated in workshops (33 in the intervention group and 36 in the control group) and the final number of nurses completing the 12-week posttest was 64.

Two instruments were used for data collection, a demographic form and the T-TAQ tool. Participants were asked to rate their level of agreement on the T-TAQ from strongly agree to strongly disagree on each of the five subscales during a pretest, posttest, and 12-week posttest. The responses were coded and scored. The data were then cleaned and entered in SPSS v. 25 for analysis.

Discussion of Findings

The data analysis revealed that there was improvement in nurses' attitudes toward teamwork and communication in both the experiment and control groups. There was not statistical significance between groups ($p >$. 05) following the 12-week posttest, however there was significance within groups ($p <$ .001). The lack of significance between groups may have been a result of the content within the comparison groups education. The curriculum for the workshop on identification and prevention of bullying that the comparison group participated in contained content related to respectful conversations which may have resulted in elevated scores on the communication portion of the T-TAQ. The significance noted within groups was suspected to be partially a result of participant's exposure to the questionnaire during the pretest. Exposure to the pretest was likely one component in the improved scores on the posttest. Also, there was potentially some overlap in the two curriculums' emphasis on the importance of effective communication. The experimental group showed moderate improvement following education however based on similar improvements in the comparison group, the *TeamSTEPPS*® education only had a small effect, between groups, on the results following the 12-week posttest ($\eta^2 = 0.01$).

These findings are consistent with the reciprocal safety culture model that emphasizes the importance of interactions, personal reflection, and role modeling to achieve culture change over time (Cooper, 2000). Attitudes are not easily changed, however with ongoing support and reinforcement from various levels within an

organization, change can potentially occur. If leadership role models effective teamwork and communication behaviors consistently, it is likely that nurses' attitudes will change over time. Previous research has demonstrated that improved teamwork and communication can reduce adverse events, however interventions to achieve improvements involve considerable time and increased use of resources (Kalisch, Curley, & Stefanov, 2007).

Administrative support is critical to the success of culture change (Amiri et al., 2018). Although there was strong administrative support for the implementation of this study, there was only minimal participation in the study by administration which support the results that showed an inability to sustain improved attitudes on the 12-week posttest. Ulrich and Kear (2014) identified that patient safety is dependent on effective nursing leadership, organizational support, and an organizational culture that continually strives to strengthen patient safety. Therefore, a lack of administrative participation in this research study may point to a lack of organizational support for culture change that could ultimately impact nurses' attitudes toward teamwork, communication, and patient safety.

Conclusions and Implications

In conclusion, this study has demonstrated an ongoing need to educate nurses on teamwork and communication to improve attitudes toward patient safety. Team training strategies were moderately effective in improving nurses' attitudes; however, they were not effective in maintaining nurses' attitudes over a 12-week period. Based on the study results, several conclusions have been drawn:

1. Following education, nurses' attitudes toward teamwork and communication improved.
2. An educational intervention using the *TeamSTEPPS*® curriculum can improve nurses' attitudes toward teamwork and communication.
3. As time passes following intervention on teamwork and communication, attitudes tend to return to the levels prior to an educational workshop.

This research study has implications for nursing practice and the improvement of patient safety including:

1. Nurse educators must intentionally teach nurses about teamwork and communication strategies to improve patient safety.
2. Ongoing reinforcement and support from leadership and administration is needed to sustain long term attitude changes.
3. Administrators and leadership need to promote an environment that supports effective teamwork and communication skills through role modeling and accountability.
4. Administration and nurses must continue to focus on developing and integrating communication and teamwork skills to improve patient outcomes.

Recommendations for Further Study

The results of this study have implications for further research related to improving nurses' attitudes toward patient safety through the acquisition of effective teamwork and communication skills. Recommendations for further research include:

1. Development and implementation of a longitudinal study investigating the effects of a multilevel intervention that includes education and ongoing reinforcement of patient safety concepts including teamwork and communication. A longitudinal study would allow an investigator the time needed to study a population of nurses over an extended period to assess whether attitude changes have occurred. Also, a multilevel intervention that includes education, regular reinforcement on patient safety concepts, and assessment of patient outcomes based on attitudes and behavior changes might provider greater insight into the process of culture change within an organization.
2. An investigation of nursing administration and leadership's perception of their role in promoting changes in nurses' attitudes toward teamwork and communication to support a culture of safety could yield insightful information. With evidence that nursing administration and leadership play an important role in promoting culture change, and thus attitude change, it would be important to investigate the perceptions of these individuals related to promoting an environment conducive to attitude change.
3. A multisite investigation of nurses' attitudes toward teamwork and communication following an educational intervention using a curriculum such as *TeamSTEPPS*® might provide a larger sample size with a more diverse population. A multisite study would potentially increase participation and facilitate the researcher's ability to identify differences between organizations that

may assist in pinpointing safety culture variations that have the potential to affect nurses' attitudes toward patient safety.

4. A multisite investigation of nurses' changed practices relating to communication and teamwork following an educational intervention using a curriculum such as *TeamSTEPPS*®. This type of study would eliminate the need for self-reporting of attitudes and potentially provide deeper insight into actual practice changes made by nurses to effort to improve the overall safety of patients.

Nurses play a critical role in safe patient care and their attitudes toward teamwork and communication are a pivotal factor in patient safety. Nurses must possess the knowledge, skills, and attitudes of patient safety concepts to improve patient outcomes. With effective teamwork and communication skills, nurses, hospital administrators, and senior leadership could make a significant impact on keeping hospitalized patients safe. When healthcare providers join as a unified team, patients and their families could be the beneficiaries of safe patient care that produces positive outcomes and decreases the incidence of medical errors.

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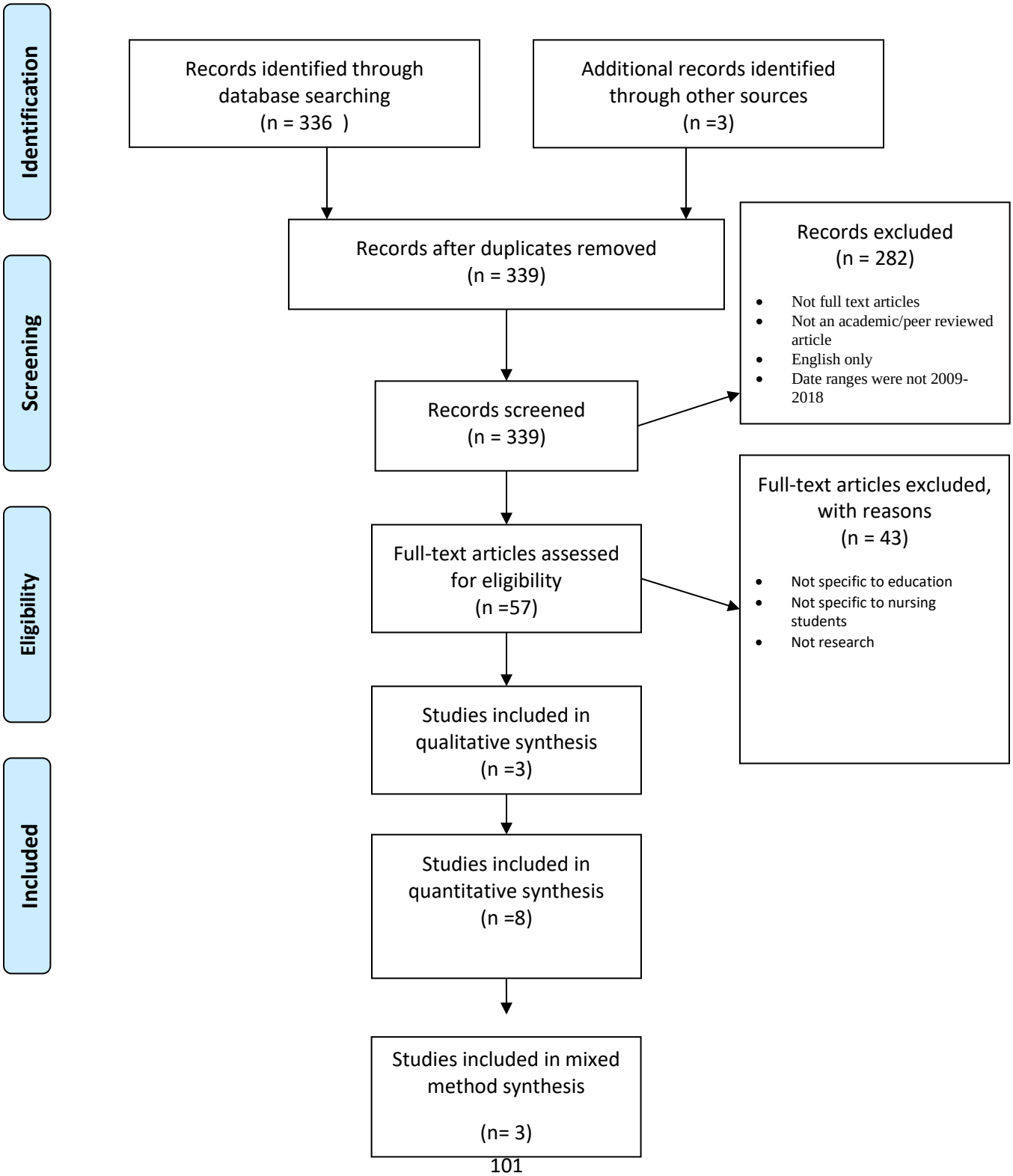
APPENDIX A

Prisma Diagram for *The role of education in developing a culture of safety through the perceptions of undergraduate nursing students: An integrative literature review*


Identification
Screening
Eligibility
Included
Records identified through database searching (n = 336)
Additional records identified through other sources (n =3)
Records after duplicates removed (n = 339)
Records excluded (n = 282)
Not full text articles
Not an academic/peer reviewed article
English only
Date ranges were not 2009-2018
Records screened (n = 339)
Full-text articles excluded, with reasons (n = 43)
Not specific to education
Not specific to nursing students
Not research
Full-text articles assessed for eligibility (n =57)
Studies included in qualitative synthesis (n =3)
Studies included in quantitative synthesis (n =8)
Studies included in mixed method synthesis (n= 3)

Appendix B

Literature Review Matrix for *The role of education in developing a culture of safety through the perceptions of undergraduate nursing students: An integrative literature review*

Table 1 Literature Review Matrix

Authors	Framework	Aim	Design	Findings	Main concepts
Abbott et al[16] (2012)	Interprofessional patient safety course, Foundations in Patient Safety	Explore nursing students' attitudes about the value of an interprofessional patient safety course to their own professional formation	Exploratory, mixed method using critical sampling	• Students learned new knowledge in the interprofessional course • Students were able to apply new knowledge	• Interprofessional safety education is valuable • Understanding the role of other healthcare team members is vital to safe patient care
Aubin & King[17] (2015)	Nursing Scope and Standards of Practice, The Essentials of Baccalaureate Education for Professional Nursing Practice, and Quality and Safety Education for Nurses	Explore responsiveness of nurses and IP teams to medical errors in a simulation environment	Pilot study, qualitative, content analysis	• Students unwilling to identify nurse errors during simulation • Fear of speaking up	• Inability to question authority • Perceived lack of knowledge • Perceived curriculum variations • Fear of retribution
Hewitt et al[18] (2015)	Adult and experiential learning concepts described Knowles & Kolb	To examine BSN nursing students perceived effectiveness of an educational intervention to promote awareness of medication errors	Quantitative	• Educational intervention was effective in promoting awareness of medication errors	• Safety awareness • Systems factors

Lukewich et al[19] (2015)	Canadian Safety Competencies Framework	Explore nursing students self-reported confidence in learning patient safety during BSN program	Cross sectional, with embedded cohort 2010-2013	• Confident about safety in clinical • Less confident in sociocultural aspects of patient safety • Majority didn't feel comfortable speaking up for safety	• Self-reported confidence in safety • Comfort in speaking up
Mansour[20] (2015)	Quality and Safety Education for Nurses	Investigate the factor structure of the HPPSACS tool when completed by nursing students in UK	Cross sectional survey, senior nursing students, convenience sampling	4 factors identified: • Willingness to report errors • Identification and management of errors • Inter-professional context for patient safety • Perceived support for improving patient safety • Patient safety scales provide valuable information	• Testing of the HPPSACS tool when administered to nursing students

Tella et al[7] (2015)	European Union Network for Patient Safety	Nursing student perception about learning patient safety	Cross sectional, Non-experimental	• Finnish less experience with event reporting • Finnish had more support in learning patient safety	• Safety in nursing education & student perceptions of safety
Weatherford and Viveiros[6] (2015)	Quality and Safety Education for Nurses	Understand student attitudes regarding safety competencies at the end of a BSN program and determine need for curriculum changes	Cross sectional with senior nursing students	• Classroom & clinical contribute to safety awareness • Exposure to an intervention for safety increases perception of safety	• Comparing safety awareness in the classroom and clinical settings. Is it necessary to teach safety in both components?
Vaismoradi et al[21] (2014)	None identified	Explore Iranian nursing student's perceptions and role of nursing education in providing safe care	Qualitative, semi structured interviews, purposeful sampling	• Better integration of safety competencies in education. • More clinical mentoring needed	• Safety –comfort • Lack of knowledge
Jones[8] (2013)	Quality and Safety Education for Nurses	Integration of QSEN in curriculum of first semester nursing students	Quantitative, pre-test post-test design with convenience sampling	• Support for use of QSEN in teaching first semester nursing students	• Integration of QSEN competencies to teach safety

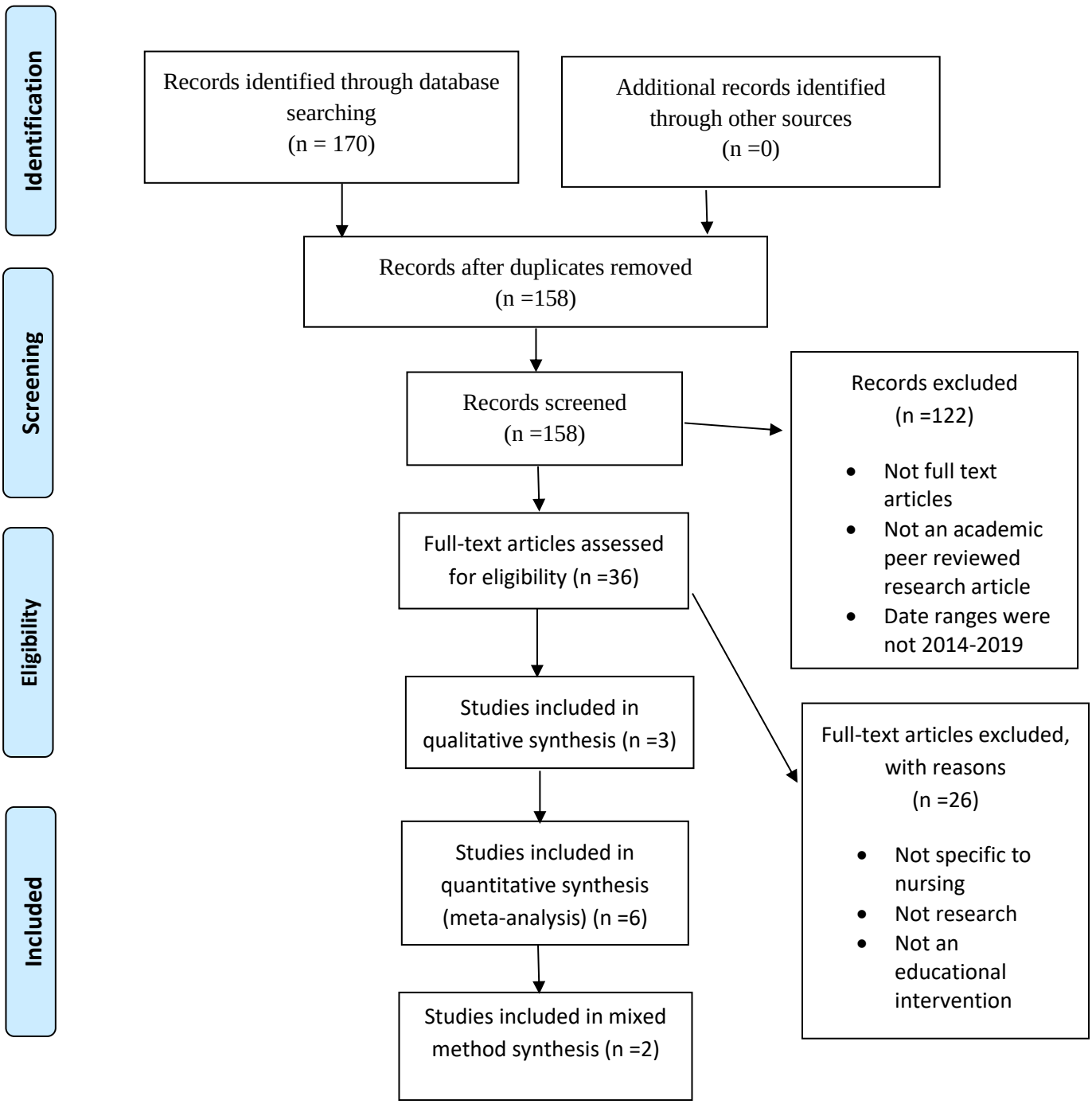
Duhn et al[22] (2012)	Canadian Patient Safety Institute's Safety Competencies Framework	To understand nursing student's perspectives on patient safety curriculum in education	Descriptive cross-sectional	• Students did not have a strong belief that safety was well integrated in the curriculum, but they did acknowledge that is was being taught. • Senior students reported less confidence in safety knowledge as compared to Junior nursing students • As student's progress through the program they are more aware of the complexity of safety events	• Decreased confidence • Neutrality • Safety awareness
Vaismoradi et al[11] (2011)	Not mentioned	To explore Iranian nursing student's perspectives on patient safety in the nursing curriculum	Qualitative with 3 focus groups, semi structured interviews	• Patient safety needs to be incorporated throughout the nursing curriculum • Students need nurse mentorship	• Full involvement of students in patient care • Structuring patient safety education

				• Students feared retribution	
Chenot and Daniel[23] (2010)	Quality and Safety Education for Nurses	To examine patient safety education for nursing students and their attitudes toward patient safety	Mixed method including snowball sampling	• Strong support for the HPPSACS tool to measure patient safety curriculum in education	• Comfort • Error reporting • Denial • Culture
Miller and LaFramboise[24] (2009)	Quality and Safety Education for Nurses	To test the effects of an intervention, in the classroom and clinical settings, related to patient safety on senior nursing students	Mixed method, quasi-experimental	• Intervention group showed improved perceptions related to safety • Changes in perceptions are related to patient centered care.	• Safety • Blaming • Lack of communication • Resource seeking • Problem solving systems
Sullivan et al[4] (2009)	Quality and Safety Education for Nurses	To assess student perspectives of QSEN content in their curriculum and self-reported understanding of QSEN	Descriptive Quantitative	• Students perceive QSEN as important • QSEN was perceived to be present in the curriculum • Quality improvement was the lowest QSEN competency	• QSEN

			• Lab and simulation were under-utilized for teaching QSEN competencies.

Appendix C

Prisma Diagram for Chapter III


Identification
Screening
Eligibility
Included
Records identified through database searching (n = 170)
Additional records identified through other sources (n =0)
Records after duplicates removed (n =158)
Records screened (n =158)
Records excluded (n =122)
Not full text articles
Not an academic peer reviewed research article
Date ranges were not 2014-2019
Full-text articles assessed for eligibility (n =36)
Full-text articles excluded, with reasons (n =26)
Not specific to nursing
Not research
Not an educational intervention
Studies included in qualitative synthesis (n =3)
Studies included in quantitative synthesis (meta-analysis) (n =6)
Studies included in mixed method synthesis (n =2)

APPENDIX D

Literature Review Matrix for Chapter III

Author/Date/ Level of Evidence	*Framework*	*Research Question/Hypothesis*	*Design/Sample*	*Tool*	*IV and DV*	*Summary of Findings*	*Study Limitations*	*Main Concepts*
Amiri et al. (2018) Level I-B	Not listed	• To determine the effect of empowering nurses and supervisors through an educational program on patient safety culture in adult ICU's	• Randomized control trial • Proportional stratified sampling and census for a total sample (n=80) including nurses 9n=60) and supervisors n=20) • Experimental group nurses (n=30) and supervisors (n=10) • Control group nurses (n=30) supervisors (n=10)	• The Persian version of Hospital Survey on Patient Safety Culture (HSOPSC)	• IV- 2-day workshop using the *TeamSTEPPS* curriculum • DV-Nurses empowerment toward patient safety culture	• The total posttest mean score on the HSOPSC was significant higher in the experimental group as compared to the comparison group ($p< 0.001$) • There were significant improvements in the experimental group scores in the categories of teamwork within units ($p< 0.001$), manager expectations and actions promoting patient safety ($p< 0.001$), organizational learning and continuous improvement ($p<0.001$), communication openness ($p<0.001$), and handoffs and transitions ($p<0.001$) • There were no significant changes in the control groups scores on the posttest	• The use of a self-reported instrument and the lack of observational data	• An innovative empowerment program using *TeamSTEPPS* resulted in improved patient safety culture scores • Communication, handoffs, teamwork, learning, managers expectations and actions to promote patient safety improved in the experimental group.
Ballangrud et al. (2017) Level II-C	The Systems Engineering Initiative for Patient Safety 2.0 model The TeamSTEPPS "Model of Change"	• To translate and validate teamwork questionnaire • To investigate healthcare providers perception of teamwork • To explore the impact of inter-professional teamwork intervention in a surgical unit on structure, process, and outcome	• Descriptive, explorative and quasi-experimental interventional • Physicians (n=110), nurses (n=405), nurse assistants (n=59), midwives (n=24), physiotherapists (n=19), and occupational therapists (n=7) from 5 different hospitals were invited to participate	• Quality from Patients Perspective (QPP) • Norwegian translated teamwork questionnaire	• IV- interprofessional teamwork intervention • DV 1- Healthcare providers perception of teamwork, team decision making, safety culture, and attitude towards teamwork • DV 2- Adult patients admitted to the surgical unit perception of quality of care during their hospital stay	• The study was organized into three phases: Setting the stage and deciding what to do, Training and implementation, and monitoring, integrating, and providing coaching for the initiatives to be sustained over time. • Data collection from phase 1 & 2 has been collected but not published. Data collection from phase 3 is ongoing	• Isolation on the effect of ongoing intervention	• Teamwork is a key feature of patient safety • Challenges exist in the healthcare environment as a result of perceptions of • patient safety • Team training is recommended for healthcare providers who are working in teams

			• Patients from the intervention surgical unit who meet inclusion criteria will be invited to participate • Following power analysis, a sample of 65 patients at baseline will be needed to find significance		• DV 3- Data from patient medical records					
Blakeney et al. (2018) Level III-B	IP Continuum Model & Relational Model of Organizational Change	• To improve team functioning and efficiency of work among inpatient acute heart failure care teams at a large academic medical center in the Pacific Northwest	• Cross-sectional pre/post design • Purposeful sampling • Acute Heart Failure care team members (n=100)	• Relational Coordination (RC) survey • *TeamSTEPPS* Team Perception Questionnaire • 1 open ended question	• IV 1- *TeamSTEPPS* training • IV 2- Structured interprofessional bedside rounds (SIBR) • DV- Relational Coordination (RC) scores	• Purposeful IP team intervention led to improvements in team communication and relationships with an acute heart failure care team (p= 0.000- 0.022) • Improved patient satisfaction, provider and nurse satisfaction noted anecdotally by patient reports • Structured IP bedside rounding is an effective approach to improving team communication and relationships • Shared knowledge was not significantly improved (p= 0.125)	• Healthcare's constant state of change which occurred during the study (staffing and organizational models). • Response rates and changes in respondents over time • Results represented aggregates of all workgroups and may not represent variations within and between workgroups	• *TeamSTEPPS* • Interprofessional collaboration • Team-based care • Team culture • TeamSTEPPS Perception Questionnaire
Clapper et al. (2019) Level III-C	Saturation in training model	To assess the impact of *TeamSTEPPS* and the 4-phase brain-based lesson plan for simulation for teaching teamwork and communication in an urban academic teaching hospital	• Mixed-method pilot • Newly assigned pediatric interns and nurses (n=23)	• *TeamSTEPPS* Team Performance Observation tool • Open ended survey	• IV- One five-hour *TeamSTEPPS* training using the 4-phase brain-based lesson plan for simulation • DV- Participant transfer of new knowledge and	• Teams performed higher in post-intervention shoulder dystocia simulation • Teams performed higher in post-intervention cardiac code simulation • Statistically significant improvements in *TeamSTEPPS* knowledge • Training in interprofessional teams	• Small sample size (n=20) not allowing for generalization • The survey did not investigate any negative aspects that may have surfaced from the learning experience.	• 4-phase brain-based lesson plan for simulation Interprofessional • learning • *TeamSTEPPS* • *TeamSTEPPS* training

						skills to the clinical setting	using simulation helped to create a culture that empowered individuals to speak up and work effectively as a team	• The knowledge test used for the intervention has not been validated.		
Clapper et al. (2018) Level III-C	Gibson's Theory of Affordances and Perception	To explore what clinical teams focus on in their environment to identify if team members from the same units shared information readily, especially when they saw a need to intervene to improve a team member's performance and clinical outcomes for patients during simulations that were held during day and overnight shifts.	Qualitative Pediatric hospitalists, senior pediatric residents, pediatric interns, clerkship medical students (n=27) working in pediatric hospital medical teams conducting family centered rounds	• Coded notebooks for documenting personal thoughts about their clinical environment and responses to four questions • Debriefing sessions	• None	• Major themes identified: Fixation on patient monitor, trying to gather more information about the patient, Patient diagnosis and treatment. Need for knowledge through closed-loop communication, and teamwork and communication. • Minor themes identified: Unfamiliarity with equipment and affordances in environment, needing more help on the team, frantically searching for affordances for patient care, fixation on the monitor, internal fixation on monitor leads, and patient diagnosis and treatment	• Small sample size (n=34) on only 3 specialty units. • The study was conducted before *TeamSTEPPS* training • The use of high-fidelity simulation instead of actual patients	• The environmental scan conducted through *TeamSTEPPS* training could address task-fixation issues • Team members need to protect themselves and patient but may not demand that team members do the same. • Situation monitoring is important in providing safe patient care in a team environment. • Team members need to be empowered to • speak up • Educators must be familiar with Gibson's theory of Affordances and Perception to create interventions that help teams to provide safe patient care
Dahl et al. (2017) Level III-C	Not discussed	• Improve team member's interpersonal risk taking, learning behavior and willingness to work together through a *TeamSTEPPS* intervention	• Preliminary cohort Study, mixed method • A convenience sample of all OR caregivers will be asked to participate	• 39-item questionnaire that includes constructs from the AHRQ Hospital Survey on Patient Safety Culture, Edmondson's 'Measure of psychological safety' questionnaire, and questionnaire on turnover	• IV- *TeamSTEPPS* training course • DV- Perceived psychological safety of CT OR team members • DV 2- The overall effect of *TeamSTEPPS* on burnout and job satisfaction • DV 3- Observed turnover rate among OR nurses	• Implementation is ongoing	• The study has not been completed and the results have not been published.	• Effective communication is a key component of teamwork • Establishing a culture that encourages team members to speak up is necessary in maintaining a safe patient environment		

					intentions, job satisfaction and 'burnout'	• DV 4- Self-reported rates of medical error and near misses in the OR				
Falco and Balmer (2018) Level III-B	*TeamSTEPPS* model	To examine the roles that general pediatric team members assume in real-life settings and how team members conduct teamwork practices on family-centered rounds	• Qualitative Ethnographic study • Pediatric hospitalists, senior pediatric residents, pediatric interns, clerkship medical students (n=27) working in pediatric hospital medical teams conducting family centered rounds	• 25 hours of observations during family centered rounds	• None	• Major themes identified under the categories of Communication, Situation monitoring, Leadership, Mutual Support to reflect the *TeamSTEPPS* model • Communication: Intern is the communicator, but not the only one, structured process: running the list, unstructured process: pooling information, prompted by attending or senior resident asking questions. • Situation Monitoring: Happened through running the list and double checking with the senior resident, information that was pooled created a shared mental model. • Mutual Support: built into attending and senior resident roles: empower the senior resident, interns helped one another, balance between helping and allowing learners to make decisions, happened through running the list and prioritizing on rounds. • Leadership: attributes were shared among team members, including creating the plan of care through shared decision-making, mostly attending and senior residents organized the team and	• Observations were conducted by only 1 researcher • The researchers were unable to observe interactions among family members, patients, nursing staff, and other providers • The context and composition of the team may not be transferrable to general pediatric teams not using family centered rounds. • The findings do not reveal all aspects of *TeamSTEPPS.*	• *TeamSTEPPS* curriculum provides a framework for assessing everyday teamwork • Teamwork is affected by the educational environment • Family-centered rounds may not fit within teamwork models, but it can support effective teamwork

							managed resources, including prioritizing patients on rounds			
Kalisch et al. (2015) Level II-C	Salas and colleague's teamwork model	• Use virtual simulation to improve teamwork among nursing staff on inpatient hospital units	• Quasi-experimental • Convenience sample of nurses (n=38), nurse assistants (n=5)	• Nursing Teamwork Survey (NTS) and the Teamwork Knowledge Survey	• IV- Virtual Simulation • DV- Overall teamwork scores on the NTS and Teamwork Knowledge Survey	• Overall teamwork skills improved pre and post intervention (p<.012) • Actual teamwork knowledge did not improve significantly per and post intervention (p<.301) • Lack of significance in teamwork behaviors and knowledge and computer proficiency while participating in virtual simulation	• Single group design and small sample size (n=43) limiting generalizability • Participation rate • Large attrition rate from pre to posttest response rates • Use of a virtual environment rather than real-life patients	• Virtual teamwork simulation improved teamwork among participants • Nursing teams are critical to high-quality care
Lisbon et al. (2016) Level III-B	Kirkpatrick's 4 levels of evaluation model	• To describe the process and results of implementation of TeamSTEPPS through interprofessional team training of an emergency department	• Quantitative, Pilot report • Sample: Emergency department staff (n=113) including physicians, resident physicians, nurses, and ancillary personnel	• *TeamSTEPPS* knowledge test • AHRQ Hospital Survey on Patient Safety	• IV- Interprofessional education using the *TeamSTEPPS* curriculum • DV 1- Scores on the *TeamSTEPPS* knowledge test • DV 2- Scores on the Hospital Survey on Patient Safety	• TeamSTEPPS knowledge statistically improved 45 days after the intervention (p,.<.05) • Improved attitudes toward communication in all areas of the Hospital Survey on Patient Safety 45 days after the intervention (p<.05)	• Survey data was not segregated by profession or training status • Lack of a control group • Final stages of a hospital-wide electronic health record implementation during the study	• Participants demonstrated improved knowledge, attitudes, and behaviors following *TeamSTEPPS* training. • New tools were implemented (observational huddle tool) to document utilization of the learned behaviors.
Sonesh et al. (2015) Level III-B	Kirkpatrick's framework of training evaluation	To assess the effectiveness of a team training intervention in improving learning and transfer of teamwork	• Quantitative, Repeated measures pre-post design • Sample: Obstetrics staff including Registered nurses, nurse managers, licensed practical nurses, and nurse educators, two resident	• 7- item multiple choice, true/false questionnaire • 8-item situational judgement test • Teamwork Perceptions Questionnaire • 40 hours of behavioral observation	• IV- Adapted *TeamSTEPPS* training program • DV 1-Participant perceptions • DV 2- Scores on Situational Judgement Tests (SJT's) • DV 3- Participant behaviors measured by observation	• Participants perceived training as useful • Participants acquired knowledge of communication strategies • Behavioral observation suggested that decision accuracy significantly improved on the job • There was a marginally significant reduction in newborn's hospital length of stay	• The researchers were unable to match participants' data across training periods • A low statistical power may have limited the ability to detect training efforts resulting in a concern for a Type II error	• Patient safety • Team training is supported by research with implications for improved decision making and communication in clinical settings • *TeamSTEPPS* • Situation awareness

			physicians (n=43)					• Self-report may have been subject to biases • The sample was not well-represented by non-nurse professionals • Lack of interprofessional participation • The training modules were only 85 minutes	
Zhu et al. (2016) Level III-B	Organization-wide QI perspective by O'Brien, et al. & OD and Large Group Interventions to formulate a conceptual framework for implementing change initiatives such as *TeamSTEPPS*	• To study the implementation of the *TeamSTEPPS* initiative in 14 critical access hospitals to explore how hospital's practices correspond to suggested best practices	Longitudinal Qualitative Convenience sample: 14 Critical Access Hospitals and included Change agents (n=38), executive sponsors (n=28), other staff involved in implementation (n= 13) for a total sample size (n=157).	• Quarterly interviews	• None	• Major theme identified: Hospitals varied in the level of deliberation that the change leaders and teams demonstrated in preparing for *TeamSTEPPS* • Minor themes: No clear perspective about how the assessment would affect implementation, time constraints limited their ability to complete a thorough assessment of needs, hospitals failed to identify specific goals for implantation of *TeamSTEPPS*, change leaders often developed appreciation of staff member's characteristics	• The relationship between preparation steps and how they individually or interactively affect the change process were not investigated • The use of implementation progress used to evaluate the unfolding process of implementation has not been validated. • Lack of generalizability of findings to other QI implementations of *TeamSTEPPS* in other organizational settings	• Deliberate implementation of *TeamSTEPPS* strategies were more likely to achieve progress during implementation • Small rural hospitals with limited resources and infrastructure face unique challenges to implementing teamwork and quality improvement strategies

Note. ***Level of evidence based on the*** **Johns Hopkins Nursing Evidence-Based Practice Model and Guidelines** ***(3rd. ed.) by D. Dang and S.L. Dearholt, 2018. Copyright Sigma Theta Tau International***

APPENDIX E

TeamSTEPPS Teamwork Attitudes Questionnaire (T-TAQ)

TeamSTEPPS Teamwork Attitudes Questionnaire (T-TAQ)

Instructions: Please respond to the questions below by placing a check mark (√) in the box that corresponds to your level of agreement from *Strongly Disagree* to *Strongly Agree*. Please select only one response for each question.

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Team Structure						
1.	It is important to ask patients and their families for feedback regarding patient care.					
2.	Patients are a critical component of the care team.					
3.	This facility's administration influences the success of direct care teams.					
4.	A team's mission is of greater value than the goals of individual team members.					
5.	Effective team members can anticipate the needs of other team members.					
6.	High performing teams in health care share common characteristics with high performing teams in other industries.					
Leadership						
7.	It is important for leaders to share information with team members.					
8.	Leaders should create informal opportunities for team members to share information.					
9.	Effective leaders view honest mistakes as meaningful learning opportunities.					
10.	It is a leader's responsibility to model appropriate team behavior.					
11.	It is important for leaders to take time to discuss with their team members plans for each patient.					
12.	Team leaders should ensure that team members help each other out when necessary.					

PLEASE CONTINUE TO THE NEXT PAGE

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Situation Monitoring						
13.	Individuals can be taught how to scan the environment for important situational cues.					
14.	Monitoring patients provides an important contribution to effective team performance.					
15.	Even individuals who are not part of the direct care team should be encouraged to scan for and report changes in patient status.					
16.	It is important to monitor the emotional and physical status of other team members.					
17.	It is appropriate for one team member to offer assistance to another who may be too tired or stressed to perform a task.					
18.	Team members who monitor their emotional and physical status on the job are more effective.					
Mutual Support						
19.	To be effective, team members should understand the work of their fellow team members.					
20.	Asking for assistance from a team member is a sign that an individual does not know how to do his/her job effectively.					
21.	Providing assistance to team members is a sign that an individual does not have enough work to do.					
22.	Offering to help a fellow team member with his/her individual work tasks is an effective tool for improving team performance.					
23.	It is appropriate to continue to assert a patient safety concern until you are certain that it has been heard.					
24.	Personal conflicts between team members do not affect patient safety.					

PLEASE CONTINUE TO THE NEXT PAGE

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Communication						
25.	Teams that do not communicate effectively significantly increase their risk of committing errors.					
26.	Poor communication is the most common cause of reported errors.					
27.	Adverse events may be reduced by maintaining an information exchange with patients and their families.					
28.	I prefer to work with team members who ask questions about information I provide.					
29.	It is important to have a standardized method for sharing information when handing off patients.					
30.	It is nearly impossible to train individuals how to be better communicators.					

Please provide any additional comments in the space below.

Thank you for your participation!

APPENDIX F

Demographic form

Participant Demographic Form

1. Age (years): _____
2. Years of Experience: _____
3. Hours worked per week:_____
3. Years Employed at the current facility: _____years _____ months
4. Current Unit: _____