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A WEB-BASED INTERPROFESSIONAL EDUCATION PROGRAM FOR SCHOOL NURSES AND ATHLETIC TRAINERS: A PILOT STUDY

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ABSTRACT

A WEB-BASED INTERPROFESSIONAL EDUCATION PROGRAM FOR SCHOOL NURSES AND ATHLETIC TRAINERS: A PILOT STUDY

Lauren Ashley Welsch
Old Dominion University, 2017
Director: Dr. Muge Akpinar-Elci

Background: Interprofessional education (IPE) programs have been shown effective in improving interprofessional collaborative practice (ICP) through increased communication and teamwork amongst healthcare professionals with the ultimate goal of improving patient safety and outcomes. However, their use and subsequent outcomes have not been reported amongst athletic trainers (ATs) and school nurses (SNs) in secondary school healthcare. The purpose of this study is to develop, implement and evaluate an IPE program designed to meet the needs of this unique healthcare setting. In addition, qualitative analysis will further describe the communication between ATs and SNs. Methods: A mixed method exploratory design was employed. Following recruitment and consent, participants were interviewed regarding their current interprofessional communication. Participants then completed the online learning program which consisted of a series of pre-outcome measures, 4 learning modules and post-outcome measures. One month following completion of the program, participants were interviewed again. Results: Participants exhibited high levels of self-efficacy and comparable attitudes towards teamwork and communication compared to normative values prior to beginning the program. Following the program, there was an increase in TeamSTEPPS® Teamwork and Attitudes Questionnaire ($Z=3.078$, $P=0.002$), an increase in the knowledge of the roles and responsibilities of the other profession and a positive response to the program. However, the interviews illustrated the presence of additional barriers which may prevent

interprofessional collaborative practice (ICP). Conclusion: An IPE program was designed and implemented for high school ATs and SN that improved participant knowledge and attitudes towards the concepts of ICP. However, the presence of additional barriers continues to make ICP challenging. Future research should examine the use of modified IPE programs in addition to system wide policy changes to address additional ICP barriers.

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This dissertation is dedicated to my parents for their constant support and immeasurable influence on my life. Dad, for providing an example of work-life balance I wish to emulate and encouraging me to set my expectations for myself high. Mom, for providing a listening ear and your unwavering belief in my ability to be successful.

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CHAPTER I

INTRODUCTION

As the healthcare system becomes increasingly complex, healthcare providers, patients and their caregivers must work together to deliver safe and effective patient care.[1] Recent research attributes preventable adverse events across the healthcare system to failures in communication and teamwork amongst healthcare practitioners.[1] Because of the frequency and severity of preventable adverse events, implementation of prevention protocols is paramount. One such mode of prevention is through the utilization of highly successful healthcare teams.[1] However, the development and maintenance of healthcare teams that can work together optimally is challenging. Thus, formal training or IPE is often needed. The goal of IPE programs is to provide participants with the skills necessary to work as a member of an interprofessional care team. The current body of knowledge surrounding IPE is diverse, with a variety of programmatic formats and outcomes to examine effectiveness. While IPE programs are widely implemented in traditional healthcare settings such as hospital systems, high functioning teams are needed in other practice settings as well. Therefore, future research surrounding IPE should include nontraditional healthcare systems and previously unstudied members of healthcare teams.

BACKGROUND

In 1999 Kohn et al published a book entitled *To Err is Human: Building a Safer Health System*, this landmark report delineated the high rate of preventable adverse events throughout

the healthcare system and encouraged future research on the prevention of such events.[1] Similarly, a study by Baker et al[2] identified that 36% of reported adverse events were preventable. Equally concerning is the severity of adverse events. The Joint Commission reviewed sentinel events, or unanticipated events that occurred in the healthcare system, from 2004-2015 and found that over half of the events resulted in death.[3] Unexpected additional care, beyond what was needed for the original diagnosis, was reported in 26.2% of sentinel events, which can lead to increased healthcare costs as well as time away from work for the patient and their families.[3] When an adverse event occurs, it has been reported a patient's hospital stay can increase from 7.6 days to 16.2 days on average.[2] In addition to monetary consequences, there is the potential for psychological harm or the development of feelings of depression, embarrassment, shame, and/or worry following an adverse event.[3] Clearly, the consequences of adverse events are severe and affect patients and their families physically, psychologically and financially. As such, reducing adverse events in health care represents a major point of emphasis for quality improvement.

Throughout literature critical components such as failures in communication and lack of teamwork and leadership emerge as common causes of adverse events.[1,3-5] Because of the increasingly complex nature of the healthcare system, and the diverse specialties required to treat patients, effective communication and teamwork within the healthcare team is necessary for safe and effective patient care.[6] *To Err is Human* suggests a safety principle that emphasizes the creation of improved learning environments to teach that allow learners to practice the skills necessary for improved communication and teamwork.[1] As such, a variety of IPE programs designed to teach team training concepts in multiple learning formats have been developed. One systematic review of 40 peer-reviewed IPE program articles reported diversity exists in

participants, location, content stressed, instructional methods and faculty instruction.[7] Unfortunately, the impact of such programs on patient outcomes are relatively unknown,[7] making the best format to teach and practice these skills debatable. In addition, the prevalence of team training programs are unknown as is the extent to which healthcare students and providers participate in such programs.[7] Additional research surrounding IPE programs is imperative to ensure evidence based practice is used in the development of future IPE programming and that all healthcare providers are provided with the opportunities to develop the skills necessary to work interprofessionally.

Interprofessional Education

Interprofessional education, defined as 2 or more healthcare providers learning, with, from, and about one another is the platform to teach teamwork and communication skills across various healthcare providers.[8] Currently, a great diversity of IPE programs exists.[7,9] For example, participation in IPE programs can occur in the traditional didactic environment with pre-licensed healthcare students, and/or later in a clinical or simulated environment with licensed healthcare providers. Furthermore, the number and types of participants varies as well as the length, the content taught and the delivery mode. Often, IPE programs are tailored to fit the needs of the intended learners and the resources available and thus, are incredibly diverse.[9]

Several recent systematic reviews have attempted to describe the current evidence surrounding effective IPE programming.[10-13] Hammick et al reviewed 21 studies and found positive results for 38 outcome measures, 12 mixed results and only 1 neutral result.[11] The positive outcomes observed include a positive learner response to IPE, an increase in knowledge and skills necessary for ICP and, an increase in ICP behaviors. Another review by Cooper et al examined 30 studies, and while they did not quantify the results, they also noted the largest

changes following IPE were in student's knowledge, attitudes, skills and beliefs.[10] All included studies were conducted on undergraduate students and found more successful programs utilized students at the same intellectual level and occurred earlier in their course of studies.[10] Students also valued practical learning experiences and learning was enhanced when hands-on learning was included.[10] Cooper et al also noted outcome measures were primarily examined immediately post-program delivery or shortly afterwards, making it challenging to assess changes overtime.[10] A separate review by Reeves et al noted positive outcomes in 4 of the 6 included studies.[12] Even for the studies with positive results, there is a great diversity in intervention specifics, participants and outcomes used. The 4 studies which found IPE benefits included a variety of traditional and nontraditional members of the healthcare team and delivered programs which lasted from 2 half-day IPE sessions[14] to programs which occurred over the course of a year.[15] While these reviews illustrate a variety of IPE programs can produce positive results, more research is needed to adequately describe the long-term and short-term benefits of IPE as well as program specifics which maximize benefits.

TeamSTEPPS®

Team Strategies and Tools to Enhance Performance and Patient Safety, or TeamSTEPPS® 2.0, is an open-access evidence-based training curriculum with readily available materials for use in optimizing team performance across a variety of healthcare settings. Developed over the course of three years, it aims to improve patient safety by advancing communication and teamwork skills.[16] TeamSTEPPS® is designed to be implemented in 3 phases: 1) an assessment to evaluate readiness and need for such a program, 2) the training for the onsite leaders of the program and other staff who will participate in the implementation, and 3) the evaluation and plan for continuation of the program.[16]

The TeamSTEPPS® curriculum is comprised of five key principles including: Team Structure, Communication, Leadership, Situation Monitoring and Mutual Support. [17] *Team Structure* refers to the learner's ability to identify the components of a team that work most effectively together.[18] The next principle, *Communication*, is the process by which team members are able to successfully exchange information within the team.[18] Included in the *Communication* principle are the teachings of Situation Background Assessment Recommendation (SBAR) and 'call-out'. These are techniques used to effectively communicate critical information within a team in a timely fashion.[18] A 'check-back' is then taught to the learners and used to ensure the information communicated was understood, as intended, by the receiver.[18] The last portion of the Communication principle is the 'handoff', which describes the means to transfer information during transitions, such as at the end of one's shift, to ensure continuity of care.[18] The *Leadership* principle allows team members to maximize the role of each team member through an understanding of the actions of the team.[18] Incorporated into the teachings of this principle are the concepts of effective team leaders This principle also instructs the learner on the proper methodology to share a plan (brief), monitor and modify the plan as needed (huddle) and finally review the team's performance (debrief).[18] The fourth principle, *Situation monitoring*, is the process of scanning and assessing a situation to gain information that will support the team's function.[18] These concepts are taught through the STEP acronym that includes ***S***tatus of the patient, ***T***eam members, ***E***nvironment, and ***P***rogress towards the goal. Another pneumonic taught in TeamSTEPPS® Situation Monitoring is the IMSAFE acronym (illness, medication, stress, alcohol and drugs, fatigue, eating and elimination) which covers the content a healthcare provider should be continuously monitoring.[18] These checklists are designed to provide the learner with tools necessary for monitoring many diverse situations to ensure they

include all pertinent information that could affect the patient's health condition. The last TeamSTEPPS® principle, *mutual support*, is the ability to support all members of the team and is taught through CUS principle: I am Concerned, I am Uncomfortable, this is a Safety Issue, as a means to provide feedback when team members are concerned.[18]

The TeamSTEPPS® curriculum was designed to be flexible to best meet the needs of the intended learners and the resources available. The program incorporates a variety of teaching methods including: PowerPoint presentations, videos, role playing, participant discussion, and summation handouts. In addition, the developers of TeamSTEPPS® aimed to provide a program that is cognizant of participant time restraints and makes effective use of participant time. Thus, the program can be modified in length and duration to fit the needs of the team members and or the organization. In addition, learning is further enforced through the use of pneumonic aids, such as the SBAR, which help reinforce learning and retention for future use.[19] The TeamSTEPPS® program represents a widely utilized and evaluated evidence based program that can be altered to best fit the needs of a variety of healthcare providers.

Nontraditional Population

Over 389,055 students attend high school (grades 9-12) in one of the 309 public high schools in the state of Virginia annually.[20] The National Federation of State High School Associations (NFHS) estimates 55.5% of all high school students participate in at least one sport; a percentage which has consistently grown for over 22 years.[21] Virginia alone had 173,283 total adolescents participate in high school athletics for the 2014-2015 school year.[21] As the number of student-athletes increases, the importance of efficient and effective medical care is crucial for the health and safety of high school student-athletes in Virginia.

Athletic trainers (ATs) and school nurses (SNs) are employed to ensure the safety of the

student body. However, the State of Virginia does not mandate public schools employ a SN nor AT. In the State of Virginia, the ratio of school nurses to students is about 1 to 873. [22] While this is not as a high as some states like Utah (4,893:1) or Michigan (4,204:1), Virginia has much fewer SNs per student compared to states like Vermont (275:1) or New Hampshire (347:1).[22] For ATs, a nationwide survey estimated AT availability in high schools is around 70% for some level (full-time, part-time, etc.) of coverage, with 37% of high schools reporting a full time AT is present.[23] Virginia reports a stronger AT presence than the national averages as 87% of high schools report some level of athletic training services and 70% of high schools report a full time AT is present at the school.[23]

School nursing is a subset of nursing that occurs in the school systems. As such, school nurses work with a variety of school age children and are often the only healthcare provider at the school during regular school hours. School nurses are responsible for children's health while they are in school and support the work of parents and educators to help children reach their educational potential and maintain optimal health.[24] Therefore, their duties are diverse as they are responsible for developing health policies at the school and district level, coordinating care between patient/parents and multiple healthcare providers, educating patients and helping to ensure students are healthy, safe and ready to learn. [24]

School nursing began in 1902 in an effort to decrease student absenteeism.[24] Because student's ability to learn is directly related to their health, providing holistic healthcare helps to ensure student's academic success.[24] SNs benefit the schools in which they work in a variety of ways. When a full-time SN is present, students have about half the illness and time away from school as those students who do not have access to a SN.[25] When students spend more time in school, versus home sick, there is an associated improvement in academics and a reduction in

dropout rates.[25] Without the presence of a SN, their duties often fall to other school employees such as principals, teachers and/or staff. Therefore, when a SN is present the previously mentioned personnel save time and thus have more time for their other duties. For these reasons, the presence of a SN is beneficial and results in a host of positive outcomes.

Athletic Trainers are allied health providers who collaborate with a multitude of other health providers to deliver care to patients in a variety of settings such as college/University, Military, Performing Arts, Physician Practice and Secondary Schools.[26] Approximately 18% of all ATs are currently employed in a high school setting and provide direct care to student-athletes.[26] ATs provide preventative care, emergency care, clinical diagnosis, therapeutic interventions, and rehabilitation exercises to physically active populations. [26] Across these care domains ATs refer patients when necessary and act as a liaison between a variety of healthcare professionals, the patient, and their families.[27] Because of the collaborative nature of an ATs job, the Commission on Accreditation of Athletic Training Education (CAATE) has standards to delineate the inclusion of IPE and ICP into the professional and post-professional education of ATs.[28,29]

Athletic trainers and SNs often work in the same location and treat the same patient population. In addition, the care delivered by one provider impacts the care provided by the other. Examples of health conditions where interprofessional collaboration between AT and SN could improve patient care and safety are concussion, return to learn/play protocols, diabetes and other chronic conditions such as asthma. Asthma for example, is a chronic, potentially significant health condition that affects approximately 9% of high school children nationally. [30] Uncontrolled asthma is associated with decreased quality of life, self-esteem, school performance and increased utilization of the health care system and mortality in school age

children.[31] Almost 40% of school age children with asthma in the Commonwealth of Virginia are at risk for potentially deadly complications as their asthma is uncontrolled.[30] Evidence has demonstrated improvements in asthma management, such as increasing medication adherence, can lead to improved quality of life for children diagnosed with asthma.[32] The care provided by the SN during the school day and their associated symptoms will determine the care the AT provides after school as the same student engages in physical activity that can have a direct impact on respiratory function. Therefore, communication between the SN and AT is crucial in providing safe and effective patient care for student-athletes with asthma and many other chronic conditions. As other healthcare disciplines have shown, failures in teamwork and communication between healthcare providers can result in decreased patient safety and an increase in medical errors.[1] The benefits of SN and AT ICP could greatly impact the large, and growing, number of student athletes. However, ATs and SNs face additional challenges to ICP as they often work at different times, are employed by different entities and are educated separately. For these reasons, an IPE program tailored to meet the unique needs and challenges of ATs and SNs is necessary to provide optimal patient care to the thousands of high school student-athletes in Virginia.

STATEMENT OF PROBLEM

Successful teamwork and communication between ATs and SNs stands to improve patient care and safety. However, forming and maintaining interprofessional collaborative teams is challenging, and an IPE program may be necessary to facilitate these collaborations. While IPE literature is robust in traditional healthcare settings, such as in hospitals with physicians and nurse learners, nontraditional subsets of the healthcare system are underrepresented in the IPE literature. Improved communication and teamwork between ATs and SNs in the high school setting may lead to benefits similar to those found in other disciplines such as improved patient

outcomes and safety.[12] However, IPE programs which are developed, implemented, and evaluated in this population and in other nontraditional healthcare environments are lacking.

THEORETICAL RATIONALE

Two theoretical frameworks support this work, Program Theory and The Kirkpatrick Model of Program Evaluation. Program Theory provided the framework to help determine what content should be included in the intervention and the associated expected outcome(s) of each part of the program. The Kirkpatrick Model of Program Evaluation provided the framework for the selection of the outcomes measures. Introductions to these frameworks are provided below.

Program Theory

Program Theory is used to explain how the inclusion of specific aspects of a program will produce an associated outcome.[33] Through the use of "if-then" statements such as, IF something is included in the program THEN the following change is expected, program designers can utilize Program Theory to clearly justify and explain why portions of the program are included and the expected outcome for each portion.[34] Program Theory was utilized throughout the design of the learning content and simulation to conceptualize why each part should, or should not, be included and the goal of each portion of the included content (Appendix A). In this way, Program Theory provided a framework for the development of the learning content and allowed the research team to systematically make decisions about what should be included and how we expect the program to affect participants.

Kirkpatrick Model

The Kirkpatrick Model of Program Evaluation is designed to assess training evaluation outcome measures. This model can be applied to a multitude of training programs and has been widely used throughout Health Services Research (Appendix B).[35] The original Kirkpatrick

Model placed outcome measures into 4 levels. The first level, *reaction*, assesses the reaction of the participant towards the training or how favorable or relevant the training program was found to be to the participant.[35] The second level, *learning*, examines what the participant learned, specifically if the participants acquired the intended knowledge, skills, attitudes, perceived value, or confidence changes.[35] The third level, *behavior*, assesses changes in participant behavior as a result of the training program.[35] The final level in the Kirkpatrick Model is *results*. This level examines the patient care outcomes that occurred as a result of the training.[35]

The original version of the Kirkpatrick model was modified and the new model now includes 6 levels. This new modified version has been widely used in IPE literature to further classify the wide range of outcome measures utilized in IPE and will be used in the present study.[36] In the modified version level 2 and level 4 were each split in to 2 sublevels. Level 2a focuses on modifications to the participant's attitudes or perceptions following the program and level 2b examines changes in knowledge following the program. Similarly, level 4 outcomes were split in to Level 4a which examines changes that occur to the organizational practice as a result of the program and level 4b which measures benefits to the patient directly. [36] The use of the Kirkpatrick Model provides additional justification for the selected outcome measures included in this study, and demonstrates the research study is grounded in a popular method of program evaluation within the IPE literature.

PURPOSE OF THE STUDY

The purpose of this study is to evaluate an IPE program rooted in the TeamSTEPPS® principles, designed specifically for high school ATs and SNs which is delivered in an electronic format. This study will provide foundational knowledge to guide the development of similar programming. Specifically, this study will describe the development, implementation and

evaluation of a concise online program that teaches skills to improve communication and teamwork between ATs and SNs.

SIGNIFICANCE OF THE STUDY

The proposed project is significant as it will inaugurate educational programs that instruct teamwork and communication skills into the field of secondary school healthcare. While these programs have benefited traditional healthcare settings,[9] they have not been introduced into nontraditional settings between SNs and ATs. Because there is a paucity of literature surrounding these programs in nontraditional settings, the proposed study can provide evidence to support the utilization of these concepts in future educational and research initiatives.

Additionally, this study will provide evidence to support the use of an electronic method of delivery for this content. Similar programs require participants to receive in-person training which places an increased time demand on the participant. However, it has not been reported that in-person programing provides additional benefits over programs that can be completed online and at times chosen by the participant. Because we aim to teach this program to healthcare providers, it is important to be cognizant of their limited time and scheduling constraints. Therefore, we elected to deliver the learning through an online mechanism so it can be completed when it best fits the participant's schedule and wherever they wish. [37]

LIMITATIONS

1. The study sample is small therefore the generalizability of the findings is limited.

2. Similarly, this study includes only one school district, which may have unique characteristics, making the generalizability of the results outside of the selected school district inappropriate.

3. Gender was omitted from the demographic portion of the study therefore categorizing

results by gender was not performed

4. Two of the 11 TeamSTEPPS® modules were taught in this curriculum. Therefore, the researchers can't make conclusions about the entirety of the TeamSTEPPS® program.

5. This study design relies on self-reported data and thus there is the possibility of response bias. Participants may have been unable to accurately recall the information asked of them, which could have led to inaccurate results.

6. Social desirability bias, where participants are more likely to select answers they believe are desirable, may have impacted participant answers on the outcome measures.

7. Due to the recruitment process, SN interviews were conducted before the ATs. Given the methodology of constant comparison, the later interviews may be richer as they were asked additional questions.

ASSUMPTIONS

1. It was assumed all participants in this study could comprehend English in the written and spoken form and could thus comprehend all the materials provided to them.
2. It was assumed all participants would provide truthful answers to all survey and interview questions.

AIMS AND HYPOTHESES

Specific Aim 1-To determine changes in AT and SN knowledge of each other's roles and responsibilities in the high school setting.

Hypothesis 1 AT and SN knowledge of each other's roles and responsibilities will increase following the learning program as determined by an increase in scores on the Knowledge of Roles and Responsibilities Survey.

Specific Aim #2 To assess high school ATs and SNs attitude towards teamwork and

communication in healthcare delivery and to examine changes following a learning program.

Hypothesis 2 ATs and SNs will more favorably view the concepts of teamwork and communication in the healthcare delivery system following the learning program as determined by an increase in total Teamwork Attitudes Questionnaire scores following the program.

Specific Aim #3 To determine AT and SNs perception of the learning program.

Hypothesis 3a ATs and SNs will view the online delivery system as usable as determined by comparable scores on the System Usability Scale to industry norms for a web based system.

Hypothesis 3b ATs and SNs will view the entirety of the program favorably as determined by average scores on the Participant Response Survey.

Specific Aim #4 To examine changes in communication between SNs and ATs following the learning program.

DEFINITION OF KEY TERMS

Adverse Event-An injury which occurs secondary to mismanaged medical care rather than due to the condition or disease itself.

Healthcare Provider-An individual who provides healthcare services to patients. These persons are licensed in a variety of specialties such as physician, nurse, athletic trainer, pharmacist etc.

Interprofessional Collaborative Practice(ICP)-Health care provided in a coordinated manner by health professionals who share mutual goals, resources and responsibility for patient care.[38]

Interprofessional Education (IPE)- Two or more healthcare providers learning with, from and about one another as the platform to teach teamwork and communication skills across various healthcare providers.[8]

Learning Content-The content provided in this online program that is designed to enhance interprofessional collaboration between school nurses and athletic trainers.

Preventable Adverse Event-Adverse events which are the result of an error of a person or flaw in the medical system.

Sentinel Event-An unanticipated event that occurs in the healthcare system and results in serious consequences such as death or injury.

Simulation-An imitation of a specific health scenario to allow for practice and learning by healthcare providers in a safe environment.

Student-Athlete-A participant in an organized sport that is supported by the education institution in which they are enrolled in classes. Thus, these persons are both students and athletes simultaneously.

Team Training-Training which is designed to improve the efficiency and effectiveness of a team. This training is not specific to the team's domain and instead focuses on social relations, role definition and communication within the team.

CHAPTER II

LITERATURE REVIEW

Interprofessional Education with Didactic TeamSTEPPS® and Healthcare Simulation: A Systematic Review

INTRODUCTION

As the healthcare system becomes increasingly complex and intertwined, healthcare professionals from multiple disciplines are often required to work intimately as part of an interprofessional healthcare team.[39] It has been reported that effective teamwork and collaboration within healthcare teams improves the delivery of care and thus positively impacts patient outcomes.[39,40] In contrast, inadequate communication and/or ineffective teamwork can lead to increases in medical errors and other preventable adverse events.[41,42] However, the process of developing and maintaining successful healthcare teams is complex and challenging. Interprofessional education is an educational approach in which the skills necessary to develop and maintain healthcare teams are taught; this can occur prior to professional practice and certification or post-certification. [43] Interprofessional education is defined as 2 or more healthcare groups learning with, from, and about each other.[44,45] This type of learning environment aims to teach healthcare students, and/or practicing clinicians, the skills required to work within an interprofessional team. While the integration of IPE is not unanimous across all academic and clinical settings, many settings have embraced IPE as an important part of their curriculum and training processes.[46] Currently, there are a plethora of unique IPE programs, and a consensus has not been reached on how best to deliver and evaluate IPE.[47] A number of reviews of the literature have attempted to synthesize IPE programs to add to the knowledge base surrounding development and effectiveness of such programs.[36,47-49] However, at this time none of these reviews have synthesized the literature regarding didactic TeamSTEPPS® and

simulation. Because evidence should guide the formation of such programs, a comprehensive understanding of 2 common IPE components may help to illustrate areas of potential improvement thus strengthening the development of future IPE programs.

The TeamSTEPPS® program was developed jointly by the United States Department of Defense (DoD) and the Agency for Healthcare Research and Quality (AHRQ) to provide healthcare professionals with an open access, evidence based tool to improve patient outcomes through the use of high performing teams.[50] The TeamSTEPPS® program in its entirety takes 4-6 hours to complete and focuses on the TeamSTEPPS® core competencies of: team structure, leadership, situation monitoring, mutual support, and communication.[51] The TeamSTEPPS® curriculum provides participants with knowledge on how to work effectively in interprofessional collaborative teams, and provides instructors with guidelines on how to incorporate medical simulation as a training tool.[50] However, the use of medical simulation is not integrated into the learning content provided for the participants and its use is not a part of the core TeamSTEPPS® principles and curricula.

Simulation provides healthcare teams an opportunity to practice skills, such as newly acquired communication and teamwork skills, after participating in the TeamSTEPPS® curriculum. In particular, healthcare simulation is helpful to learn and practice optimal communication and teamwork in a safe environment for emergency situations, situations that occur infrequently, or those that have high rates of mortality and morbidity.[52-54] It is through practice simulations that healthcare professionals can work together and gain confidence in newly acquired skills and improve communication. An IPE program which incorporates the didactic TeamSTEPPS® principals, in addition to healthcare simulation, may provide the necessary components to improve communication, interprofessional teamwork, and provider

confidence which may impact patient outcomes.[54,55] This concept is not novel; numerous healthcare programs integrate these concepts into their IPE programming. However, the literature lacks a synthesis of IPE programs that incorporate both TeamSTEPPS® and healthcare simulation. A synthesis of this literature is valuable as this information can assist current faculty and educators in the design, implementation and evaluation of effective IPE experiences that incorporate healthcare simulation. Therefore, the purpose of this systematic review is to synthesize, critically appraise, and evaluate existing literature on IPE programs that utilize didactic TeamSTEPPS® in conjunction with healthcare simulation. A secondary purpose of this review is to summarize the outcome measures utilized in each program and subsequent results of the didactic and simulation IPE experiences.

METHODS

Search Strategy

Two independent researchers (LAW and JMH) performed a systematic search utilizing EBSCO (Academic Search Complete, CINAHL, Education Research Complete, Education Source, Eric, Health Source Nursing/Academic Edition and MEDLINE), and PubMed from database inception through March 2017 (Table 1). Using these databases, we searched TeamSTEPPS OR Team STEPPS AND interprofessional education AND simulation OR simulator. The results of this search were independently reviewed to determine inclusion based on the criteria below. First, titles and abstracts were reviewed and if eligibility was uncertain at that time, the full text was screened. A hand search was performed on the references lists of all screened articles as well as the Research/Evidence articles provided through the TeamSTEPPS® website.[56]

The initial literature search yielded 66 peer reviewed articles (Figure 1). After duplicates within each search engine and between search engines were removed a total of 42 articles remained (Table 1). A hand search of the reference lists of the 42 articles identified an additional 2 articles, thus a total of 44 articles were reviewed. Of these 44 articles, 11 met the inclusion criteria [52-55,57-63] listed below.

Criteria for Selecting Studies

Each item of the inclusion criteria must be met for inclusion in this review.

Inclusion Criteria

- Studies that utilized a didactic learning session based on TeamSTEPPS® concepts. The studies needed to explicitly state the use of TeamSTEPPS® in the methodology.
- In addition to didactic TeamSTEPPS® methods, studies must include an interactive simulation that was a supplement to the didactic program and have provided a description of said simulation.
- Studies that included healthcare students or practicing healthcare clinicians from more than one discipline who participated in an educational simulation.
- Studies that collected outcome measures pre-and post-learning intervention.
- Studies published in English.
- Studies published in peer-reviewed journals.

Exclusion Criteria

- Studies that did not collect an outcome pre-and post a learning intervention which included didactic learning and healthcare simulation.[64,65]
- Studies where the simulation was performed entirely electronically via computers[66,67] or where a simulation experience did not occur.[68]

- Studies that included role-playing in lieu of a healthcare simulation.[69]

Assessment of Methodological Quality

The Medical Education Research Study Quality Instrument (MERSQI), was used in conjunction with the Newcastle-Ottawa Scale-Education (NOS-E) to appraise the quality of the included studies.[70] These measures were designed to assess methodological quality in medical education research and can be used independently of study design.[70-74] The MERSQI instrument has 8 individually scored items which examine items such as study design, sampling, data type, validity, outcomes and data analysis. The scale for each item varies, but range from 0.5-3 giving the instrument a total possible score of 16. [70] Previous research has found the MERSQI to have excellent interrater reliability with Intraclass Correlation Coefficients (ICCs) for each item ranging from 0.76-0.98.[71] The NOS-E instrument includes 5 items that examine representativeness, comparison group, retention and blinding, and are scored from either 0-1 (4 items) or 0-2 (1 item) for a total possible score of 6.[70] Previous research has found the NOS-E to have excellent interrater reliability with an overall ICC of 0.82 and ICCs for each item ranging from 0.44-0.75.[70] Because the MERSQI and NOS-E assess different aspects of study design it was determined they are best used as complementary assessment tools to achieve a more comprehensive appraisal of the literature.[70,71] The 2 reviewers (LAW and JMH) met to review the instruments to ensure understanding of each item prior to appraisal. They then independently assessed the included studies utilizing the MERSQI and the NOS-E. Differences in interpretation were resolved through consensus where each reviewer stated their justification and the literature was reviewed collectively until an agreement was reached.

The 2 independent reviewers (LAW and JMH) had a high percentage of agreement on the NOS-E instrument (53/55, 96.4%) and good percentage of agreement on the MERSQI (73/88,

83.0%). The results of the critical appraisal for each of the included articles can be found in Table 3. Total scores for the MERSQI ranged from 7.5-15 with an average score of 11.45 (total possible 14). The NOSE- scores ranged from 1-4 with an average of 2.1 (total possible 5).

Abstracted Information

In addition to critical appraisal, information pertaining to each study such as the outcome measures, simulation setting, patient type, program length, participants, TeamSTEPPS® involvement, debriefing and the results were abstracted and can be found in Table 2. To abstract information, each study was first reviewed by all researcher. The primary researcher then highlighted relevant information and compiled it in a table by the category of information. This table was reviewed by all researchers to ensure accuracy and amended as necessary until all authors agreed.

Outcome Measures

We categorized each outcome measure as either an established outcome instrument or an instrument designed specifically for the individual study. For this purpose, we operationally defined established outcome instruments as those that have undergone some or all the following analyses: face validity, content validity, construct validity, criterion-related validity, reliability analysis, and whose results have been published.

Kirkpatrick Model for outcome measures

The modified Kirkpatrick Six-Level Training Evaluation Model is designed to objectively analyze the effectiveness and impact of a training program and provides a framework to categorize the outcome measures associated with a program.[35,36] This version of the Kirkpatrick training model was developed from the original 4-level model to include additional outcome measures which were identified in IPE literature.[36] The six-level Kirkpatrick model has

been used previously in IPE reviews and was selected for the present review to further categorize and describe the outcome measures included.[36,47,75]

The first level of the hierarchical model is 'reaction'.[76] Outcome measures in this category, include survey instruments or in-depth interviews, are used to understand the participant's reaction to the training.[76] The second level, 'learning', focuses on measuring the knowledge, skills, and attitudes changes which occurred as a result of training participation.[76] This level is split into 2 distinct parts; 2a focuses on modifications to the participant's attitudes or perceptions and part 2b examines the acquisition of new knowledge as a result of the program.[36] This level of outcome assessment also utilizes survey instruments. Learning the intended material is important however; using that information to make positive behavior changes is a higher level of evaluation. Thus, Level 3 provides an opportunity to examine behavioral changes that occur as a result of the intervention program.[76] Established outcome instruments at this level provide the means to quantify behavior in order to observe change, and insight into the tangible changes that occur as a result of the intervention. While positive changes in participant behavior are important, they do not necessarily result in positive changes in patient outcomes. Level 4 outcomes are the most challenging to evaluate, but the only level that offers insight into results of the training program. This level is also split into 4a which focuses on changes to the organizational practice and part 4b which directly measures benefits to the patients.[36] While there are innate challenges to this type of evaluation, such as longer follow up time and increased study costs, changes in patient outcomes are often the ultimate goal in healthcare training.[76]

Other information abstracted from the studies included: simulation setting, type of simulation, simulation length, the scenario simulated, and descriptions of the included participants and their role. Finally, information about the didactic portion was abstracted

including specifics on TeamSTEPPS® such as program content, the delivery mode, didactic program length, and the methodology of the debriefing process.

RESULTS

Abstracted Information

Outcome Measures

Nine of the included studies utilized at least 1 established outcome instrument to evaluate their program.[52-54,57,59-63] All the outcome measures have been further summarized below using the previously described Kirkpatrick Model.

Kirkpatrick Model for Outcome Measures

Kirkpatrick level 1

Four of the included studies [53,57,59,60] utilized Level 1 outcome measures. Examples include the 17-item Satisfaction with Simulation Experience (SSES) [53,77] and the 15-item Medical Team Training Program Evaluation Tool.[57,78] Both studies utilized these measures post-training, and found the subjects were satisfied with the training program (Table 2). The remaining Level 1 outcome measures utilized in the included studies were designed specifically for the study in which they were used.

Kirkpatrick level 2

Level 2 outcome measures were the most widely used with a total of 16 outcome measures used in 9 studies. [53-55,57,58,60-63] At this level, there was an equal mix of outcome measures designed specifically for the study and established outcome instruments.

Kirkpatrick level 2a

Level 2a outcome measures were used to assess changes in attitudes or perceptions following the intervention. The specific content of level 2a outcome measures varied, and

included changes in confidence,[53,55] attitudes,[57,60] motivation, [60] self-efficacy, [60] and impressions of safety.[54]

The most frequently level 2a instrument was the TeamSTEPPS® Teamwork and Attitude Questionnaire (T-TAQ). The T-TAQ, or a derivative of it, was used in 4 of the 10 studies.[58,60-62] The T-TAQ assesses a person's attitudes toward the role of teamwork in the delivery of healthcare.[79] The article by Scotten et al (2015) found significant improvements for 3 of the 5 constructs of the T-TAQ 1-month post intervention, and 2 significant construct improvements from pre-intervention to 12-months post intervention. This suggests participant's attitudes towards teamwork improved following the intervention and that these changes may be present for at least 1 year. In addition, Wong et al[62] and Brock et al[60] identified significant improvements in 4 of the 5 constructs following the intervention (Table 2). Another outcome measure associated with TeamSTEPPS®, The Teamwork Perceptions Questionnaire (TTPQ), was utilized to access a person's perceptions of teamwork in 2 of the included studies.[58,61] The study by Scotten et al[61] noted improvements in 2 of the 5 constructs at both 1-month and 12-months post training, which suggests participants perceive the benefits of teamwork to be greater following intervention. Clark et al[58] combined 20 items from the T-TAQ and TTPQ to create a modified outcome measure, and reported a significant increase in participant scores after the intervention (Table 2).

Kirkpatrick level 2b

Level 2a outcome measures which examine the acquisition of knowledge or learning were less frequently included in the presented studies. Examples include knowledge changes in other professions scope of practice[58] and knowledge towards teamwork and other key concepts.[57,60]

Kirkpatrick level 3

Three studies[52,59,63] utilized Level 3 outcome measures. The study by Klipfel et al[59] utilized the 16-item Mayo High Performance Teamwork Scale (MHPTS). This established outcome instrument provides a method for team members to rate the performance of the team based on predetermined behaviors. The MHPTS demonstrates acceptable levels of internal consistency and sensitivity to change.[80] Klipfel et al[59] noted the mean scores for all but 3 of the items increased by 0.7 following the intervention, which suggests improvement in critical behaviors in crisis situations. The Team Performance Observation Tool (TPOT) was utilized by Capella et al[52] to assess team performance during trauma resuscitation. The TPOT is also associated with the TeamSTEPPS® program and rates teams on 21 specific skills using a 1-5 Likert scale. However, the validity and reliability of this instrument has not been published in peer-reviewed literature. Capella et al[52] reported a significant improvement in TPOT scores following the training program suggesting better team performance during trauma situations. Hobgood et al[63] assessed changes in behavior via 2 outcomes scored by 2 raters who did not participate in the program. For this study, the standardized patient (SP) in each scenario completed the 10-item Standardized Patient Evaluation while an independent rater completed the modified Mayo High Performance Teamwork Scale while reviewing a video recording of the simulation. The results from this study indicated no significant difference between the 2 groups on either instrument, indicating the training program did not have the desired effect of improving patient evaluation or team performance [63].

Kirkpatrick level 4

Two studies [52,54] included outcome measures which directly assessed patient care and are thus classified as level 4b outcomes. These outcome measures included clinical data of

mortality,[52] complications or adverse events,[52,54] and time of different treatment parameters such as time from arrival to emergency room to a computed tomography (CT) if required.[52] Another study,[61] did not examine patient care outcomes, but instead examined the engagement between the healthcare provider and the patient as measured by the patient using the 13-item Engagement with Health Care Provider Scale (EHCPS). We believe this outcome measure should also be considered a Level 4 outcome because it assesses a result of the intervention as determined by the patient. The study by Riley et al[54] noted a 37% decrease in perinatal morbidity following the intervention in only the hospital that received the didactic *and* simulation training. The study by Capella et al[52] observed a significant decrease in time to computerized tomography (CT) scan upon arrival, time to the operating room and time to endotracheal intubation. These outcomes are measures of high performance and are crucial during emergency situations.

Setting

Three of the included studies[54,59,61] utilized in situ simulations. For example, Klipfel et al[59] utilized in situ simulation that involved briefing, a scenario, and debriefing. This process occurred within the work place with participants who were available at that time based on the real-world availability of their work schedule. Comparatively, 4 studies [52,55,60,62] stated their simulation occurred in a center designed specifically for simulation training. For example, the study by Wong et al[62] utilized the New York Simulation Center for the Health Sciences. The remaining 4 studies[53,57,58,63] did not state where the simulation occurred.

Modeled Patient

A patient encounter was simulated in all included studies. For 3 studies, SPs were used to model the patient.[53,60,63] Animated mannequins were used in 6 studies. [52,55,59,60,62,63] The remaining studies did not explicitly state how the patient was modeled. [54,57,58,61]

Program Length

Only 1 study[58] designed a program that required multiple sessions and this training program occurred over a semester long course. The remaining 8 studies varied in total time from 3 hours, [53,54,62] 4 hours, [52,57,60] 9 hours [55] or a full day program.[63] Two studies included[59,61] did not provide information about the overall length of their program.

Simulation Scenario

All but 3 of the included studies[58,61,63] explicitly stated an emergency situation was simulated. Examples of simulated emergencies were: a sepsis condition which deteriorated to sepsis shock, [53] an unresponsive patient following a cardiac emergency, [59] and a case of complete heart block and cardiac arrest.[62] In addition, all of the included studies utilized more than 1 simulated scenario within their study. For example, the study by Brock et al[60] included a total of 9 unique simulations: 3 adult acute cases, 3 pediatric cases and 3 obstetric cases. The scenarios included were discipline specific and thus varied greatly. Three studies[54,55,59] noted the included simulations were designed based on real situations that occurred in the past.

Participants

The total number of professions represented in each study varied from 2 to 5 and represented a wide variety of professions including nursing, pharmacy, social work, respiratory therapy, physicians/medical students/residents, and physician assistants (Table 2). The study by Scotten et al[61] did not provide specifics on the professions included, only stating that multiple professions were included. Similarly, the study by Riley et al[54] stated all labor and delivery staff were eligible to participate without delineating the professions included. Four studies[53,57,58,60,63] included healthcare students, while the remaining 6 studies[52,54,55,59,61,62] included licensed healthcare professionals. There were no studies that included students and healthcare

professionals together, but 3 studies[52,54,59] included medical residents along with hospital staff in simulations.

TeamSTEPPS® Involvement

The extent to which TeamSTEPPS® was integrated into the didactics varied along with the extent of didactic description between all studies. Five studies[55,57-59,62] stated TeamSTEPPS® principles guided the formation of their didactic session, but did not state the specific areas of focus. Other studies selected specific parts of the TeamSTEPPS® curriculum to focus their learning content. The most popular area of focus was the SBAR[53,54,61,63], which creates a means for standard interprofessional communication. Other studies stressed different TeamSTEPPS® content including a briefing[52,61,63], "I am concerned, uncomfortable, this is a safety issue" or CUS[52,61,63], closed loop communication and communication skills[54,60], call-out[52,53] and check back.[52,53] More infrequently stressed TeamSTEPPS® content included situational awareness,[54] "status, team, environment, progress" or STEP,[52] shared mental model,[54] and feedback to acknowledge.[53]

Debriefing

A formal debriefing after the simulation occurred in all 11 studies.[52-55,57-63] Three of the studies[52,59,63] video-recorded the simulation and reviewed the recording as part of the debriefing process. An additional study[61] noted the in-situ simulations were recorded but did not state if these recordings were used for debriefing. Debriefing sessions were facilitated by persons not actively participating in the simulation including educators, [52,63] physicians, [52,53,55] and nurses.[52,53,55] These persons were often educated on standard debriefing procedures to ensure effective debriefing for the participants.[57] In addition, Brock et al[60] included participants of the simulation and observers of the simulation in each debriefing process. While some studies

explicitly stated the debriefing was short, the study by Riley et al[54] included a full 2-hour debriefing immediately after each 30-45-minute simulation. The study by Clark et al[58], which included many parts and occurred over the course of an academic semester, did not provide descriptive information about the debriefing portion of the intervention.

The delivery method and length of the didactic portion varied across studies. For the studies which gave a specific time component for only the didactic portion,[52,54,55,60,63] the length of this portion varied from 1 30-minute session[54,62] to 1 2-hour session.[52] The study by Figuro et al[55] was the only study which stated multiple didactic lectures were performed in a series (3 lectures x 30 minutes/lecture). The remaining studies[58-61] did not provide specifics on the length of the didactic TeamSTEPPS® portion of their intervention. The delivery method for the TeamSTEPPS® content included lecture based,[55,57,62,63] pre-assigned reading material,[53] and an audiovisual webinar.[54]

DISCUSSION

The purpose of this systematic review was to synthesize, critically appraise, and evaluate existing IPE programs which utilize didactic TeamSTEPPS® in conjunction with healthcare simulation. A secondary purpose of this review was to summarize the associated outcome measures utilized and the results of these programs. The critical appraisal of each article offered an opportunity to further examine the quality of the included studies. The article by Riley et al[54] scored the highest on the MERSQI with a total score of 15. The same article,[54] as well as the article by Hobgood et al[63] scored the highest on the NOS-E with scores of 4. Two of the 5 questions on the NOS-E appraisal tool regard the comparison group. A majority of the included studies employed a prospective pretest posttest study design, and a comparison group was not utilized. Therefore, 8 of the 10 studies did not receive any points for these questions.[52,55,57-62]

Similarly, a lack of diversity in the sampling institution resulted in lower scores on the MERSQI. To improve scores on the MERSQI and NOS-E instruments researchers should consider employing control groups, include participants from multiple institutions, and include validated outcome measures.

While most studies evaluated the intervention immediately, 3 studies[55,61,62] examined the changes at additional time points. Two of these studies,[55,61] examined the same outcome measures at multiple points after the intervention. Figueroa et al[55] evaluated immediately and at 3-months post intervention and identified significant changes in confidence and skills in the role of team leader, advanced airway management, cardioversion/defibrillation, and an increase in use of TeamSTEPPS® concepts at both follow-up times. Additionally, Wong et al[62] utilized the HSOPS survey pre-intervention and 1 year afterwards and found 3/6 safety culture composites showed a significant improvement in the percentage of positive responses. Scotten et al[61] evaluated participants at 1-month, 6-months and 12-months post intervention. This study found mixed results as some subcategories of the T-TAQ and T-TPQ were only statistically different immediately following the intervention while others were only significantly different at the later time points.[61] These inconsistent findings support the need for future studies to incorporate a longitudinal assessment of level 2, 3 and 4 outcomes of IPE programing.

Completion of the TeamSTEPPS® program in its entirety takes approximately 6 hours, and not all content may be applicable to all learners. Therefore, TeamSTEPPS® was designed to be adapted to the particular needs of the group to whom it is being taught [50] and variations in content and time to completion were noted in the included studies. The included studies taught specific portions of the program or used TeamSTEPPS® principles to direct their own, much shorter, didactic learning programs. However, the processes involved in reducing the

TeamSTEPPS® content was often not thoroughly described, nor were specifics surrounding what, and how TeamSTEPPS® content was delivered to the participants. Given the lack of information provided, the content delivered in these studies cannot be replicated in future research or didactic sessions. Future research should include additional information regarding the didactic education so the methods can be replicated and external validity confirmed. Furthermore, studies should explicitly state the amount of time it took to implement the program so the reader has a better understanding of the time involved.

As the use of IPE programs continues to grow, particularly those involving TeamSTEPPS® content along with healthcare simulation, the use of best evidence should become routine. Previous research, and the findings from this study illustrate areas of potential improvement in IPE. A lack of descriptive methodology has been identified as an area for improvement in the IPE literature.[81-83] Specific to this review, the researchers noted the description of how TeamSTEPPS® was modified and delivered for each specific program was incomplete. Without thorough description of these processes, replication and comparison between programs is challenging. The evaluation of IPE programs has also been identified as an area of potential improvement.[49,81] As was seen in this study, outcomes are typically assessed using a plethora of self-reported survey instruments which are given immediately post intervention. While these measures are important, considerations should be given to the use of common instruments which can be employed overtime to allow for comparison between studies and a further understanding the long-term effects of IPE. [47,81] While the T-TAQ was used frequently in the included studies in this review, additional invalidated and undetailed outcome measures were also used throughout the included studies. Future IPE research should focus on

increasing the external validity of published papers by utilizing validated outcome measures and further delineating all aspects of learning content.

Limitations

One limitation to this review is that we only included studies that used pre-and post-test study designs. There are other valuable study designs which include post-test measures only and qualitative methodology to examine the effectiveness of TeamSTEPPS® training. Another limitation of this review was the electronic means through which the search was conducted and the inclusion of only papers published in English. In addition, theses, dissertations, and capstone projects involving IPE and TeamSTEPPS® content were excluded. Though every attempt was made to avoid omissions, it is possible additional studies were omitted. Finally, we acknowledge there are other crew resource management programs designed to train participants in team training or interprofessional communication. The TeamSTEPPS® program was developed using crew resource management framework. We elected to mandate the didactic portion be based on TeamSTEPPS® to increase continuity between studies.

CONCLUSION

The results of this systematic review revealed IPE programs which incorporate didactic TeamSTEPPS® and healthcare simulation result in positive change for a variety of outcome measures. While many reviews on IPE programming exists, this is the first review to specifically examine the use of TeamSTEPPS® and simulation in IPE programs. The use of TeamSTEPPS® principals along with healthcare simulation is a popular method to educate healthcare students and practitioners to improve teamwork and communication with the goal of improving patient outcomes. There is great diversity among the design of such programs and the evaluation methods. Thus, comparisons between studies are difficult to make. As new IPE programs are

implemented, previous findings from research studies should guide development of the IPE programming, implementation of the didactic content, and evaluation so that the effectiveness of such programs can be improved upon. Furthermore, future research should use established outcome instruments to compare results and also consider the Kirkpatrick levels of outcomes to add to the evidence.

Figure 1. PRISMA Search Schematic

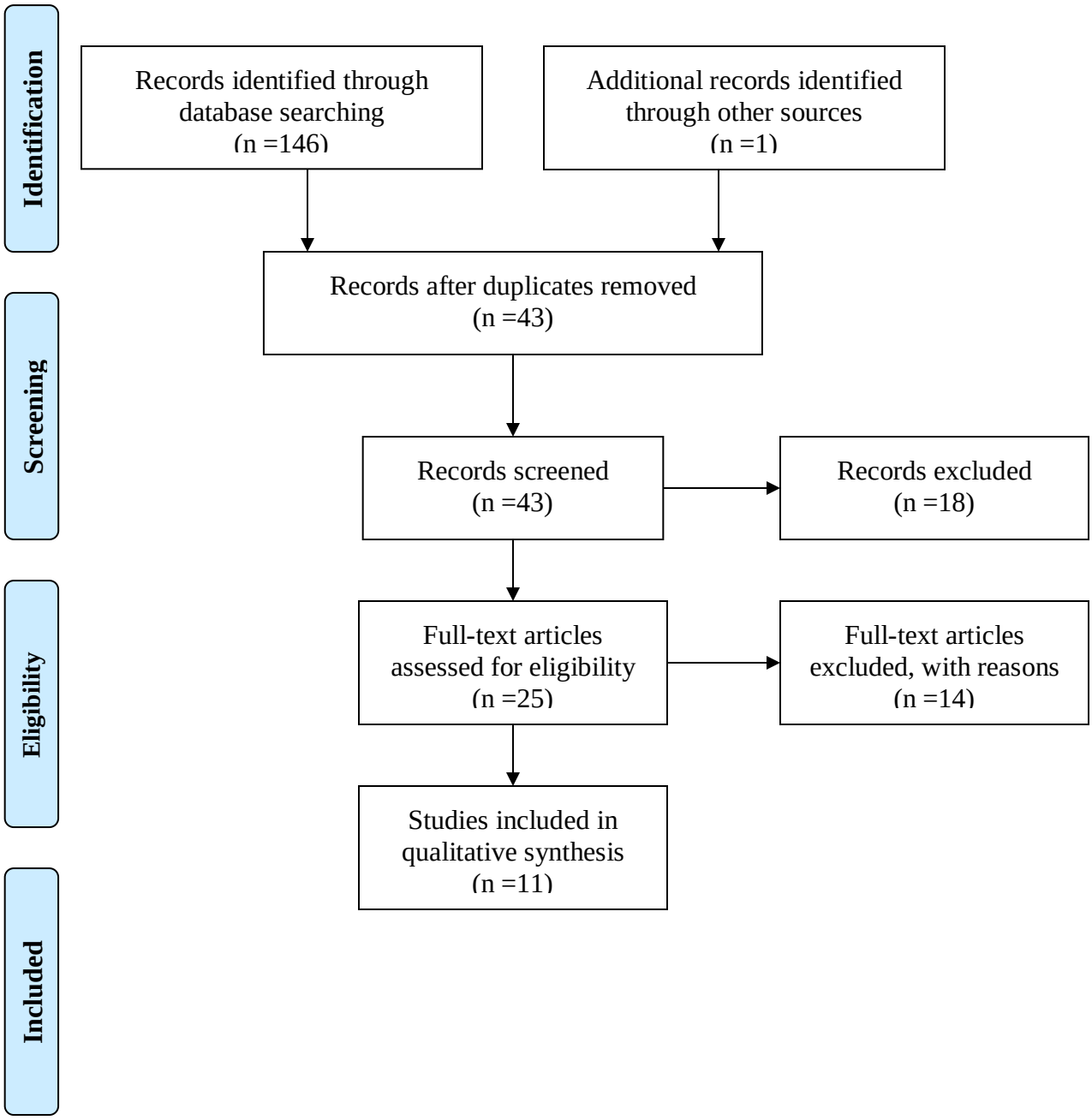

Table 1. Search Summary

Step	Search Terms	Boolean Operator	EBSCO Host	PubMed
1	TeamSTEPPS Team STEPPS Inter professional education	OR	1,362	52,797
2	Simulation Simulator	OR	1,042,421	289,436
3	1, 2	AND	155	33
Duplicates				146*
Total Identified				42

*Total number of duplicates between EBSCO and PubMed.

Table 2. Characteristics of Included Studies

	Outcome Measures	Characteristics (location, patient, length)	Simulation Scenario	Participants	TeamSTEPPS® content	Debriefing	Results
Brock [36]	Pre-and post: 1. T-TAQ 2. Attitudes, Motivation, Utility and Self-Efficacy (AMUSE). Post only: 3. An instrument to report perceived frequency to practice communication skills. 4. Respondents rated their understanding of key concepts	Simulation Center. Animated mannequin and standardized patient. 4 hours.	3 adult acute cases 3 pediatric cases 3 obstetric cases Each lasted 1-hour. Students actively participated, or observed, based on the number of participations.	149 students completed both the pre-training and post training outcome instruments (4th year medical-73, 3rd year nursing-46, 2nd year pharmacy-23, 2nd year PA-7).	The framework for the didactic portion of the educational training content was TeamSTEPPS®.	Facilitator led debriefing afterwards.	AMUSE achieved acceptable internal consistency (α=0.90). Positive changes post for the AMUSE total score and subscales. T-TAQ exhibited acceptable internal consistency (α=0.93). Overall T-TAQ scores increased (p<0.00). Pharmacy students had lower motivation scores than medical or nursing students (*P*=0.010) and medical students reported higher post levels of self-efficacy than nursing or pharmacy students.
Capella [11]	1. TPOT 2. Clinical data from trauma registry	Simulation center. Animated mannequin. 4 hours.	A 2-hour simulation included 3 different scenarios. Details on the cases were not provided, but they were designed to be simple and allow for practice of didactic learning principles.	Nurses (n=16), residents (n=28), faculty surgeons (n=6) in a level-1trauma center.	2-hour didactic of TeamSTEPPS® essentials; briefing, STEP, CUS, call outs and check backs.	Simulations were recorded and reviewed. Feedback was provided by a team of educators.	Team performance improved significantly across all domains of TeamSTEPPS® (leadership, situation monitoring, mutual support and communication). Significant decrease in time to CT (*P*=0.005), time to intubation (*P*=0.049), and time to operating room (*P*=0.021) post training. No other significant differences found between groups.

Table 2. Continued

	Outcome Measures	Characteristics (location, patient, length)	Simulation Scenario	Participants	TeamSTEPPS® content	Debriefing	Results
Clark l[34]	1. 20 statements T-TAQ and TTPQ 2. 12 statements on IPE, simulation, knowledge of professions, and what they hoped to (pre) or did (post) gain.	Semester long course	Students were divided into groups during the semester long IPE elective course. 5 simulations occurred during the semester that used high, medium and low fidelity technology.	45 students pre and 37 post. Included pharmacy, nursing, social work, and respiratory therapy students.	TeamSTEPPS® provided the conceptual underpinning for all aspects of this study.	Debriefings occurred during the course, but specifics were not provided.	Significant increase post intervention in perceived understanding of scope of practice. Students gained an appreciation for the complexity of ICP. Increase in simulation experience was noted post intervention and an increase in the perceived number of professionals needed for ICP.
Figueroa[14]	Occurred pre, post, and 3 months post. 1. Subjects perception of their confidence and skills. 2. TeamSTEPPS® involvement	Simulation center. Animated mannequin. 9 hours.	6 cases were developed from emergencies in the previous year.	37 total (23 nurses, 5 cardiology/critical care, 5 respiratory therapists, 4 other) from Pediatric Intensive Care Unit	3 30-minute lectures reviewed TeamSTEPPS® principles. Simulations addressed TeamSTEPPS®.	Structured debriefing occurred in 3 parts; reaction, discussion of issues encountered, and a summary.	Confidence and skills in team leader, airway management, cardio/defibrill increased significantly immediately post training and 3 months later. An increase in TeamSTEPPS® use occurred immediately after training and 3 months post.

Table 2. Continued

	Outcome Measures	Characteristics (location, patient, length)	Simulation Scenario	Participants	TeamSTEPPS® content	Debriefing	Results
Hobgood [32]	1. 36-item Teamwork Attitudes instrument 2. 12-item Teamwork Knowledge test 3. 10-item standardized patient (SP) evaluation 4. 20-item modification of the Mayo High Performance Teamwork Scale	Not stated. All subjects participated in a SP exercise, 80/438 participated in an exercise with an animated mannequin as well. A full day.	160/438 subjects in high-fidelity and 80 in a low-fidelity For all simulations, students were divided into groups of 4 and used the same 2 scenarios.	203 senior nursing students and 235 4th year medical students.	90-minute didactic focused on Situation Awareness, Shared Mental Model and Leadership. Also trained in Briefs, Call-Outs, Check-back and De-briefs, SBAR and CUS.	High-fidelity debriefing used a video-recording facilitated by a faculty member. Low-fidelity debriefing involved discussion only.	Attitudes towards teamwork improved following the intervention (*P*=.0.001) in all cohorts. Knowledge improved following the training for all groups. SP evaluations were reliable. The High-Performance Teamwork scale demonstrated excellent inter-rater reliabilities. No significant differences were found between groups on this measure.
Klipfel [35]	1. 16-item Mayo high performance teamwork scale 2. 10-item reaction to the training questions-only given post intervention.	In-situ. Animated mannequin.	1 deteriorating patient case and 1 emergent experience. Began with orientation to the room and continued with a change report.	Based on real-world availability. 23 subjects (18 RN and 5 urology residents).	Discussed TeamSTEPPS® principles and TeamSTEPPS® guided simulation development	Review of simulation video as strategies from the didactic portion were discussed.	Mean scores of Mayo increased by ≥0.7 for items 5, 9, 12, 15. Mean scores increased (<0.7) for all but three items (8,10,11). Participants had favorable outcomes towards the simulation experience.
Liaw [12]	1. 5-item Confidence scale 2. 8-item perception of the program 3. 17-item satisfaction with simulation experience	Standardized patient. 3 hours.	Orientation to the simulation environment. Included a patient with a sepsis condition and a continuation when the patient deteriorated.	125 medical (n=33) and nursing (n=92) students.	Communication strategies taught were adapted from TeamSTEPPS®.	Lead by nursing and medicine facilitators after the hands-on experience to allow for reflection.	Confidence and perception scores improved significantly post training. There were no significant differences found in confidence and perception between medical and nursing students. Overall, all students reported being satisfied with the learning experience.

Table 2. Continued

	Outcome Measures	Characteristics (location, patient, length)	Simulation Scenario	Participants	TeamSTEPPS® content	Debriefing	Results
Riley [13]	1. Perinatal morbidity and mortality 2. 10-item Weighted Adverse Outcome Score 3. 38-item Safety attitude questionnaire	In situ. 3 hours.	11 simulations were developed from incidents previously experienced. The simulations lasted approximately 30-45 minutes.	3 small community hospitals All labor/delivery staff could participate. All women admitted between 2005-2008.	Based on TeamSTEPPS® situational awareness, SBAR, closed-loop communication, and shared mental model.	A 2-hour debriefing session occurred immediately after the simulation.	Significant (37%) improvement in perinatal morbidity for the didactic and simulation hospital only. No significant changes for any hospital in culture of safety measures.
Robertson [33]	1. 12-item teamwork knowledge test 2. Collaborative Healthcare Interdisciplinary Relationship Planning 3. Team Skills Checklist 4. Medical Team Training Program Evaluation tool	4 hours	Simulations included resuscitation and treatment of a myocardial infarction and were designed to incorporate TeamSTEPPS® principles. Students self-selected their role and received a written description of their role.	3rd year Medical students (n=104) and 1st year nursing students (n=88) completed all outcome measures.	The opening lecture incorporated the skills and tools in TeamSTEPPS® curriculum.	Debriefing occurred after the simulations and was led by the nurse and physician facilitators who received debriefing tools.	Significant improvement in knowledge of team skills for both disciplines ($p<0.001$). Significant improvement in attitudes towards teamwork for nursing students only ($P=0.004$). Participants were satisfied with the training as evident by satisfaction scores. Simulation was rated the highest of the teaching strategies used.
Scotten [37]	1. T-TAQ 2. T-TPQ 3. IP Team Performance Scale. 4. Team Collaboration Scale 5.Engagement with Health Care Provider.	In situ	Participant selected and impromptu. < 15 minutes and was designed to allow for practice of skills without work interruption.	65 facilities participated in the program, but only 8 facilities completed all pre/post-training measures.	ISBAR, Brief and CUS were the TeamSTEPPS tools of emphsis.	Performed immediately after simulation.	Team structure, leadership, and situation monitoring improved ($p<0.05$). TTPQ subscales of team structure and communication improved.

Table 2. Continued

	Outcome Measures	Characteristics (location, patient, length)	Simulation Scenario	Participants	TeamSTEPPS® content	Debriefing	Results
Wong [38]	1. T-TAQ 2. Hospital Survey on Patient Safety Culture	Simulation Center. Animated mannequin. 3 hours.	2 event-based simulations were developed; an elderly man with rapidly worsening respiratory distress secondary to bacterial pneumonia and a 60-year old man in cardiogenic shock secondary to complete heart block.	72 emergency department nurses and resident physicians. 32 completed responses 1 year post	The TeamSTEPPS® curriculum was adapted to fit the goals of the study	Instructors conducted debriefings after each case. Major discussion points focused on teamwork and communication.	4/5 teamwork construct questions groups showed significant improvement following the program. The remaining, 'communication' was nearly significant *P*=0.107). HSOPS responses were 100% before the program and 44% at one year. 3/6 safety culture composites showed significant improvement in the percentage of positive responses following the program.

Table 3. Critical Appraisal with MERSQI and NOS-E Scores

Questions	Brock et al[36] (2013)	Capella et al[11] (2010)	Clark et al[34] (2015)	Figuero a et al[14] (2013)	Hobgoo d et al[32] (2010)	Klipfel et al[35] (2014)	Liaw et al[12] (2014)	Riley et al[13] (2011)	Roberts on et al[33] (2010)	Scotten et al[37] (2015)	Wong et al[38] (2016)
MERSQI											
Study Design	1.5	1.5	1.5	1.5	3	1.5	1.5	3	1.5	1.5	1.5
Sampling: institutions	0.5	0.5	1	0.5	1	0.5	0.5	1.5	0.5	0.5	0.5
Sample: response rate	0.5	0.5	0.5	1.5	1.5	0.5	1.5	0.5	1.5	0.5	1
Type of data	1	3	1	1	3	1	1	3	1	3	1
Validity evidence for evaluation instrument	1	1	1	0	1	1	1	1	1	1	1
Data analysis: sophistication	2	2	1	2	2	1	2	2	2	2	2
Data analysis: appropriate	1	1	1	1	1	1	1	1	1	1	2
Outcome	1	3	1	1	1.5	1	1	3	1.5	3	1.5
Summation score	8.5	12.5	8.0	8.5	12.5	7.5	9.5	15	10	12.5	10.5
NOS-E											
Representativeness of intervention group	1	1	1	1	1	1	0	1	1	1	1

Table 3. Continued

Questions	Brock et al[36] (2013)	Capella et al[11] (2010)	Clark et al[34] (2015)	Figuero a et al[14] (2013)	Hobgoo d et al[32] (2010)	Klipfel et al[35] (2014)	Liaw et al[12] (2014)	Riley et al[13] (2011)	Roberts on et al[33] (2010)	Scotten et al[37] (2015)	Wong et al[38] (2016)
Section of comparison group	0	0	0	0	1	0	0	1	0	0	0
Comparability of comparison group	0	0	0	0	1	0	1	1	0	0	0
Study retention	0	1	1	1	1	1	1	1	1	0	0
Blinding Assessment	0	0	0	0	1	0	0	0	0	0	0
Summation score	1	2	2	2	4	2	2	4	2	1	1

CHAPTER III

METHODOLOGY

The purpose of this study was to investigate the effects of an online learning program designed to teach the skills necessary for improved interprofessional collaboration between ATs and SNs. This chapter provides a detailed explanation of the research methodology that was used.

STUDY DESIGN

The study was a mixed method, quasi-experimental, one-group pretest-posttest design involving one group of participants with repeated measurements taken before and after an intervention.[84] However, 2 of the selected outcome measures were completed at only 1 time point, after participation in the intervention.

The qualitative interview employed a social constructivism research paradigm. This paradigm was used to make sense of the participant's world by learning about the constructs that lead to their current views on the discussed topics. [85]

SAMPLING PROCEDURES

This study used a convenience sample of ATs and SNs currently employed in urban high schools in one school district. No exclusions were made from this group. To recruit participants, 2 investigators attended a prescheduled meeting for each of the professions i.e. 1 meeting for the ATs and a separate meeting for the SNs. This was arranged and coordinated in advance through the supervisor of each group. At each meeting, the researchers introduced themselves, discussed the purpose of the project and provided a general overview of the methods including what is required from each participant. Participants were then recruited through a sign-up sheet that allowed interested persons to provide their names and email addresses (Appendix C). The

interested individuals were contacted via telephone to confirm their interest, complete the consent process and the first interview question. Following this call, the researchers provided the participant with the link to access the survey via email. The study remained open for 3 weeks, with 2 weekly email reminders sent to each participant 1 week after the initial email was sent. One month following completion of the online portion of the study, the participant was contacted and completed the qualitative interview.

The supervisor who facilitated the meeting provided a list of individuals, as well as their contract phone number and/or email address, for those who were unable to attend the staff meeting. Any eligible individuals not present at the meeting were contacted to determine their interest in participation. All recruiting occurred after the study was approved by the Institutional Review Boards (IRB) from the school district and the university conducting the research.

Setting

Excluding the telephone interviews, the study was completed entirely online. Therefore, the participants individually selected where they wished to complete the study and the computer or tablet they used. The interviews were conducted over the telephone at a mutually agreed upon date and time.

Sample Size

The goal of this pilot study was to collect preliminary results on IPE programs in a unique population that provides healthcare services outside of what is included in previous IPE literature. Because this is a pilot study, research to determine the sample size needed is varied.[86] The maximum number of participants for this study was 22 (11 ATs and 11 SNs from the selected high schools).

Human Participants

Before beginning any study related procedures, approval was obtained from the University IRB and the school district. Participants were informed of the benefits and risks associated with the study and informed about their right to say no and/or withdrawal from participation at any time.

PROCEDURES

Once a participant expressed an interest in participation, he or she was contacted via the telephone number they provided to orally consent and complete a primary qualitative interview question (Appendix D). Following consent, the participant responded to 1 interview question. These responses were recorded on a USB recorder (QZTELECTRONIC 8Gb). For back up, the audio was also recorded on an iPhone through the video recording capabilities only (IOS 6). After completion of the phone call, each participant was provided a web link to access the online portion of the study. Participants moved through the online content at their own pace; however, the researchers estimated the online portion took approximately 1 hour to complete.

The online program began with the participant completing 4 surveys: the demographics questionnaire (Appendix E), Roles and Responsibilities Knowledge Survey-AT (RRKS-AT) (Appendix F) or Roles and Responsibility Knowledge Survey-SN (RRKS-SN) (Appendix G), General Efficacy Scale (GSE) (Appendix H), and TeamSTEPPS®-Teamwork Attitude Questionnaire (T-TAQ) (Appendix I). Once these measures were completed, the participant progressed to the learning content. Following the learning content, they progressed to the simulation activity and then completed the posttest outcome measures which include: the RRKS-AT or RRKS-SN, T-TAQ, GSE, System Usability Scale (SUS) (Appendix J) and Participant Response Survey (PRS) (Appendix K).

The second portion of the qualitative interview occurred over the telephone, approximately 1 month after completion of the online program (Appendix L). The researchers contacted each participant to schedule the interview immediately following completion of the online portion. Similarly, to the initial interview question, interviews were recorded on a USB recorder (QZTELECTRONIC 8Gb) and backup audio was recorded on an iPhone (IOS 6). Following completion of the interview, the participants were given the opportunity to provide their name and email address to be entered to win a gift card. Once the interviews were transcribed, each participant's transcription was sent to them via email to be reviewed and ensure transcription accuracy.

INSTRUMENTS AND MEASURES

Demographic Questionnaire

The questions in the demographic section were brief with the primary goal to better describe the participants of the study (Appendix E). Of interest was the amount of experience each healthcare professional had in their field and the amount of time at their current place of employment. Additional questions in this section included age and level of education. This measure was completed prior to the learning intervention only.

Roles and Responsibilities Knowledge Survey

There are 2 separate RRKS (RRKS-SN, RRKS-AT) instruments which were designed specifically for the study and have not been previously validated. The RRKS-AT was used to determine ATs knowledge of the roles and responsibilities of SNs (Appendix F). The RRKS-SN was completed by SNs and used to determine the SNs knowledge of the ATs roles and responsibilities (Appendix G). The survey content was compiled based on previous research

regarding the role of each profession as well as job descriptions of each.[24,27,37,87] An expert panel consisting of clinicians in each discipline reviewed the instruments for content and clarity.

The RRKS-AT consisted of 10 items and the RRKS-SN 12 items where the participant was asked to select agree, disagree or unsure. This instrument was not designed to produce an overall score. Instead, the percentage of correct response for each item was calculated. The RRKS-AT and SN measures were given pre-and post-intervention to determine changes in the knowledge of the roles and responsibilities of the other health profession following the learning intervention.

General Self-Efficacy Scale

The GSE scale is an open-access measure of self-reported self-efficacy (Appendix H).[88] This 10-item instrument is widely used with reported acceptable internal consistency of Cronbach's alphas between 0.76-0.90.[88] To complete this instrument participants selected a level of agreement for each of the 10 items which range from not at all true, hardly true, moderately true to exactly true.

The GSE is scored by assigning a numerical value to each item where a response of 'not at all true' is awarded 1 point, 'hardly true' is awarded 2 points, 'moderately true' 3 and 'exactly true' is awarded 4 points. The scores were then summed for a total score, ranging from 10-40. The GSE was administered before and after the completion of all learning content to examine how capable an individual thinks they are and changes they think may occur following the program.

TeamSTEPPS® Teamwork and Attitudes Questionnaire

The TeamSTEPPS® Teamwork and Attitude Questionnaire was designed to be used with the TeamSTEPPS® program to assess a person's attitudes toward the role of teamwork in the

delivery of healthcare (Appendix I).[89] The T-TAQ is comprised of 30 questions divided into 5 constructs each with 6 corresponding statements: Team Structure, Leadership, Situation Monitoring, Mutual Support, and Communication. The T-TAQ exhibits acceptable internal consistency for each construct with Cronbach's Alphas of 0.70, 0.81, 0.83, 0.70 and 0.74 respectively.[89] This instrument was designed to be used as a stand-alone instrument or to evaluate changes overtime.

The TeamSTEPPS® program recommends T-TAQ scoring by either providing a total score for each of the 5 constructs or an overall average from all 30 items.[89] First, each item is scored from 1-5 where items scored as 'strongly disagree' are given 1 point, 'agree' is awarded 2 points, 'neutral' is 3 points, 'agree' is 4 points and items scored as 'strongly agree' are given 5. For the 4 negatively worded questions (items 20, 21, 24, 30) the scores were reversed, as is recommended.[89] Each item score was then averaged for each construct or for the overall instrument. For example, a score of 4.23 on the Mutual Support construct indicates, on average, participants rated the 6 items in that construct 4.23 or slightly above an 'agree' rating. For this study, the T-TAQ was used pre-and post-intervention to examine changes in attitudes towards the concepts taught in TeamSTEPPS® after completion of the intervention.

System Usability Scale

The System Usability Scale was designed to asses a participant's response to a system (Appendix J).[90] The term 'system' encompasses many types of interface including web, cell phone, hardware, TV, and interactive voice response. The SUS has been found to be a reliable instrument with a Cronbach's Alpha score of 0.911.[90] The SUS includes 10 items rated on a 5-point Likert scale. There are 5 positive statements and 5 negative statements that alternate to decrease response biases. Participants selected their agreement, from strongly disagree to

strongly agree, for each item. The scoring of the SUS is as follows; for items 1, 3,5,7,9 the score is the Likert scale number minus 1. For items 2, 4, 6, 8 and 10 the item score is 5 minus the number from the Likert scale.[91] Once the individual items have been scored and summed this number is multiplied by 2.5 to obtain the overall SUS score. Total scores range from 0-100 where 0 indicates poor system usability and 100 indicates a useable system.[91]

The researchers thought it prudent to include this measure because the learning content was delivered entirely online, which may pose a challenge for some participants. Thus, a measure of system usability was felt to be necessary. This measure was collected after completion of the intervention to examine participants perception of the usability of the online delivery system.

Participant Response Survey

The Participant Response Survey was developed by the researchers to better understand the participant's views of the program (Appendix K). The PRS includes 6 items which were scored on a 5-point Likert scale ranging from 'strongly agree' to 'strongly disagree' where strongly agree is awarded 5 points and strongly disagree 1 point. Instead of summing each item and providing an overall score, the PRS was reviewed qualitatively and the researchers summarized the findings for each of the 6 items. This instrument was completed following the learning content and used to gain a better understanding of how the participants viewed the program.

Interview Questions

The qualitative interview questions were designed specifically for this study to further describe the interprofessional communication occurring between ATs and SNs. As such, the questions were designed to encourage dialogue surrounding the concepts of communication

between the SN and AT before and after the intervention (Appendix L). In addition, questions were included to provide participants with an opportunity to discuss their views on the training program. The interview questions were open-ended by design, and included additional prompts throughout to help stimulate participant discussion.

INTERVENTION

The intervention for the purpose of this dissertation was the learning content and simulation activity. The learning content was divided into 4 parts that each participant progressed through at a self-selected pace. Part 1 instructed on the roles and responsibilities of either SNs or ATs. This content was specific to the type of provider completing the learning content so that a SN received learning content regarding the AT's roles and responsibilities while the AT received learning content regarding the SN's roles and responsibilities. Parts 2 and 3 provided the TeamSTEPPS® instruction and Part 4 provided a summation simulation activity. Parts 1-3 were delivered via voiced over PowerPoint presentations to provide consistent visual and auditory learning across all participants. Part 4 was delivered through 2 video vignettes. The delivery modes were selected to allow participants to pause the content and review as necessary throughout. More information regarding intervention content and development is provided below.

Part 1: Roles and Responsibilities

There were 2 versions of Part 1, ***Roles and Responsibilities.*** The Roles and Responsibilities-School Nurse was given to the SNs and taught the roles and responsibilities of the AT. The Roles and Responsibilities-Athletic Trainer was given to the ATs and taught the roles and responsibilities of the SN. The content in Part 1 was developed using information from professional organizations and the existing literature regarding the role of each profession as well

as job descriptions. [24,27,37,87] An expert panel of clinicians from each discipline reviewed the content for accuracy and clarity prior to use. The researchers estimate this portion took approximately 10 minutes for each participant to complete.

Part 2 and 3: TeamSTEPPS®

The next 2 parts provided the TeamSTEPPS® content. For Part 2, the participant was instructed on ***Team Structure.*** Team Structure provided information about forming and maintaining successful teams. Once the participant reviewed this presentation, they completed a short survey (Appendix M) to test their knowledge of the content. The purpose of this is to ensure each participant reviewed the learning content to a satisfactory level. These scores were not reviewed by the researcher or included in data analysis. Following the successful completion of Part 2, participants moved to Part 3 ***Communication***. The goal of this portion was to teach the components of successful communication and provide specific strategies to achieve optimal communication. Again, the participant completed a posttest activity (Appendix N) following the learning content. The researcher's estimate Parts 2 and 3 took approximately 30 minutes to complete.

Part 4: Simulation

The final portion of the learning content included a summation activity consisting of 2 videotaped simulations. The scenario simulated was a handoff between an AT and SN. This scenario was selected as ATs and SNs often work at different times, but with the same population. Therefore, a proper handoff is imperative for ICP. All handoff components were taught in the didactic portion of the program ensuring the participants had previous knowledge of the procedures and content of a proper handoff.

The first simulation demonstrated a poor handoff which contained numerous errors. After viewing the poor simulation, the participants were prompted to describe 3 errors they observed. This exercise allowed each participant to think critically about a handoff and recall information from previous didactic portions of the program. Once the participants identified 3 errors, they were provided a complete list of the errors made in the handoff to review (Appendix O). This ensured the participants are aware of all errors so poor behavior is not reinforced. Lastly, the participants watched a second handoff simulation that is free from errors and can be used as an example to model their own future handoffs.

Both simulations occurred in an environment designed to mimic a high school clinic. This was done to increase the relevance and credibility to the intended population. In addition, the actors who participated in the simulation were knowledgeable of the role of ATs and SNs to further illustrate an authentic simulation for the participants included in this study.

DATA ANALYSIS

Quantitative Analysis

Data analysis began by summarizing demographic information for all participants including means and standard deviations (STDEV) where appropriate. For each instrument (RRKS-AT/SN, GSE, T-TAQ, SUS and PRS) descriptive statistics (median and range) were completed for the overall instrument score and for each item within the instruments. Summary data was reported in aggregate as well as separated by professional groups. Because the RRKS-SN/AT instruments haven't been used previously, Cronbach's alpha was used to establish internal consistency. Cronbach's alpha scores range from 0.00-1.00 and scores that approach 0.90 or greater are considered to be reliable.[84] A Wilcoxon signed-rank test was used to examine differences in scores pre-and post the learning intervention. For this analysis, the dependent

variable was the score on the RRKS and the independent variable was time. Significance level will be set a-priori at $P<0.05$ for all analyses. This level was selected because of the small sample size anticipated and the exploratory nature of the study.

The GSE and SUS analysis compared the present study data to previously reported GSE and SUS industry norms.[88 90] The goal of this analysis was to allow the researchers to highlight specific areas where the participants deviated from the norm. This was accomplished by providing comparisons each item and reviewing scores qualitatively.

For the T-TAQ instrument, differences in T-TAQ scores following the intervention were compared through descriptive statistics and a Wilcoxon test with a dependent variable of T-TAQ score and an independent variable of time (pre-and post). Additional analysis included the examination of changes within each construct. This was completed by computing additional Wilcoxon tests for each construct and each professional group. By examining change scores, the researchers were able to determine which constructs demonstrated the most change after the intervention.

The information gleaned from the PRS instrument was used to provide insight into the reaction to the program. The researchers highlighted areas of interest such as the lowest and highest scoring items and the percent of agreement with each statement.

Qualitative Analysis

A phenomenological approach provided the framework for the analysis of the qualitative interviews.[85] After transcription was complete, each transcription was emailed to the participant to review and determine accuracy. Following participant approval, the researcher read through the data and began to determine underlying themes. Once overarching themes were identified, the researcher coded the data with preliminary horizontal coding where like responses are

colored and labeled similarly. The researcher then noted the relationships between themes and removed information that was not significant within and across interviews. The codes were then clustered together using their natural relationships to create larger related themes.

Several strategies were employed to increase the trustworthiness of this study. First, the researcher kept a reflexive journal throughout the process to note ways in which the research may be impacting the researcher. The researcher utilized constant comparison where the works of previously coded interviews were used as a reference point for subsequent coding.[92] Similarly, the researcher simultaneously collected and analyzed data so that the research questions and methods were adjusted as the data was collected.[92] In addition, the researcher utilized a codebook throughout the process that was reviewed by the external auditor and discussed in peer debriefing. Peer debriefing occurred throughout the research process to examine areas for potential trustworthiness improvements with an outside team of colleagues, clinicians and other interested parties. An audit trail was kept throughout the process which included information such as the research timeline, field notes, interview protocol, codebooks and additional information to provide evidence of systematic data collection and analysis methods.[92,93] Lastly, 2 researchers analyzed all data and met to compare codes and as well as themes twice during the analysis process.

CHAPTER IV

RESULTS

DEMOGRAPHICS

A total of 21 ATs (age=35.14±11.58) and 7 SNs (age=52.71±5.74) completed the intervention portion of the study including the pre-and post-outcome measures. Participant demographics can be found in Table 4. There was a total of 5 missed data points across 3,276 possible data points (0.15%). There were missing data in the SUS (n=1, 0.36%), the T-TAQ (n=3, 0.18%) and the GSE (n=1, 0.18%). Because the missing data points were defined as *missing at completely random*, the researchers elected to replace the missed data point with the mean for that participant on that scale.[94] For missing data points on the T-TAQ measure the mean construct score was used. Six school nurses and 16 athletic trainers completed the pre-and post-qualitative interviews.

SPECIFIC AIM 1:

To determine changes in AT and SN knowledge of each other's roles and responsibilities in the high school setting.

Roles and Responsibility Knowledge Survey- Athletic Trainers and School Nurse

The RRKS surveys were completed by participants prior to and after completion of the intervention. Data for the RRKS can be found in Table 5 and Table 6. For each item, data is presented as the percent of participants who answered each item correctly. Before the intervention, the SN correct response percentages ranged from 57.1% to 95.2% (Table 5) and the AT from to 42.9 to 100 (Table 6). After completion of the intervention, correct responses increased for all items on the RRKS-AT and RRKS-SN, with all participants answering 4 items correctly on the RRKS AT and 10 items correctly on the RRKS-SN.

Roles and Responsibility Knowledge Survey- School Nurses

Data for the RRKS-SN can be found in Table 6. The SN participants answered 4 of the 12 questions correctly prior to the intervention, with correct response percentages ranging from 42.9-100%. After the intervention, all SN participants (n=7, 100%) answered 10 of the 12 questions correctly. For the remaining 2 items the scores improved to 85.7% correct response for both questions ‘an AT does not implement rehabilitation following and injury’ and ‘an AT can treat injuries using modalities such as ice, manual therapies and electronic modalities’.

Cronbach’s alpha was used to establish internal consistency for both the RRKS-AT and the RRKS-SN. For this analysis, the pre-intervention data from all participants were used for each participant group. The RRKS-AT exhibited low internal consistency (α=0.418). The RRKS-SN displayed moderate internal consistency (α=0.840).

A Wilcoxon signed-rank test was used to examine differences in RRKS scores pre-and post the learning intervention for both the RRKS-AT and RRKS-SN. For these analyses, the dependent variable was the score on the RRKS and the independent variable was time (pre-and post-intervention). The RRKS-AT showed a significant improvement in scores (z=-2.721, *P*=.007) indicating an increase in SNs knowledge of the roles and responsibilities of ATs following participation in the intervention program. Similarly, the RRKS-SN showed a significant improvement in scores following the intervention (z=-2.207, *P*=0.027) indicating an increase in ATs knowledge of the roles and responsibilities of SNs following completion of the intervention.

SPECIFIC AIM 2:

To assess high school ATs and SNs attitudes towards teamwork and communication in healthcare delivery and to examine changes following a learning program.

TeamSTEPPS® Teamwork Attitudes Questionnaire

Data from the T-TAQ can be found in Table 7. This information is separated by profession (AT, SN and combined) and time (pre-and post-learning intervention). Median and range were selected because of the small sample size and Likert scale data. The AT median score increased in 4/5 constructs, while the *Mutual Support* subscale remained unchanged. School nurse median scores increased for 4/5 constructs and remained the same in one construct (*Situation Monitoring).* When all data were combined, there was an increase in median scores for all constructs. Total overall score medians increased for AT, SN and combined.

Individual Wilcoxon Signed Ranks Tests were used to examine differences in total T-TAQ scores and individual construct scores pre-and post-intervention. The results indicate a significant difference in the total combined T-TAQ score (Z=-3.078, *P*=.002). Differences in the *Team Structure* (Z=-3.059, *P*=.002), *Situation Monitoring* (Z=-3.082, *P*=.002), and *Communication* (Z=-2.275, *P*=.023) constructs were also noted for the combined data. These findings indicate participants attitudes towards these concepts improved following the program. When examining T-TAQ scores by profession a significant increase was noted for *Team Structure*, *Situation Monitoring* and *Communication* for the ATs and only *Mutual Support* for the SNs. Complete construct descriptive and change score data can be found in Table 7.

SPECIFIC AIM 3:

To determine AT and SN's perceptions of the learning program.

General Self-Efficacy Scale

Descriptive data for the GSE can be found in Table 8 and is stratified by profession (AT, SN and combined) and time (pre-and post-intervention). General Self-Efficacy total scores, as well as the median and range for each item, remained largely unchanged pre-and post-intervention. In

addition, there appear to be no marked differences in total scores between ATs and SNs nor for individual item scores. Overall, the participants exhibited a strong sense of general self-efficacy; 8 of the 10 items had median scores of 4 pre-intervention and 9 of the 10 items had a median score of 4 after the intervention. Furthermore, GSE scores were compared to normative values for each item and total score (Table 9).[95] Participants of this study scored higher on the GSE compared to a normative value.[88,96,97]

System Usability Scale

The SUS instrument was completed post learning and is separated by profession (AT, SN and combined), median and ranges for each item as well as the total score (table 10). The SUS includes items that are written positively and negatively. In order to calculate a total score, negatively written items (2, 4, 6, 8 and 10) scores were inverted. For example, a median score on item 4 'I thought there was too much inconsistency in the system' indicates participants scored Somewhat Disagree.

System Usability Scale scores were compared to industry norms for all interfaces and specifically for web interfaces such as the one used in this study.[90] Participants in the present study scored higher (76.9) compared to total industry norms (69.5) and specifically web interfaces (68.2), which indicates the participants of this study found the system more useable than average SUS participants on a variety of systems.

Participant Response Survey

Data for the PRS were collected post learning intervention. Medians and ranges for each item can be found in Table 11 and percent of participants who selected either 'agree' or 'strongly agree' for each item. Qualitative interpretation of the data indicates the SNs scored slightly higher than the ATs for each of the 6 items. Overall, participants were most in agreement that the

speaker was knowledgeable, organized and effective in his/her presentation and that the teaching methods and aids were used effectively with a median of 5 and range of 2-5 for both items. Median and range for each item on the PRS, as well the number and percentage of participants whole selected ‘Agree’ or ‘Strongly Agree’, can be found in Table 11. Participants were most likely to be in agreement with Item 1 (The speaker was knowledgeable, organized and effective in his/her presentation) with 96% of participants stating that they ‘Agree’ or ‘Strongly Agreed’ with this statement. Conversely, only 61% of the participants selected Agree’ or ‘Strongly Agree’ to the statement “I expect my job performance to improve as a result of this course.”

SPECIFIC AIM 4:

To examine changes in communication between SNs and ATs following the learning program.

In addition to examining changes in communication, the qualitative analysis provided an opportunity to further explore and describe the phenomenon of interprofessional communication. Three themes were identified and addressed participant’s views on interprofessional communication and collaboration as well as their views on the online learning program. Table 12 represents the emergent themes and subthemes as well as illustrative quotes from the interviews.

Interprofessional Interaction

Description

Participants were encouraged to describe their interprofessional interaction(s) with the SN or AT at their school. Participants provided descriptors of the communication such as when and where they occurred, who initiated the interaction, communication frequency, mode of communication and length. Overall, the specifics of the interactions were fluid and dependent on the specific issue that needed to be discussed. “Um normally we can do it depending on the situation like normally we can do it in the mornings even before we get into…Sometimes if

there's someone we need to follow up on I'll walk down to the clinic or communicate via email."-AT 21

Therefore, the mode and location of communication varied and included phone call, email, and in-person and occurred in offices or less frequently at the professional's homes based on the specific needs of the conversation. The initiator was most likely the person with the problem or question and was thus not dependent on profession.

> Umm I think it depends on when I'm deciding to make contact so like I don't really decide to email if I know that I'm about to be going there but if like I said if it's the end of the day and I think it's something that may come across their desk in the morning and I think it's something they the student might need accommodations for within the school um I will go ahead and email them that night or first thing in the morning –AT 11

Participants discussed the reasons for communication which frequently included concussion and concussion accommodations. "I keep on falling back into concussions because that's the main thing I deal with her."-SN 5 "The primary reason I talk to the athletic trainer has to do with student athletes with concussions that's probably 99% of my communication with her."-SN 6 Other topics included musculoskeletal injuries, general medical sicknesses, emergency situations and asthma.

Perception

Participant perceptions of interprofessional interactions were varied. While participants tended to have a positive perception of interprofessional interactions in general, their perceptions of their own interactions were not always as positive. Reasons for dissatisfaction included lack of communication or extraneous communication, lack of respect or understanding between parties and difficulty facilitating communication. "…we are still trying to work out those kinks and having lack of communication with the trainer um I even complained about that early on this

year…”-SN 5 For in-depth or personal topics, participants perceived an in-person conversation as ideal so they could ask questions and confirm meanings.

> Sure, yea I’m kinda old school um so I actually prefer the face to face conversations with people um some of my initial contact is by email and if there’s something that requires a discussion rather just information being given ill request a face to face and then well sit down and we’ll have a conversation-AT 3

However, they perceived email to be very helpful and valuable for the relaying of information that didn’t require additional discussion.

> I think most of the time I use email because it’s easier and like I said sometimes she needs that information for the school and of course I’m not there in the mornings so I'll just typically send an email and then follow up if I have something more detailed or something that we should talk face to face about-AT 13

Other perceived considerations for the mode of communication included timeliness for time sensitive information, the ability to ask questions, a ‘paper trail’, HIPPA compliance, and the ability to communicate nonverbally such as through tone or body language.

> “The advantage of talking to her on the phone of course is that the um information is um received and or delivered in a quicker matter as opposed to emailing.”-SN 6 “Um some pros for email again are um that often don’t have something to write down with so she having her email it it’s in a written form and can go back and look at my emails.”-AT 1

Outcome

Participants were asked to describe observed outcomes of communication. They often described continuity of care as a positive outcome of communication and described the phenomenon of being on the ‘same page’ with all clinicians, the patient and their families.

> Um they, I’m trying to think, they benefit because they have different minds on ya know what ever scenario is happening or better communication so that everybody knows what’s happening and the best patient care for the athlete or just student is happening so it’s not 2 different things happening at once we are all on the same page. -AT 4

> but it certainly allows for better care and then the fact that there is a good relationship between the staff members and good open communication allows the kids ya know they

> know if the nurse knows we know and if we know the nurse knows so they don't have to worry about running around and that sort of thing. -AT 15

> I know that my job goes better when she and I are on the same page I have worked in the school system for a very very long time….My school nurse now is much more open so we have a much better line of communication and our kids do so much better. Everything is all the same and nobody is putting one against the other which is awesome. -AT 18

In the absence of communication there was a discontinuity of care which lead to feelings of unease as they were worried something would be missed or 'fall between the cracks'. Patient outcomes, namely a quicker return to academic and athletic participation, was noted as a positive outcome of communication between SNs and ATs.

> Let's just go back to the concussion thing because that's what we mostly communicate on, it saves the patient in other words it doesn't waste their time on the comeback. Like if she knew about a concussion and did not tell me about it or waited a few days to tell me about…and they already had their return to play permission it delays their comeback unnecessarily-AT 20

Lastly, participants noted benefits to their own careers as an outcome of communication. These benefits included an increase in professionalism, increased interprofessional learning and a decrease in disciplinary action from supervisors.

Challenges and Proposed Solutions

Challenges

Participants frequently mentioned schedule differences or accessibility issues as a challenge to ideal communication. Because SNs and ATs often work at different times, and in different locations within the school, participants felt it was challenging to communicate effectively-especially for those topics which required further in-depth discussions. "I think for me it's just the time for me. I get into the school about 3 and she leaves the school about 3:50 or 4 4:15 so if the nurses office is super busy I don't always get a chance to talk to her that day."-

AT 1 In addition, the ATs and SNs included in this study were employed by different entities which was also identified as a barrier.

> …because of the situation I find myself in as a clinical outreach athletic trainer for a hospital and not a school employee sometimes there is a barrier to communication because I'm not a school employee and sometimes they hide behind the HIPPA clause not understanding we are a part of the HIPPA protocols and we can share information back and forth with each other-AT 3

Characteristics such as personality and age differences, challenged some participants. Lastly, a lack of knowledge of the other professions roles and responsibilities was a challenge. "Umm I think some of it has to do with probably lack of knowledge about what our roles are um as far as what she's supposed to take care and what I'm supposed to take care of and what we are supposed to be communicating with each other."-AT 9 Participants noted they didn't feel like the other profession understood their role or 'why they were there' and that made communicating more frustrating and less constructive.

> Um I think it depends on the person and like the school nurse um so like for example at the school I was at last year the school nurse kinda like didn't really have a great understanding of what our role was so that was kind of challenging. So, it's kind of like a personality thing that I think makes good communication difficult. -AT 6

Proposed Solutions

In addition to identifying challenges participants were encouraged to describe solutions that had worked for them or propose solutions that might facilitate effective communication. Participants frequently described an initial face to face meeting between the AT and SN to introduce themselves and discuss how they would communicate. "Well I would say first of all I would make it a priority week 1 or day 1 to walk down there and meet them face to face."-AT 20. "I would say definitely go out of your way in the beginning on building that relationship

because it will help you out in the future and down the road when you might not necessarily think it will."-AT14 These initial meetings served the purpose of building a relationship between the professionals and provided a way to discuss communication early in the relationship and prior to any communication issues which may arise. Participants also proposed an increase in the amount of communication as well as the priority placed on communication as possible solutions to poor communication.

> Make sure you meet them face to face and try to have that just face to face interaction, not every week, but more than once a semester, more than once a year, don't just meet them in August and then never see them again, and have some times to just stop by-AT 21
>
> advice I would give them um I kinda got on my own is more communication is better than less um if you think even if you even have a little inkling that it needs to be communicated go ahead and send an email and you can follow up the next day and if you're at school go ahead and talk to her that way everyone is on the same page and everyone has the same knowledge. -AT 1

In the presence of communication breakdowns, the participants suggested the patient should always be the highest priority (not the relationship between the SN and AT) and that supervisors should be involved when necessary.

> If that's not working out then you gotta go above it and and understand that certainly talk with ya know I talk with my supervisor and say hey I've done a b and c and I'm not making any headway. Not necessarily go to a nursing supervisor right away but maybe engaging my supervisor, getting some other ideas-AT 15

Program Evaluation

Strengths

When asked about specific parts of the program participants found helpful they mentioned the education of the roles and responsibilities as well as the interactive simulation portion. They thought the entirety of the program was detailed and relevant to their work.

Overall, they expressed a satisfaction with the delivery mode and described it as easy to use and a convenient way to complete the program. Overwhelmingly participants answered that they would recommend a program like this to a colleague.

> It was smooth and all the sound worked fine and all the slides worked fine and technology wise it was good and the information was very good. It was thorough without being redundant um it was it was very educational. -AT 2

> Oh yea I think it's helpful to see to be reminded again that we're all part of the care team and everyone needs to be communicating and working together so I think it's always a good reminder to make sure everyone is communicating and doing the best they can. -AT 13

> Um I liked it um I feel like the videos and that we as athletic trainers are getting more information about the school nurse and their responsibility because like I was saying for a lot of us don't realize what they're actual responsibilities are um and I liked the little videos like this was poor communication this was good communication because I think that really helped ya know kind of drive the point that this might have been an ok way to communicate but a lot of things were missing. -AT 6

> Uh I thought it was really good that it gave kind of a background on the trainers. We never really got that well we knew they could diagnose concussions but we didn't really know that they actually have a doctor that they work under and that they are ya know, trained in a lot of other areas that I didn't really realize that because I hadn't seen it so I think that that got more respect from me for their position-SN 4

Weaknesses

Participants felt the program could be improved upon by first identifying the 'gap in knowledge' or area of improvement to the participant before beginning. In addition, including more relevant examples was given as a suggestion to make the program more engaging and to decrease the length.

> Um the one thing that I would suggest would be to throw in some more case examples on it rather than um text book type things. Go back to the files of athletic trainers, maybe form the conversations you're having with this group now and throw out real life scenarios on how to communicate what worked and what didn't work um and use that as a best practices kind of situation within the program. -AT 3

Participants gave many suggestions as to when a program like this could be most effective. Some felt this program should be given as part of a new hire training so the information was received before beginning work, others felt this information should be included in pre-professional education and others felt it could be most effective if given as part of a continuing education program for currently practicing clinicians.

> Umm I think it could be interesting as an in-service sort of like a beginning of the school year type thing and I don't think it would have to be every year maybe like a new employee orientation kinda thing um and maybe like have it be like acted out in person or have pope like maybe be able to play the roles as an example so that you're really making sure people are engaged in it. -AT 6

> It should definitely be a part of your undergrad education it should fall somewhere in there but probably the most important it should be a part of your job requirement it should be on your list of things to do when you first start your job. -AT 20

While some participants enjoyed the ease of the online program, others suggested an in-person program where SNs and ATs could learn together.

Table 4. Summary Statistics [mean±standard deviation or number (percentage)] of Demographic Information for Participants

	Athletic Trainers (n=21)	**School Nurses (n=7)**	**Total**
Age (years)	35.14±11.58	52.71±5.74	39.53±12.91
Years of Practice Experience	12.10±10.98	11.50±8.43	11.94±10.26
Years at Current Place of Employment	4.99±6.53	8.07±9.47	5.76±7.31
Employment Characteristics			
Full Time at 1 School	N=11(52)	N=7(100)	N=18(64)
Full Time at >1 School	N=7(33)	N=0(0)	N=7(25)
Part-time at 1 School	N=2(10)	N=0(0)	N=2(7)
Part-time at >1 School	N=1(5)	N=0(0)	N=1(4)
Days Present at School			
5+ Days	N=20(95)	N =7(100)	N=27(96)
3-4 Days	N=1(5)	N=0(0)	N=1(4)
Highest Degree Achieved			
Masters	N=14(67)	N=1(14)	N=15(54)
Undergraduate	N=7(33)	N=4(57)	N=11(39)
Diploma RN	NA	N=2(29)	N=2(7)

Table 5. Percent of School Nurse Participants that Selected the Correct Response on the Roles and Responsibility Knowledge Survey-Athletic Trainers

Item	Pre-Intervention Response (%)	Post-Intervention Response (%)
1. An athletic trainer (AT) works under the direction of a physician.	42.9	100
2. An AT is certified in CPR and First-Aid and is able to provide emergency care.	100	100
3. An AT provides medical coverage during practices and athletic competitions.	100	100
4. An AT does not tape and brace joints to prevent further injury.	71.4	100
5. An AT can develop prevention and strengthening programs to prevent injuries from occurring.	85.7	100
6. An AT can evaluate and diagnose musculoskeletal injuries.	71.4	100
7. An AT does not implement rehabilitation programs following injury.	42.9	85.7
8. An AT can treat injuries using modalities such as ice, manual therapies and electrical modalities.	71.4	85.7
9. An AT is responsible for proper documentation of injuries and associated treatments.	100	100
10. An AT can refer an injured student-athlete to the appropriate healthcare professional.	100	100
11. An AT does not act as a facilitator between student-athletes, parents, and other healthcare professionals.	85.7	100
12. An AT can provide healthcare services to all student-athletes that participate in their school district.	42.9	100

Table 6. Percent of Athletic Trainer Participants that Selected the Correct Response on the Roles and Responsibility Knowledge Survey-School Nurses

Item	Pre-Intervention Response (%)	Post-Intervention Response (%)
1. The role of the school nurse encompasses the health and education of students.	95.2	100
2. The school nurse can treat acute injuries/illnesses as well as manage long-term care.	81.0	95.2
3. A school nurse can provide health screenings without a physician present.	61.9	76.2
4. A school nurse does not have a role in ensuring environmental safety of students (i.e. playground checks and indoor air quality assessment).	85.7	81.9
5. A school nurse is the health expert on the teams which identifies special educational needs of students and develops plans for reasonable accommodations.	57.1	66.7
6. School nurses are required to report certain infectious diseases to appropriate authorities.	95.2	100
7. A school nurse can refer students to the appropriate health professionals.	81.0	100
8. School nurses work to prevent injuries and disabilities.	57.1	90.5
9. A school nurse can administer prescription drugs.	76.2	85.7
10. A school nurse provides educational materials to the patient and their families to aid in the decision-making process.	81.0	100

Table 7. TeamSTEPPS®-Teamwork Attitudes Questionnaire Descriptive Statistics (Median, Range) by Construct**

	Pre			Post		
Construct	AT (Median, Range)	SN (Median, Range)	Combined (Median, Range)	AT (Median, Range)	SN (Median, Range)	Combined (Median, Range)
Team Structure	24, 6-30	26, 23-27	24, 6-30	28, 21-30*	27, 24-30	27.5, 21-30*
Leadership	26, 6-30	23, 24-30	27.5, 6-30	27, 22-30	30, 26-30	28.5, 22-30
Situation Monitoring	24, 6-29	28, 16-29	24, 6-29	25, 21-30*	28, 25-30	27, 21-30*
Mutual Support	24, 18-30	26, 18-30	24, 18-30	24, 18-30	29, 25-30*	24.5, 18-30
Communication	24, 10-29	26, 17-29	24, 10-29	25, 22-30*	27, 24-29	26, 22-30*
Total	22, 46-1391	131, 120-133	127, 46-138	127, 110-148	141, 127-149	133.5, 110-147*

*Signifies a significant change from the pre-intervention scores at the 0.05 level

**Possible construct scores ranges from 6-30

Table 8. General Self Efficacy Scale Descriptive Statistics (Median, Range) for all Participants

Item	Pre			Post		
	AT (Median, Range)	SN (Median, Range)	Combined (Median, Range)	AT (Median, Range)	SN (Median, Range)	Combined (Median, Range)
1. I can always manage to solve difficult problems if I try hard enough.	3, 3-4	4, 3-4	3, 3-4	4, 3-4	4, 3-4	4, 3-4
2. If someone opposes me, I can find the means and ways to get what I want.	3, 1-4	3, 2-4	3, 1-4	3, 1-4	3, 3	3, 1-4
3. It is easy for me to stick to my aims and accomplish my goals.	4, 3-4	3, 2-4	4, 3-4	4, 3-4	4, 3-4	4, 3-4
4. I am confident that I could deal efficiently with unexpected events.	4, 3-4	4, 3-4	4, 3-4	4, 3-4	4, 3-4	4, 3-4
5. Thanks to my resourcefulness, I know how to handle unforeseen situations.	4, 3-4	4, 4	4, 3-4	4, 3-4	4, 3-4	4, 3-4
6. I can solve most problems if I invest the necessary effort.	4, 3-4	4, 3-4	4, 3-4	4, 2-4	4, 3-4	4, 2-4
7. I can remain calm when facing difficulties because I can rely on my coping abilities.	4, 3-4	4, 4	4, 3-4	4, 3-4	4, 3-4	4, 3-4
8. When I am confronted with a problem, I can usually find several solutions.	4, 3-4	4, 4	4, 3-4	4, 3-4	4, 3-4	4, 3-4
9. If I am in trouble, I can usually think of a solution.	4, 3-4	4, 3-4	4, 3-4	4, 3-4	4, 3-4	4, 3-4
10. I can usually handle whatever comes my way.	4, 3-4	4, 4	4, 3-4	4, 3-4	4, 4	4, 3-4
Total	36, 30-40	38, 34-39	36, 30-40	37, 29-40	39, 27-39	37, 29-40

Table 9. General Self-Efficacy Scale Compared to Normative Values

	Combined Present Study (Mean±STDEV)	Normative Data[88] (Mean±STDEV)
Item 1	3.50±0.50	3.27±0.57
Item 2	2.60±0.67	2.94±0.68
Item 3	3.46±0.57	3.30±0.64
Item 4	3.71±0.45	3.08±0.65
Item 5	3.75±0.43	2.94±0.71
Item 6	3.86±0.35	3.54±0.58
Item 7	3.75±0.43	2.97±0.80
Item 8	3.64±0.48	2.98±0.65
Item 9	3.68±0.47	3.05±0.66
Item 10	3.75±0.43	2.91±0.72
Total	35.71±3.00	29.48±5.13

Table 10. System Usability Scale Descriptive Statistics (Median, Range) for all Participants

Item	AT (Median, Range)	SN (Median, Range)	Combined (Median, Range)
1. I think I would like to use this system frequently.	3, 0-4	3, 3-4	3, 0-4
2. I found the system unnecessarily complex.	3, 1-4	3, 1-4	3, 1-4
3. I thought the system was easy to use.	3, 2-4	3, 1-4	3, 1-4
4. I think that I would need the support of a technical person to be able to use this system.	3, 1-4	3, 0-4	3, 0-4
5. I found the various function in this system were well integrated.	3, 2-4	3, 2-4	3, 2-4
6. I thought there was too much inconsistency in this system.	3, 1-4	4, 3-4	3, 1-4
7. I would imagine that most people would learn to use this system very quickly.	3, 0-4	4, 3-4	3, 0-4
8. I found the system very cumbersome to use.	3, 2-4	4, 1-4	3, 1-4
9. I felt very confident using the system.	3, 1-4	3, 2-4	3, 1-4
10. I need to learn a lot of things before I could get going with this system.	3, 1-4	3, 0-4	3, 0-4
Total Score	72.5, 45-97.5	80, 47.5-100	75.0, 55-100

Table 11. Participant Response Survey Median and Range and Percent Agreement by Item

Item	AT (median, range)	SN (median, range)	Combined (median, range)	Combined* (n, %)
1. The speaker was knowledgeable, organized and effective in his/her presentation.	4, 2-5	5, 4-5	5, 2-5	N=27, 96
2. The teaching methods and aids were used effectively.	4, 2-5	5, 4-5	5, 2-5	N=27, 96
3. The content was relevant to my job.	4, 1-5	4, 3-5	4, 1-5	N=25, 89
4. I expect my job performance to improve as a result of this course.	4, 2-5	4, 3-5	4, 2-5	N=17, 61
5. Overall, this course was worth my time.	4, 1-5	4, 3-5	4, 1-5	N=22, 79
6. I would recommend this course to a colleague.	4, 1-5	4, 4-5	4, 1-5	N=23, 82

*n represents the total number of participants who selected that they ‘agreed’ or ‘strongly agreed’ with each of the items. The percentage is how many participants selected ‘agreed’ or ‘strongly agreed’ out of the total number of participants.

Table 12. Qualitative Emergent Themes and Subthemes

Theme	Subtheme	Example Quote
1.Interprofessional Interaction	1a. Description	So, because of our situation with the nurse we have right now um I am available through my phone in the morning until I get to the school so me and my nurse usually email back and forth and then when I get to the school around 1:30 she's still there if I need to stop in and see her at any point-AT 9
	1b. Perception	I think it's great if there is that communication. I feel so much better knowing that this athletic trainer and myself have a good report and we know what's going on-SN 2
	1c. Outcome	I think everything happens a little bit faster like a timely like they are recovering faster they're getting on the field and in the classroom faster because we have both sides of it working so I think everything is just sort of expedited with the process. -AT 9
		Oh, the ball would be dropped, major lawsuits, not really major but there could be incidences that if there is no communication and an athlete was injured at practice and then they went to school and their PE class and they got hit in the head again and things were just worse and then umm all because there was no communication and teachers didn't know about the athlete's injury from the day before. -AT 14
2. Challenges and Proposed Solutions	2a. Challenges	Umm I think probably a lot of it goes both ways just saying that we don't necessarily know what all they are supposed to be handling within the school because our scope is so smaller we have a lot of other things so I think it's kind of just understanding more what they are doing-AT 9
	2b. Proposed solutions	In regard to personality like you're not going to change them so I think you kind of need to find that halfway point where you can meet and figure out what works best for both of you-AT 16
		I would say definitely go out of your way in the beginning on building that relationship because it will help you out in the future and down the road when you might not necessarily think it will. -AT 9
3. Program Evaluation	3a. Strengths	I thought it was really good that it gave kind of a background on the trainers…I think that was really the most important think I remember. -SN4
		I thought it was good and covered the important things and doesn't leave anybody hanging. I think lengthwise it was long enough but I wasn't yawning and jumping head too much-AT 15
	3b. Weaknesses	Well it was interesting to read as far as applying it ya know being so late in the school year some of the things we were already doing and I can't think of anything on there that I would apply to what we already got in place. -SN 3
		I feel like if I remember correctly maybe break up the questions a little bit because there were such a long line of them in a row like so many options of like agree/disagree type questions it kind of got blurred together. -AT 9

CHAPTER V

DISCUSSION

The purpose of this study was to design, implement and evaluate an educational program that provided ATs and SNs with the necessary skills regarding roles and responsibilities, communication, and team structure to work as an interprofessional team. A mixed method design was employed to evaluate the program and understand the phenomenon of interprofessional communication. Following completion of the online program, ATs and SNs appeared to have an increased knowledge of the other profession's roles and responsibilities, exhibited a positive attitude towards the concepts of teamwork and communication and possessed high levels of self-efficacy. In addition, participants viewed the program favorably. However, the qualitative interviews illustrated that true interprofessional collaboration remained infrequent and alluded to the barriers preventing these types of interactions from occurring.

POPULATION DESCRIPTION

Participant attitudes towards IPE before beginning such a program may pose a challenge in effective implementation of the IPE skills learned.[8] Therefore, it is important to understand the characteristics of the population of study prior to program implementation. The demographic characteristics of the included population such as age, education, and years in the profession largely mirrored the AT and SN professional populations referenced in the literature.[84,98] While all participants were employed in the same school district, there were key differences in demographics between the professions. On average the SNs were older than the ATs (52.71±5.74 and 35.14±11.58 years, respectively), but both professional groups had been practicing in their given professions for similar amounts of time (approximately 12 years). However, the SNs

(8.07±9.47 years) were employed at their current place of employment for almost double the years as the ATs (4.99±6.53 years), which may indicate ATs are more likely to start their careers at a younger age, but move frequently between positions. At this time, literature surrounding age of participants and success of IPE programs has not been synthesized as information about age of participants is often not presented.[11]

The T-TAQ is a self-reported outcome measure which assesses respondent's attitudes towards the concepts of TeamSTEPPS® in their healthcare practice. The T-TAQ can be used before beginning an IPE program to assess the needs of the intended population and following a program to show change.[89] The participants in the present study scored comparably on the T-TAQ pre-intervention to practicing clinicians reported in the literature.[60,61,99]

The positive views towards the concepts taught in TeamSTEPPS® found in the T-TAQ were reflected and expanded upon in the qualitative interviews. Though participants sometimes expressed dissatisfaction with their current communication and teamwork, they were overwhelmingly positive towards the concepts. "I wish there was more communication, I really do. I would like to collaborate more closely. I think we should be."-SN 1. "Patient care is involved with a team and it's not just one person I think the school nurse and the athletic trainer or if there are other healthcare provider are a team you're not going to get the best care from just one person."-AT 2. The combination of the T-TAQ scores and qualitative responses illustrated that participants see the value and need for teamwork and communication in clinical practice and may be open to incorporating these concepts into their practice.

Because general self-efficacy describes one's confidence in their ability to achieve a desired result, pre-intervention GSE scores may also provide insight into the participant's ability to successfully complete an IPE program and implement these teachings into practice.[100]

Participants in the present study scored higher on the GSE compared to normative values reported across the literature.[88,96,97] This finding indicate participants were more confident in their ability to achieve a desired result than a general population.

A correlation between personality and GSE has also been reported.[101] Persons who exhibit more self-esteem, self-regulation, optimism and orientation towards the future are more likely to score higher on the GSE.[101] Though the present study did not include personality markers, it is possible that the types of people drawn to the included professions may exhibit certain personality characteristics which cause them to score higher on the GSE compared to their counterparts who do not have those characteristics. In addition, the practice setting of school healthcare requires AT and SN to work independently without the assistance of an on-site supervisor as would be the case in a traditional healthcare settings. Perhaps working in an independent setting, such as a secondary school, encourages the development of higher levels of confidence and self-efficacy throughout their careers. Therefore, participants in this study may have scored higher on the GSE, because their chosen work settings promote additional self-efficacy. The school nurses had worked at their current place of employment longer and exhibited increase GSE scores compared to the ATs. Personality traits of the included participants as well as characteristics of their work setting may help explain the higher than normal GSE scores observed.

A measure of self-efficacy was included in this study persons with as higher levels of self-efficacy might be more able and willing to implement changes they feel are important.[100] In fact, extensive research has revealed that self-efficacy is a predictor of one's decision to pursue a task (such as completing the program) and also their likelihood of participating in the activity (working interprofessionally).[102] The high pre-intervention GSE scores for participants in this

study, is an encouraging finding as it indicates that participants may feel able to successfully complete the IPE program and implement changes in their practices.

MEASUREMENT TOOLS

While the T-TAQ is frequently used and reported, it is possible this instrument may be limited by the presence of a ceiling effect. A ceiling effect is said to occur when a large number of participants score at the higher end of possible ranges such that there is limited variability in the outcome being measured.[103] In the presence of a ceiling effect it is harder to dichotomize participants into groups who do and do not express more favorable attitudes towards the concepts taught in TeamSTEPPS®. In addition, it is more challenging to illustrate an increase in scores overtime as there is minimal increase which can occur.[103] For the present study, the median T-TAQ score pre-intervention for each construct was 4 or 5, thus there was little to no room for the participants to "improve" in their scores. The *Leadership* construct had the highest pre-intervention median score (27.5) and did not show significant change following the intervention. Conversely, the constructs that did show overall increases in scores exhibited lower pre-intervention construct medians, with the exception of the *Mutual Support* subscale. Because of the large number of participants who scored in agreement with each statement (pre-and post the learning intervention) the T-TAQ may be limited in its ability to show improvements in scores over time.

Instruction directly pertaining to the constructs of *Leadership*, *Mutual Support*, and *Situation Monitoring* was not included in the educational program. Therefore, the researchers did not expect to see improvements in these constructs. However, the *Situation Monitoring* construct scores increased following the program, which shows construct improvement can occur even though content was not directly taught. The *Situation Monitoring* construct includes questions

which pertain directly to the concept of ‘team’ and it is possible an increased value placed on team following the program may have increased these construct scores. Conversely, the *Leadership* construct asks questions directly about the leadership present in a team. While this content was not taught in the didactic education, it also may be possible that the participants do not have a natural leader within their interprofessional team, making it less likely for participants to place a value on leadership. While a hierarchal system is common in traditional healthcare where the physician is thought of as the leader; in a secondary school healthcare setting, there is no traditional leadership model which could explain lower *Leadership* scores and the lack of change following the program. The construct of *Mutual Support* examines how participants work with and rely on other members of the team.[89] As the interviews revealed, ATs and SNs were not working with nor relying on each other “This is horrible, but unfortunately, I have not um had any other situations other than concussions with communication with the school nurse.”-AT 14 Because they are not supporting each other, even after the program, this construct remained low.

The knowledge of healthcare workers roles and responsibilities has been identified as a core concept in ICP and is thus included in many IPE programs.[104] Before healthcare workers are able to work interprofessionally they must first understand what their role is and the role of the other team members. As the healthcare system becomes more complex, both in the workforce and the complexity of the conditions treated, a thorough understanding of roles and responsibilities is all the more crucial.[104] Assuming roles are known throughout the team can lead to problems with communication and ultimately collaboration. For these reasons, an understanding of the SN and AT roles and responsibilities is crucial and was included in the program.

The RRKS-AT was designed to test *parents’* knowledge of ATs roles and responsibilities, and it is possible these questions did not adequately asses the knowledge another

healthcare professional would need to work interprofessionally. Similarly, the RRKS-SN was designed by the researchers to assess the basic knowledge of SN roles and responsibilities. While each instrument was reviewed by the population it represented to help ensure relevance, it is possible the questions represent only basic knowledge of their roles and cannot adequately assess the knowledge needed to participate in ICP.

While a knowledge of roles and responsibilities has been identified as a core concept of ICP, it is only one of 4 competency domains.[104] It is possible, that even with an increased knowledge of each other's roles and responsibilities, deficiencies in other domains may prevent ICP. In addition, the ability of participants to apply newly acquired knowledge regarding the other professions roles and responsibilities and make subsequent changes to clinical practices remains unknown.

The qualitative finding illustrates a separate issue regarding roles and responsibilities. Participants frequently expressed a belief that the other profession did not understand their role. When asked what advice they would give to a new clinician from the other profession, participants were quick to express a desire for the other profession to understand, and therefore appreciate, what they did.

> so, it's just understanding each other's jobs and recognizing that and being supportive of each her in their capacity of work and I think that from my personal standpoint and experiences that's been something that's helped me and my school nurse. Just acknowledging and understanding our positions and how we work together for the best outcome-AT 16.

Particularly for the ATs, it seemed a lack of understanding regarding their role was a concern and may have been prohibitive in collaborations.

> I think they have a pretty good understanding but yea I think they just need to know what our job is and what we're capable of. We're not just do some calf stretches and heel raises and kinda be brushed off ya know recognize us as as medical professionals that have an area of expertise just like they do. -AT 15

"Instead of just being like well I don't know why she won't communicate with me or he or um I don't know why they won't tell me this I just think that they honestly don't know that you need to know that thing."-AT 6. While we measured the actual knowledge of roles and responsibilities we did not assess if participants felt the other profession knew their role. In fact, inaccurate perceptions of what the other profession does, and negative stereotypes have been identified as a preventative factor for working together.[104] Perhaps in addition to knowing the interdisciplinary team's roles it is also important to feel that your profession is understand accurately and respected as a member of the team.

BARRIERS

The acquisition of knowledge of roles and responsibilities is often included in interprofessional learning programs as it is necessary to work effectively with healthcare providers outside one's own discipline. [104,105] Thus, an increased knowledge of the other professions roles and responsibilities following the program is an encouraging step in facilitating ICP. In addition, participants appeared to have a positive attitude towards the concepts of teamwork and collaboration in healthcare. Lastly, the high levels of self-efficacy observed in this population support the belief that participants feel empowered to impact change and produce desired results. In summation, the results of this study support the belief that participants have the necessary knowledge, desire and self-efficacy to participate in ICP. However, the qualitative findings revealed a lack of enriching and frequent ICP between SNs and ATs. When asked

directly if communication changed following the intervention, the vast majority of participants said it had not. In addition, participants were asked to describe an interaction they had with the other profession before and after the program, and the descriptions of the interactions remained largely unchanged. Participants were given many opportunities throughout the interview to describe their collaborations with the other profession, but true ICP was rarely described. This led the researchers to speculate the presence of additional barriers such as misunderstanding of ICP, lack of accessibility and cultural climate may hinder ICP between SN and ATs in school healthcare.

Misunderstanding of ICP

Participants appeared to have an exaggerated view of their current interprofessional collaborations and a misunderstanding of what ICP entails. The World Health Organization defines ICP as, "When multiple health workers from different professional backgrounds work together with patients, families, and communities to deliver the highest quality of care."[106] More specifically ongoing and in-depth communication involving multiple stakeholder's opinions and needs is necessary to work collaboratively. Participants stated their communication was going well and they could not provide ways it could be improved upon. "I mean not to toot my own horn, I think we've always had very good communication and understanding."-AT 21. "I did not (notice any changes following the program) because prior to the program we had a really good rapport so we kinda already were doing all that stuff on a regular basis"-SN 2. However, when asked if they consulted with the other profession or 'put their brains together' to treat a patient the answer was often no.

> "Umm I would say probably not. I can't think of anything right off. Umm an instance that I would hope better communication would transpire would be like for instance a diabetic um if I had a diabetic kid that was playing a physically demanding sport..."-SN 5.

Some participants were willing to engage in these types of interactions, but could not think of examples in their practices where this would be beneficial. “Well we would if it came up but I haven’t had anything like that.”-SN 2. Participant examples of collaborative practice often included an AT telling the SN when a student sustained a concussion, but an example of a deeper collaboration might include the professions working together with the patient’s family to determine a comprehensive plan of care which addresses the patients concerns and involves return to play and learn. Simply relaying information between the SNs and ATs, as appears to often be the extent of communication between the professions, does not represent ICP fully. Participants may be less likely to make changes that would increase, or begin, true ICP when they believe they are already collaborating ideally. Therefore, differences in participant perceptions versus reality of what ICP entails may be one barrier to working collaboratively.

Accessibility

An additional barrier which became apparent in the qualitative portion of the study is the differences in schedules between the professions. Because SNs work during the school day and ATs work after the school day there is little overlap, if any, when both professions are physically present in the school. Participants valued in-person communication, especially for more challenging patient cases, but the differences in schedules make it difficult to meet in person.

> “Um so 95% of the time our school nurse and I communicate via email because of our schedules are completely opposite as far as the timing of our work like when we are in the school because she’s there during the day and I’m after school so we kind of always miss each other.”-AT 9.

“I feel like I don’t talk to her as much like face to face as I feel like I should. I email her a lot more um but when I can get down there I definitely go talk to her.”-AT 7 The literature suggests nonverbal cues such as tone and body language are an important part of effectively communicating and are associated with in person communication.[107] When participants are

unable to frequently meet in person ICP suffers as it is more difficult to develop relationships between multiple healthcare workers.[104] Therefore, healthcare workers who are unable to meet face-to-face regularly due to schedule differences are uniquely challenged in their implementation of ICP.

Cultural Climate

The current culture of school healthcare is another identified barrier to ICP. With the exception of concussion, current policy does not mandate interaction between the professions and thus each SN/AT dyad is responsible for determining how much communication will occur. Currently, ATs and SNs largely described only the relaying of information in the management of concussion and not true collaborative practice. Instead, policy should mandate and encourage an open and collaborative dialogue between the SN and AT for a myriad of conditions and situations. Because ATs and SNs are often hired by different entities, it's important that all policies are developed collaboratively and enforced by both professional groups. As the current culture doesn't include a plethora of SN/AT collaborations, there are few examples of modeled behavior for new ATs and SNs working in the school health setting to model their practice. The observation of modeled behavior is an effective tool for teaching behavior and inciting organization change.[108] Therefore, in the absence of such modeled behavior it is less likely ATs and SNs will engage in ICP. If the current culture was amended to support ICP between the AT and SN, these behaviors could become more normative and frequent.

Another concern in the current climate of school healthcare is a feeling that the other profession doesn't know your role and secondary to that, a lack of respect between the professions. These issues were continuously highlighted throughout the interviews and may inhibit ICP even after education of roles and responsibilities occurs. Participants, particularly the

ATs, expressed they didn't believe the SNs knew their role and this made knowing when to communicate challenging. "Umm I think some of it has to do with probably lack of knowledge about what our roles are um as far as what she's supposed to take care and what I'm supposed to take care of and what we are supposed to be communicating with each other." -AT 9 Perhaps in addition to knowing the roles and responsibilities of the professions with whom you will work, it is also crucial to feel like they understand your role.

> um getting um the school nurse to understand the contract that was established between the hospital that I am employed by and the school system that I work in and once I don't believe there was great communication between the school system and the school nurses in that system to understand what we were there for why we were there, and what we were able to do. Once that part was clarified uh there wasn't a problem anymore. -AT 3

When asked what they would want a new member of the opposite profession to know, participants frequently said this person should have a better understanding of their role before beginning their job. "um that we do more than just tape ankles and that we're here to help make sure that the health of the child is always the first priority…"-AT 7. An understanding of their own role was a concern among participants and was stated as a barrier towards ideal communication.

In addition to a lack of knowledge, participants were concerned about a lack of respect for their role. Without a mutual feeling of respect and appreciation a successful working relationship may be more challenging. "I think first and foremost let them know that I'm a part of the medical team. That I may not be a school employee but I am a medical professional."-AT 3 For the ATs in particular, there were undertones that their role was not valued and it was brought up as a concern and barrier. "Sometimes you might run into oh I can't talk to you about that because of HIPPA violations but once you kind of explain to them that we're all on the same healthcare team and getting ya know, help for clearance and all that its fine-"AT 21 Previous

literature has identified a lack of respect among workplace teams is more concerning for those who feel stigmatized.[109] Because athletic training is a newer profession and less well known and understood, it may be more important for ATs to feel respected in the workplace.

> "Athletic training, I mean is pretty is pretty prolific in this area, but you get more rural and it's a little bit tougher if they kinda well they're trainers it's the same as physical therapy kinda try to teach them a little about what an athletic trainer is and what they do and what they care for on a day to day basis what their role is at your school."-AT 15

In the presence of mutual respect, there is a subsequent increase in sharing and listening to diverse perspectives, such as is required for true ICP.[110] Therefore, a lack of feelings of mutual respect between the professions represents an additional barrier to ICP.

FUTURE DIRECTIONS

Barriers exist to ICP that our program simply did not address. The identification of these barriers is the first step in enacting the necessary changes to ensure successful ICP in the future. In the future, consideration should be given to modifications to the online program as well as system wide changes designed to help eliminate barriers.

Changes to the program should be made based on participant qualitative feedback and the quantitative outcomes. Participants suggested the program could be strengthened with the addition of more interactive examples that are relevant to ATs and SNs.

> "I don't know if this is possible but maybe make it interaction because talking with some colleagues they were very um not bored but they were they seemed to just go and kinda click through from what I've heard so I don't know how much concept was getting um retained."-AT 1

Because a lack of modeled interprofessional behavior has been identified as a barrier, providing additional unique ideas for when an AT and SN could benefit from collaboration could be immensely helpful. In addition, familiarizing SNs and ATs with ICP examples helps to overcome a natural aversion to change.[111] Similarly, consideration should be given to how

clinical examples, and the overall content, is delivered. The current methodology of voiced of PowerPoint presentations, may not provide the most memorable learning. When possible, content should be delivered in unique ways such as through video clips, role playing and interactive scenarios. By further captivating the participants attention, the researchers suspect an increase in long-term retention and program appreciation may occur.

The researchers believe instruction on TeamSTEPPS® and roles and responsibilities is still warranted and should be included in future programs. Because pre-intervention T-TAQ scores were comparable to those reported in the literature, it is important to include, and expand upon, the concepts of teamwork and collaboration via the TeamSTEPPS® program. The results of this study showed an increase in 3/5 T-TAQ constructs (*Team Structure*, *Situation Monitoring*, and *Communication*) following the program. The addition of learning content that address the reaming constructs (*Leadership* and *Mutual Support*) may facilitate an increase in the remaining T-TAQ constructs and a larger overall improvement in composite scores following the program. However, these results should be interpreted cautiously as the pre-intervention T-TAQ scores fell at the end range of possible scores (median 4 or 5 for each construct). Similarly, instruction on roles and responsibilities should remain in future programs because participants identified this as an area where their knowledge was lacking and stated it was helpful to have that information. In addition, the IPEC core competencies include knowledge of roles and responsibilities as a crucial component of ICP.[104] To further meet the needs of the specified population, the researchers suggest the roles and responsibility information be taught by SNs and ATs and delivered in video clips. These modifications may help facilitate long term learning and be more interesting to the participants.

Consideration must also be given to when and how the program is delivered. Delivery modes described in the literature are diverse and designed to meet the needs of the specific participants, thus there is no recommendation for how best to deliver a program.[112] Many participants enjoyed the online format as it was convenient. “No, I think that was pretty convenient more so because it’s there and you can access it from anywhere and its easy. All you have to do is just click on it and there it goes.”-AT 4. Others felt the program could be strengthened if it was completed in person and with both professions present. “I think nursing working together with their trainers that might be more beneficial so they know who each other is.”-SN 2. An in-person program would allow participants to truly learn from one another thus fitting the traditional definition of IPE which includes learning with from and about another profession.[8] However, this would place additional time and scheduling demands on the participants. *When* the program could be most beneficial is another consideration in designing future programs. For online programs, participants suggested it could be most beneficial before one starts their job.

> So, like if you’re new in a healthcare system that’s going to have both roles just um I think it would be a good place to put it so that everybody knows everybody’s roles and I know that people get a lot thrown at them at an orientation but um I think that that would be a good place for it so that out the gates its already on your mind ok this is somebody that I should have regular interactions with and these are their roles within the healthcare system. -AT 11

This way, the information is newly learned when they need to recall and implement it. Researchers must take in to consideration the rigors of the school year, therefore in person programs may not be feasible once the academic year starts. An in-person training program prior to the start of the academic year may be the best option. “I think well I know for our school district in particular the nurses have a mandatory meeting at least at the beginning of the year.”-SN5 “I think if it can be developed into a training class that you could present to the school

nurses as a whole. We have an annual meeting every so often it would be nice that you could come out and speak to everyone."-SN 3 By providing IPE programs early in one's career and/or early in each academic school year participants are able to develop partnerships early on to maximize impact. In addition, the potential behavioral changes following an IPE program have the potential to impact more patients when programs are delivered earlier. Lastly, the long-term assessment of programs is possible when programs are delivered at the beginning of the academic year. Conversely, some participants suggested this information best be provided to all students before they are licensed.

> "Umm probably introduce this like in an undergrad program just to talk about ya know if you're pursuing a career like in athletic training where you would work with the school nurse and understanding what they can do and their limitations and what we can do and our limitations and how we can work together."-AT 21

While a more generic IPE program may be warranted pre-licensure, a program designed for a specific work setting, such as the one discussed in this study, would not be necessary for many nurse and AT students who will work in different settings. Therefore, future research examining a program designed for a specific subset of nursing and/or athletic training should include only those populations. Past research supports no 'best practice' in how and when to deliver IPE.[112] Instead, future programs should examine feasibility and maximum impact when making these decisions.

Future research should examine the implementation and associated outcomes when this IPE program is used in a variety of settings. Variations in school districts and patient populations such as rural or urban schools, large or small schools, and school districts who employ part time ATs and SNs may impact the results. Because ATs and SNs work in a variety of schools, it is important to understand how school district characteristics affect the results.

RECOMENDATIONS

The results of this study illustrate a lack of ICP in school healthcare may not be due to insufficient knowledge, attitudes, or self-efficacy. In addition to traditional IPE programs, consideration must also be given to overcoming the system wide barriers which hinder ICP. Several recommendations are provided below which seek to improve the collaboration between SNs and ATs.

To overcome cultural barriers and begin to develop professional relationships, policy should mandate an initial face-to-face meeting between the professions. Participants continually stressed the importance of an initial face-to-face meeting between the AT and SN.

> "Just going in and introducing yourself and getting to know them as a person and opening those lines of communication when there is not an issue to talk about I think that is probably one of the best informational snippets I could give."-AT 16.

"I mean make sure you go meet face to face hopefully before the school year starts if you can. Its huge that they know who you are..."-AT 13. While the ATs said this was encouraged by their management, it did not appear to be mandated by either profession. The researchers recommend an initial face-to-face meeting where both professionals can get to know each other and discuss how their relationship will work as part of the onboarding process. Secondly, differences in schedules were routinely mentioned as a barrier. To circumvent this barrier, the researchers suggest the SN and AT each adjust their schedules twice monthly to create an overlap in schedules. This will ensure at least 2 face-to-face meetings occur where patient cases or lapses in communication can be openly discussed.

Policy changes must be supported by management from both professions and become a part of the work culture. Because the state does not currently mandate the employment of SNs nor SNs in schools, policy changes should be written and enforced by each school district. While ATs are often employed through hospital systems and not the school district, they are required to

follow contracts which could include the enforcement of ICP policy. In addition to policy which mandates increased communication between the AT and SN, consideration should be given to how patient outcomes are tracked. Currently, there does not appear to be any tracking or analysis of patient outcomes in the school district included in this study. Therefore, ICP may be viewed as additional work without a reward by school healthcare providers. Through longitudinal tracking of patient outcomes, the benefit of ICP could be more easily tracked and enforced.

In addition to policy changes which address barriers, an IPE program like the one developed in this study should be provided to SNs and ATs. Participants largely expressed an appreciation of the program and even though participants didn't frequently state their communication changed following the program, a combination of an IPE program and the elimination of barriers may be necessary to fully implement ICP into school healthcare. Consideration should also be given to how the results of the program are assessed to ensure any communication changes are described. In particular, the inclusion of Kirkpatrick Level 4 outcome measures, both 4a and 4b, which can be examined longitudinally. For the present study, Level 4 outcomes may include the number of SN/AT interactions, days missed from sport or school, or patient satisfaction surveys. The inclusion of longitudinal Level 4 outcomes would increase the robustness of the study by directly assessing the results of the educational program and the degree to which the learning program produced the desired results. Longitudinal Level 4 outcomes also provide further support for the continuation of such programs.

CHAPTER VI

CONCLUSIONS

SUMMARY

This study examined the use of a succinct online program designed to meet the unique needs of ATs and SNs working in school healthcare. Following the program, an increase in knowledge of the roles and responsibilities of the other profession was observed. In addition, participants had more positive attitudes towards the concepts of teamwork and collaboration and a favorable impression of the program. Even though participants exhibited high levels of self-efficacy, there were largely unable to make changes to their clinical practice. Through the use of interviews, the researchers were able to identify barriers which may make ICP particularly challenging for SNs and ATs working in school healthcare. A summary of the results of each hypothesis is provided below.

SPECIFIC AIMS

Specific Aim 1 -To determine changes in AT and SN knowledge of each other's roles and responsibilities in the high school setting.

Hypothesis 1 AT and SN knowledge of each other's roles and responsibilities will increase following the learning program as determined by an increase in scores on the Knowledge of Roles and Responsibilities Survey.

This hypothesis was supported as there was an increase in knowledge scores for both the SNs and ATs following the learning program.

Specific Aim 2- To assess high school ATs and SNs attitude towards teamwork and communication in healthcare delivery and to examine changes following a learning program.

Hypothesis *2* ATs and SNs will more favorably view the concepts of teamwork and

communication in the healthcare delivery system following the learning program as determined by an increase in total Teamwork Attitudes Questionnaire scores following the program.

This hypothesis was supported as the total combined T-TAQ score significantly increased following the learning intervention. In addition, *Team Structure*, *Situation Monitoring* and *Communication* constructs significantly increased following the intervention.

Specific Aim 3-To determine AT and SNs perception of the learning program.

Hypothesis 3a ATs and SNs will view the online delivery system as usable as determined by comparable scores on the System Usability Scale to industry norms for a web based system.

This hypothesis was supported as the SUS scores were higher, indicating a higher level of usability, than normative data.

Hypothesis 3b ATs and SNs will view the entirety of the program favorably as determined by average scores on the Participant Response Survey.

This hypothesis was supported by the PRS as agreement for each of the questions ranged from 61-96% indicating participants felt favorably towards the program. In addition, participants were overwhelmingly positive towards the program in the interviews.

Specific Aim 4-To examine changes in communication between SNs and ATs following the learning program.

Participants did not describe a change in the amount or type of communication following the program. The qualitative results provided thick description of the current ICPs of the participants. In addition, the presence of additional barriers to ICP were identified.

PRIMARY CONTRIBUTION

This study contributes to the body of knowledge surrounding IPE by examining a unique healthcare population which has not previously been included in such programs. IPE can be most impactful, when all healthcare providers are exposed to its teachings. This study introduces a new population, school healthcare, to IPE which stands to impact many patients. In addition, this study identifies barriers to ICP that a traditional IPE program can not address. While amendments to the IPE program described here are warranted, there are other issues preventing ICP between SNs and ATs which must also be addressed. By identifying these barriers, and making suggestions based of our findings and those from previous research, a comprehensive path towards successful ICP in school healthcare can occur.

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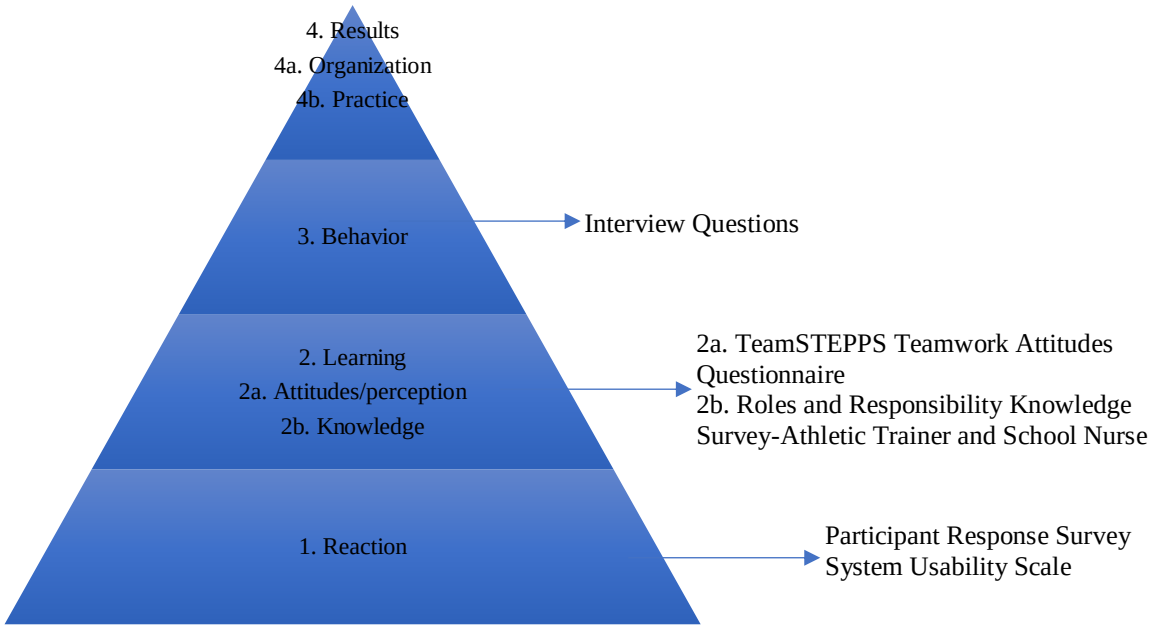
APPENDIX A

PROGRAM THEORY RATIONALE

IF…	Then…
1. **If** participants receive information of the roles and responsibilities of the other profession	**Then** participants will have an increase in their knowledge of the roles and responsibilities of the other profession
2. **If** participants are taught skills to improve communication and teamwork	**Then** participants will have an increased positive attitude towards teamwork and communication
3. **If** participants change the knowledge and attitudes towards teamwork and communication	**Then** they will change their behaviors surrounding these concepts
4. **If** the athletic trainers and school nurses in one district in Virginia change their teamwork and communication behaviors	**Then** the program may positively affect patient outcomes of the patient's the treat.

APPENDIX B

KIRKPATRICK'S SIX LEVELS OF EVALUATION



Adapted from Freeth D, Hammick M, Koppel I, Reeves S, Barr H. A Critical Review of Evaluations of Interprofessional Education. *The Interprofessional Education Joint Evaluation Team*.

APPENDIX C

RECRUITING SIGN UP SHEET

Thank you for your interest in the training program. Please provide your preferred contact information below.

Name (First, Last)	Email address or phone number

APPENDIX D

FIRST PHONE CONTACT

Investigator: Hello this is Lauren Welsch, I am calling on behalf of the Web-Based Interprofessional Education Program Study you expressed an interest in participating in. Is now a good time to talk with you about it?

Subject: Yes

Investigator: Ok, great. Before we can begin I'd like to provide you with the information you will need to consent to participate in the study. The purposes of this conversation is to give you information that may affect your decision whether to say YES or NO to participation in this research. The aim of this study is to determine the effects of an online learning program on knowledge and communication behaviors. First, we will complete this phone conversation which entails a review of the informed consent and your response to one question. The next portion of the research is online and can be completed any place you have access to a computer and internet. The final portion is an interview which will be conducted either over the phone or in person, depending on your preference. Aside from myself, the other investigators that are working with me on this project are Drs. Hoch, Akpinar-Elci, Parodi and Poston.

DESCRIPTION OF RESEARCH STUDY

Next, I would like to provide you with a brief background about this study. You see, many studies have investigated effective ways to improve communication and teamwork between healthcare providers. However, none of these have utilized athletic trainers and school nurses. Therefore, we want to see how school nurses and athletic trainers respond to a program designed specifically to enhance teamwork and communication strategies between school nurses and athletic trainers.

If you decide to participate, you will be asked to answer one question on the phone today, then complete an online portion consisting of pretest measures, online learning content and posttest measures. In addition, approximately one month following the completion of the online portion, you will be contacted to participate in an interview. If you say YES, then your participation will last for approximately 15 minutes for this portion, 1 hour for the online portion and an additional 30 minutes for the interview. Approximately 30 other athletic trainers and 10 school nurses will be participating in this study.

EXCLUSIONARY CRITERIA

However, you are unable to participate if you are not currently practicing as an athletic trainer or school nurse in one of the Virginia Beach City Public Schools High Schools.

RISKS AND BENEFITS

I do need to describe for you the risks and benefits associated with participating in this study. RISKS: If you decide to participate in this study, then you may face a risk of release of

confidential information. Specifically, the responses to your interview questions may be linked back to you. The researcher tried to reduce this risk by not recording any identifiers, such as your name or the school in which you are employed, on the audio recording. Following the interview, the audio recording will be transcribed and then deleted. And, as with any research, there is some possibility that you may be subject to risks that have not yet been identified.

BENEFITS: The main benefit to you for participating in this study is the learning content you will receive regarding communication and teamwork. The knowledge acquired through your participation might benefit you by increasing your mastery of these topics and through the incorporation of this content into your clinical practice. In addition, following completion of the study you will be entered into a drawing to win a $100.00 gift card.

COSTS AND PAYMENTS

Next, we need to discuss costs and payments. The researchers want your decision about participating in this study to be absolutely voluntary. Yet they recognize that your participation may pose some inconveniences in the form of a time commitment. In order to offset the time spent completing this study you will be entered to win a $100.00 gift card.

NEW INFORMATION

You should also know that if the researchers find new information during this study that would reasonably change your decision about participating, then they will give it to you.

CONFIDENTIALITY

It is really important that we discuss confidentiality with you. Please know that the researchers will take all reasonable steps to keep private information, such as the answers to the interview questions, confidential. The researcher will record no identifying information and will delete the audio recording immediately after transcription. In addition, the pretest and posttest measures collected on the online portion will not be linked back to your email address. The results of this study may be used in reports, presentations, and publications; but the researcher will not identify you. Of course, your records may be subpoenaed by court order or inspected by government bodies with oversight authority.

WITHDRAWAL PRIVILEGE

Furthermore, you should also know that it is OK for you to say NO. Even if you say YES now, you are free to say NO later, and walk away or withdraw from the study -- at any time. Your decision will not affect your relationship with Old Dominion University, or otherwise cause a loss of benefits to which you might otherwise be entitled.

COMPENSATION FOR ILLNESS AND INJURY

Please also be aware that, if you say YES, then your verbal consent when I am done reading this document does not waive any of your legal rights. However, in the event of harm arising from this study, neither Old Dominion University nor the researchers are able to give you any money, insurance coverage, free medical care, or any other compensation for such injury. In the event that you suffer injury as a result of participation in any research project, you may contact the responsible principal investigator or investigators at the following phone number 757-683-6131, Dr. Tancy Vandecar-Burdin the current IRB chair at 757-683-3802 at Old Dominion University,

or the Old Dominion University Office of Research at 757-683-3460 who will be glad to review the matter with you.

VOLUNTARY CONSENT
By agreeing to participate in this study, you are saying that you have listed to the informed consent information I just explained and that you are satisfied that you understand this information, the research study, and its risks and benefits. If you have any questions later on, then the researchers should be able to answer them:

Johanna Hoch 757-683-6131
Lauren Welsch 636-288-5126

If at any time you feel pressured to participate, or if you have any questions about your rights or this form, then you should call Dr. Tancy Vandecar-Burdin, the current IRB chair, at 757-683-3802, or the Old Dominion University Office of Research, at 757-683-3460.

If you would like to receive an email copy of the form we just discussed for your records please let me know and I will provide you with one. Are you willing to participate in this study?

Subject: Yes

Investigator: Great, now I'd like to ask you one question before you complete the online portion of the study. If, during the answering of this question, you no longer wish to participate please let me know and the interview will stop.

The information you share will be kept confidential. The interview will be recorded, but without identifiers, such as your name or the school in which you are employed, on the audio recording. Therefore, please don't use any identifying information about you, your school, or your colleagues during the interview. Following the interview, the audio recording will be transcribed and then deleted.

Are you ready to begin?

Subject: Yes

Investigator: Ok, I have turned on the recorder. Thank you for your willingness to participate in this study. Please answer this questions to the best of your ability. Also, please do not provide any names or other protected health information when describing patient cases. Are you ready to begin?

Subject: Yes.

Investigator:
Interview Questions
1. Tell me a story about a time you interacted with the school nurse or athletic trainer at your school.

Probe: Can you describe the interaction: when did it happen, where did it happen, what happened during the interaction?

2.Is there anything else you would like to tell me about the topics discussed today?

Closing

Investigator: That you for talking with me today. Your feedback was very helpful. As I stated previously, nobody but me will hear the recordings. If at any point after this conversation you think of something you'd like to add or change about your responses please let me know. In addition, if there is anything you feel uncomfortable with putting into a research project let me know and I will remove that portion of the data.

Do you have any questions?

Subject: No

Investigator: OK, I will now turn the voice recording devices off. *Turn off recording device*I will now email you think link to participate in the online portion of the program. Thank you very much for your willingness to do so.

APPENDIX E

DEMOGRAPHIC QUESTIONS

Please answer the following questions to the best of your ability.

1. What is your current age in years?
2. How many years have you been practicing as a school nurse or athletic trainer?
3. How long have you worked at your current place of employment?
4. Please select the answer that best describes your current employment:
    - Full time at one school
    - Part time at only one school
    - Full time at multiple schools
    - Part time at multiple schools
5. How many days per week (on average) are you physically present at the high school in which you work?
    - 1-2 days
    - 3-4 days
    - 5+ days
6. What is the highest level of education you've completed?
    - Undergraduate Degree (BA, BS, BN etc.)
    - Masters Degree
    - Terminal Degree (PhD, EdD etc.)
    - Other

APPENDIX F

ROLES AND RESPONSIBILITY KNOWLEDGE SURVEY-SCHOOL NURSE

The following is a survey designed to assess your knowledge of the roles and responsibilities of school nurses. Please circle one response for each statement. Please do not consult outside resources for the answers to these statements.

1. The role of the school nurse encompasses health and education of students.
a. Agree
b. Disagree
c. Unsure

2. The school nurse can treat acute injuries/illnesses as well as manage long-term care.
a. Agree
b. Disagree
c. Unsure

3. A school nurse can provide health screenings without a physician present.
a. Agree
b. Disagree
c. Unsure

4. A school nurse does not have a role in ensuring environmental safety of students (example playground checks, indoor air quality).
a. Agree
b. Disagree
c. Unsure

5. A school nurse is the health expert on teams that identifies special education needs of students and plans for reasonable accommodations.
a. Agree
b. Disagree
c. Unsure

6. School nurses are required to report certain infectious diseases to the appropriate authorities.
a. Agree
b. Disagree
c. Unsure

7. A school nurse can refer students to the appropriate health professional.
a. Agree
b. Disagree
c. Unsure

8. School nurses work to prevent injuries and disabilities.
a. Agree
b. Disagree
c. Unsure

9. A school nurse cannot administer prescription drugs.
a. Agree
b. Disagree
c. Unsure

10. A school nurse provides education material to aid in decision-making by the patient and their families.
a. Agree
b. Disagree
c. Unsure

APPENDIX G

ROLES AND RESPONSIBILITIES KNOWLEDGE SURVEY-ATHLTIC TRAINER

The following is a survey designed to assess your knowledge of the roles and responsibilities of athletic trainer. Please circle one response for each statement. Please do not consult outside resources for the answers to these statements.

1. An athletic trainer (AT) works under the direction of a physician.
    a. Agree
    b. Disagree
    c. Unsure

2. An AT is certified in CPR and First-Aid and is able to provide emergency care.
    a. Agree
    b. Disagree
    c. Unsure

3. An AT provides medical coverage during practices and athletic competitions.

    a. Agree
    b. Disagree
    c. Unsure

4. An AT does not tape and brace joints to prevent further injury.
    a. Agree
    b. Disagree
    c. Unsure

5. An AT can develop prevention and strengthening programs to prevent injuries from occurring.
    a. Agree
    b. Disagree
    c. Unsure

6. An AT can evaluate and diagnose musculoskeletal injuries.
    a. Agree
    b. Disagree
    c. Unsure

7. An AT does not implement rehabilitation programs following injury.

    a. Agree
    b. Disagree
    c. Unsure

8. An AT can treat injuries using modalities such as ice, manual therapies and electrical modalities.
    a. Agree
    b. Disagree
    c. Unsure

9. An AT is responsible for proper documentation of injuries and associated treatments.

    a. Agree
    b. Disagree
    c. Unsure

10. An AT can refer an injured student-athlete to the appropriate healthcare professional.

    a. Agree
    b. Disagree
    c. Unsure

11. An AT does not act as a facilitator between the student-athlete, parents, and other healthcare professionals.
    a. Agree
    b. Disagree
    c. Unsure

12. An AT can provide healthcare services to all student-athletes that participate in their school district.
    a. Agree
    b. Disagree
    c. Unsure

APPENDIX H

GENERAL SELF EFFICACY SCALE

Please respond to the questions below by selecting the answer which corresponds to how truthful you believe the following statements are. Please select only one response for each question.

	Not at all true	Hardly true	Moderately true	Exactly true
I can always manage to solve difficult problems if I try hard enough				
If someone opposes me, I can find the means and ways to get what I want.				
It is easy for me to stick to my aims and accomplish my goals.				
I am confident that I could deal efficiently with unexpected events.				
Thanks to my resourcefulness, I know how to handle unforeseen situations.				
I can solve most problems if I invest the necessary effort.				
I can remain calm when facing difficulties because I can rely on my coping abilities.				
When I am confronted with a problem, I can usually find several solutions.				
If I am in trouble, I can usually think of a solution.				
I can usually handle whatever comes my way.				

Adapted from Schwarzer R, Jerusalem M. *Generalized Self-Efficacy Scale*. Windosr, England: NFER-NELSON; 1995.

APPENDIX I

TEAMSTEPPS® TEAMWORK ATTITUDES QUESTIONAIRE

Please respond to the questions below by selecting the answer which 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
It is important to ask patient and their families for feedback regarding patient care.					
Patients are a critical component of the care team.					
This facility's administration influences the success of direct care teams.					
A team's mission is of greater value than the goals of individual team members.					
Effective team members can anticipate the needs of other team members.					
High performing teams in health care share common characteristics with high performing teams in other industries.					
It is important for leaders to share information with team members.					
Leaders should create informal opportunities for team members to share information.					
Effective leaders view honest mistakes as meaningful learning opportunities.					
It is a leader's responsibility to model appropriate team behavior.					
It is important for leaders to take time to discuss with their team members plans for each patient.					
Team leaders should ensure that team member’s health each other out when necessary.					
Individuals can be taught how to scan the environment for important situational cues.					
Monitoring patients provides an important contribution to effective team performances.					

Even individuals who are not part of the direct care team should be encouraged to scan for and report changes in patient status.					
It is important to monitor the emotional and physical status of other team members.					
It is appropriate for one team member to offer assistance to another who may be too tired or stressed to perform a task.					
Team members who monitor their emotional and physical status on the job are more effective.					
To be effective, team members should understand the work of their fellow team members.					
Asking for assistance to team members is a sign that an individual does not know how to do his/her job effectively.					
Providing assistance to team members is a sign that an individual does not have enough work to do.					
Offering to help a fellow team member with his/her individual work tasks is an effective tool for improving team performance.					
It is appropriate to continue to assert a patient safety concern until you are certain that it has been heard.					
Personal conflicts between team members do not affect patient safety.					
Teams that do not communicate effectively significantly increase their risk of committing errors.					
Poor communication is the most common cause of reported errors.					
Adverse events may be reduced by maintaining an information exchange with patients and their families.					
I prefer to work with team members who ask questions about information I provide.					
It is important to have a standardized method for sharing information when handing off patients.					

It is nearly impossible to individuals how to be better communicators.					

Adapted from Baker DP, Krokos KJ, Amodeo AM. TeamSTEPPS Teamwork Attitudes Questionnaire Manual *U S Department of Defense, Tricare Management Activity* 2008.

APPENDIX J

SYSTEM USABILITY SCALE

The following survey is designed to assess the usability of the program. The 'system' you are evaluating is the online program. Please answer each question indicating your level of agreement from Strongly Disagree to Strongly Agree.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I think I would like to use this system frequently.					
I found the system unnecessarily complex.					
I thought the system was easy to use.					
I think that I would need the support of a technical person to be able to use this system.					
I found the various function in this system were well integrated.					
I thought there was too much inconsistency in this system.					
I would imagine that most people would learn to use this system very quickly.					
I found the system very cumbersome to use.					
I felt very confident using the system.					
I need to learn a lot of things before I could get going with this system.					

Adapted from Bangor A, Kortum PT, Miller JT. An Empirical evaluation of the System Usability Scale *International Journal of Human-Computer Interactions.* 2008;24(6):574-594.

APPENDIX K

PARTICIPANT RESPONSE SURVEY

The following survey is designed to assess your views on the program. Please answer each question indicating your level of agreement from Strongly Agree to Strongly Disagree.

	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
The speaker was knowledgeable, organized and effective in his/her presentation.					
The teaching methods and aids were used effectively.					
The content was relevant to my job.					
I expect my job performance to improve because of this course.					
Overall, this course was worth my time.					
I would recommend this course to a colleague.					

APPENDIX L

INTERVIEW QUESTIONS

Investigator: The last portion of this research study is an interview which will take about 20-30 minute to complete. If, during the course of the interview, you do not wish to answer any questions you may say so and that question will be skipped.
The information you share will be kept confidential. The interview will be recorded, but without identifiers, such as your name or the school in which you are employed. Therefore, please don't use any identifying information about you, your school or your colleagues during the interview. Following the interview, the audio recording will be transcribed and then deleted. You will be given the opportunity to review the transcriptions of your interview and are encouraged to provide any corrections to the study staff.
Upon completion of the interview you will be given the opportunity to enter to win a $100.00 gift card.
Are you ready to begin?
Subject: Yes
Investigator: Ok, I have turned on the recorder. Thank you for letting me ask you these questions. As stated previously, please answer these questions to the best of your ability. Also, please do not provide any names or other protected health information when describing patient cases. Are you ready to begin?
Subject: Yes.
Investigator:
Interview Questions

1. Can you describe a typical workday for you? What does your workday look like from start to finish?
2. Tell me a story about the last time you interacted with a school nurse or athletic trainer following the program.

   a Can you describe the interaction-when did it happen, where did it happen, what happened during the interaction? Tell me the story.
   b How has your communication with the school nurse/athletic trainer changed in following the online training module? In what way?
3. What do you think are some of the benefits of communication between a school nurse and athletic trainer?
   a What are some of the barriers you have to effective communication between the school nurse and athletic trainer?
   b What would have to occur to overcome these barriers?
4. Please describe a time/instance/condition that you've experienced that should be communicated between a school nurse and athletic trainer.
5. How do you think patient outcomes might be affected by communication between the athletic trainer and school nurse?
6. Is there anything else that you can share with us that may help us understand your experiences in engaging with your colleagues (AT or SN) about patient care?

Investigator: That concludes the questions I have about your communication with your colleagues. Now I would like to ask you a few questions about your impression of the program.

7. What do you think were the strengths of the online training module that you completed?
    a What were some ways it could be improved?
8. Would you recommend a program like this to a colleague?
    a Why or why not?

Closing

Investigator: That you for talking with me today. Your feedback was very helpful. As I stated previously, nobody but me will hear the recordings. If at any point after this interview you think of something you'd like to add or change about your responses please let me know. In addition, if there is anything you feel uncomfortable with putting into a research project let me know and I will remove that portion of the data.

Do you have any questions?

Subject: No

Investigator: OK, I will now turn the voice recording devices off.

Investigator: If you wish to be entered to win a drawing for a gift card please provide your name, email, and phone number so I can keep it confidential. Also, please provide your email so I can send you the final transcripts for member checking. Additional instructions for member checking will be contained in that email. Again, thank you very much for participating in this research study. Please do not hesitate to contact me at lwels001@odu.edu if you have any questions.

APPENDIX M

TEAM STRUCTURE POST TEST

Please answer the following questions to the best of your ability. If necessary, you can refer to the previous PowerPoint to review.

1. A properly structured team yields all of the following benefits, EXCEPT:
    - A leader is clearly identified
    - A clear plan of care
    - The patient is involved in the care process
    - Team members know their roles and responsibilities

2. A Contingency Team includes all of the following characteristics, EXCEPT:
    - It is informed for emergency or specific events
    - It is time-limited (e.g., Code Team, Disaster Response Team, Rapid Response Team)
    - It is composed of team members drawn from a variety of Core Teams
    - It performs day-to-day operational management

3. Examples of effective strategies for involving patients in their care include all of the following, EXCEPT:
    - Setting up a time to discuss the patient's care without the patient present
    - Include patient in the communication between the athletic trainer and school nurse
    - Providing patients with tools for communication with their care team
    - Continually enlisting the patient's participation throughout the course of treatment

4. Which of the following is not a responsibility of the patient and their families?
    - Ask questions and voice concerns
    - Follow the instructions of the clinical team
    - Determine the best course of treatment for themselves
    - Monitor and report changes in the patient's condition

5. Which component of a multi-team system includes direct care providers and continuity providers?
    - Core Team
    - Contingency Team
    - Coordinating Team
    - Ancillary and Support Services

APPENDIX N

COMMUNICATION POST TEST

Please answer the following questions to the best of your ability. If necessary, you can refer to the previous PowerPoint to review.

1. A _____is a closed loop communication strategy used to verify and validate information exchanged.
    - Handoff
    - Call-Out
    - Check-back
    - DESC Script

2. The best communication tool or method for sharing critical information with an entire team engaged in an emergency or complex procedure is a:
    - Call-out
    - Check-Back
    - Time-Out
    - Huddle

3. A school nurse is preparing to leave for the day. Before she leaves, she wants to provide the athletic trainer with information about current patients. To provide this information successfully, the nurse should use which ONE of the following TeamSTEPPS® tools:
    - Debrief
    - SBAR
    - Handoff
    - Check-Back

4. A school nurse is treating a patient with asthma. The school nurse communicates the medication and dosage of medicine to the athletic trainer. What is the best communication strategy to use?
    - Call-Out
    - Check-Back
    - Time-Out
    - Huddle

5. A nurse has just started working at a new school system. In her prior job, staff used a toll called I PASS the BATON to handoff a patient. In the new school system, the staff are unfamiliar with this standardized format, and when patients are handed-off too her, she feels she is not receiving all the information she needs. This scenario is an example of which communication challenge:
    - Personality differences
    - Varying communication styles
    - Conflict among individuals
    - Distractions in the unit

APPENDIX O

POOR SIMULATION ERRORS

Situation
Failed to adequately introduce the patient
Current condition was not stated

Background
Incomplete background information was presented

Assessment
No assessment was given

Plan
No plan was given

Other
Relying on nonverbal communication
Communication was not concise
The AT did not close the communication loop
No opportunity for questions was given
An acknowledgment of transfer of care was not verbalized

VITA

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Education
2017 Ph.D., Health Services Research Old Dominion University, Norfolk, VA
2014 M.S., Health Sciences, The University of Toledo, Toledo, OH
2012 B.A., Athletic Training, Hope College, Holland, MI

Published or in Preparation Papers
Welsch L, Hoch J, Rutledge C. The Modified Readiness for Interprofessional Learning Scale in Currently Practicing Athletic Trainers. *Athletic Training Education Journal.* 2017; 12(1): 10-17.

Welsch L, Hoch J, Poston R, Parodi A, Akpinar-Elci M. Interprofessional Education with Didactic TeamSTEPPS and Medical Simulation: A Systematic Review. *Journal of Interprofessional Care.* Submitted March 2017.

Hoch M, Hartley E, **Welsch L**, Powden C, Hoch J. Y-Balance Test Performance Following a Competitive Field Hockey Season: A Pretest-Posttest Study. *Journal of Sport Rehabilitation.* In Press.

Research Presentations
Welsch LA. (March 2017) Teamwork Makes the Healthcare Work. *Old Dominion University Science Pubs.* Norfolk, Virginia. Oral Presentation

Welsch LA, Hoch JM. Interprofessional Education with Didactic TeamSTEPPS® and Medical Simulation: A Systematic Review. *Modeling, Simulation & Visualization Student Capstone Conference.* Suffolk, Virginia. (April 2016) Oral Presentation

Welsch LA, Rutledge CM, Hoch JM. The Modified Readiness for Interprofessional Learning Survey in an Athletic Training Population. *Virginia Athletic Trainers' Annual Meeting and Symposium.* Williamsburg, Virginia (January 2016) Oral Presentation

Additional Honors
Modeling, Simulation & Visualization Certificate Recipient (2017)
Modeling, Simulation & Visualization Student Capstone Conference Track Winner (2017)
Modeling and Simulation Graduate Assistant (2015-2017)
Mid-Atlantic Telehealth Resource (MATRC) Summit Scholarship recipient (2015)
Old Dominion University College of Health Sciences Graduate Fellowship Recipient (2014-2015)