INTERPROFESSIONAL SIMULATION AMONG HEALTHCARE STUDENTS: A RANDOMIZED CONTROLLED TRIAL TO IMPROVE COMMUNICATION SELF-EFFICACY

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INTERPROFESSIONAL SIMULATION AMONG HEALTHCARE STUDENTS: A RANDOMIZED CONTROL TRIAL TO IMPROVE COMMUNICATION SELF-EFFICACY

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ABSTRACT

Medical errors that result in adverse and sentinel events are linked to ineffective communication between providers and members of the healthcare team. Healthcare organizations have enacted multiple strategies to lower the intradisciplinary communication errors. However, this remains an area for ongoing improvements because lecture and clinical practice may be ineffective methods to teach communication. Communication errors, which are considered preventable, are now noted as one of the top three leading causes of deaths in the United States. In healthcare education, high-fidelity simulation has been acknowledged as an innovative methodology. However, there is a lack of evidence that deals with the effectiveness of teaching communication through simulation.

The purpose of this research study was to examine healthcare students' communication self-efficacy with the use of a high-fidelity simulation intervention with an interprofessional group of students compared to a control group of intraprofessional students. The sample consisted of 22 senior level healthcare students in nursing, respiratory, and allied health programs randomly selected at a health sciences college. With institutional review board approval, a randomized controlled trial was conducted using a modified version of the

Communication Skills Perceptions Questionnaire to assess healthcare students' communication self-efficacy, communication skills, and behavior pre- and post-simulation intervention with both groups.

APPROVAL PAGE

The faculty listed below, appointed by the Dean of School of Nursing and Health Studies, have examined a dissertation titled "Interprofessional Simulation among Healthcare Students: A Randomized Control Trial to Improve Communication Self-Efficacy," presented by Angel M. Boling, candidate for the Doctor of Philosophy degree, and certify in their opinion it is worthy of acceptance.

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I would like to first thank my husband, Howard and my four children, Rain, Allison, Michael, and Megan, for supporting me through this journey. Countless hours were dedicated to this educational journey that were taken away from family time and events, but I hope that they see the benefits as they are on their own educational journeys and the importance of it. My husband has survived many educational journeys with me and has managed to live through the periods of stress and anxiety but wholeheartedly supported me each and every day.

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CHAPTER 1

INTRODUCTION

Ineffective communication is the basis of 70% of medical errors and leads to poor patient outcomes and patient dissatisfaction (Ammentorp, Abroe, Kofoed, & Mainz, 2007; Institute of Medicine [IOM], 2010; Joint Commission, 2012, 2016). Despite the efforts by the Joint Commission (2012, 2016) with the development of the National Patient Safety Goals, communication remains an area for ongoing improvements in healthcare. Teaching students effective communication skills is an integral part of any nursing or allied health program. Traditional educational strategies including lecture and clinical practice are ineffective for teaching communication skills (Beaird, Nyer, & Thacker, 2017; Bussard & Lawrence, 2019; Kameg, Clochesy, Mitchell, & Suresky, 2010; Kruijver, Kerstra, Francke, Bensing, & van de Wiel, 2000; Mullan & Kothe, 2010). High-fidelity simulation is an innovative teaching modality that has unique potential to teach these skills (Labrague, McEnroe-Petitte, Fronda, & Obeidat, 2018; Lane & Rollnick, 2007; Leonard, Shuhaibar, & Chen, 2010; Ohtake, Lazarus, Schillo, & Rosen, 2013; Schiavenato, 2009). However, there is a dearth of research on the effectiveness of simulation in teaching communication skills to healthcare professionals in academic and/or workplace settings (Bussard & Lawrence, 2019; Chant, Jenkinson, Randle, Russell, & Webb, 2002; Ohtake et al., 2013).

This chapter provides significant background information on communication skill training in healthcare education, including teaching modalities, simulation, and interprofessional education (IPE), while also addressing the effects of ineffective interprofessional communication on patient outcomes. This information leads to the

identification of the research problem and the research study. This chapter concludes with an overview of the research questions addressed and the significance of the study.

Communication Skills Training

Communication skills and training have varied among academic settings in multiple countries. There is a dearth of studies that examine communication skills and effective teaching strategies (Bussard & Lawrence, 2019; Chant et al., 2002). Didactic instruction can give students the fundamental principles of communication but does not allow for the opportunity to apply and practice these skills in a professional setting (Middlewick, Kettle, & Wilson, 2012). Lane and Rollnick (2007) documented multiple reviews that found "interactive methods of teaching are more successful in helping individuals to acquire communication skills in comparison to didactic methods" (p. 13).

Nurses, as well as other health care professionals, are lacking the skills that are necessary for effective communication due to inadequate training and a profound under-appreciation of the importance of patient-centered communication (Mullan & Kothe, 2010). Graduate nurses are apprehensive regarding their ability to communicate effectively in the workplace (Leigh, 2008). Based on these findings, there is a clear need to develop communication skills among healthcare students. Lack of communication skills training and faculty and clinical constraints leave educators with the need to incorporate more realistic environments to provide students with the necessary experiences to develop self-efficacy and skill acquisition.

Study Purpose and Hypothesis/Research Questions

The purpose of this study was to examine healthcare students' communication self-efficacy using a high-fidelity simulation intervention with an interprofessional group of

students compared to an intraprofessional control group. Self-efficacy has been defined as a "belief in one's capabilities to overcome the demands of a situation to achieve a desired outcome" (Kameg et al., 2010, p. 318). Self-efficacy and its associated perceptions have been identified as a component of behavioral prediction (Harrison, Rainer, Hochwarter, & Thompson, 1997). Academic performance may be motivated by self-efficacy, and a positive relationship has been shown to exist between self-efficacy and performance mastery (Robb, 2012). Despite these findings regarding the impact of self-efficacy on student achievement and performance, the overall focus in self-efficacy studies has not been centered on the behavioral change or outcome that occurs in the simulation setting with interprofessional communication skills, but on the student's perceived self-efficacy. In order for healthcare education to recognize the impact that simulation has on student self-efficacy and behavior and/or skill obtainment, educators must understand how high-fidelity simulation can be used as a teaching modality with healthcare students. This research study addressed this gap by examining the use of high-fidelity simulation on student self-efficacy regarding interprofessional communication skills.

Communication skills have been identified as the "essential ingredient to improve effective collaboration among team members of the health care team" (Klipfel et al., 2011, p. 348). By increasing student self-efficacy and developing interprofessional communication self-efficacy, effective interprofessional communication could lead to a decrease in medical errors and an improvement in patient outcomes.

Hypothesis: Healthcare students who participate in a high-fidelity interprofessional simulation scenario will have increased communication self-efficacy compared to students who participate in a high-fidelity intradisciplinary simulation scenario.

Research questions that were addressed were as follows:

1. What effect, if any, does an intraprofessional high-fidelity simulation have on healthcare students' communication self-efficacy?
2. What effect, if any, does an interprofessional high-fidelity simulation have on healthcare students' communication self-efficacy?

Significance

Kameg et al. (2010) affirmed that nursing undergraduate programs must be able to meet the competencies of their accrediting bodies and prepare students for today's workforce. These competencies include the ability to communicate with patients, families, coworkers, and other health care professionals. Challenges such as increased student-to-faculty ratios and availability of clinical sites have placed nursing programs at a disadvantage for providing appropriate learning environments for communication training to occur (Kameg et al., 2010). Furthermore, Mullan and Kothe (2010) acknowledged that research into medical errors has shown that communication is not a skill that can be learned on one's own; it requires specific training and evaluation.

With the increasing complexity of patient care, evidence has further supported the need for interprofessional education (IPE). The IOM identified IPE as a key component of healthcare education. Interprofessional education has been found to further encourage communication and collaboration among healthcare professionals and/or students while improving patient care by minimizing communication associated errors (IOM, 2010; Reese, Jeffries, & Engum, 2010). In congruence with these findings, the IOM affirms an ongoing need for interprofessional collaboration and supports the development of IPE and training. The American Association of Colleges of Nursing (AACN) (2011) developed core

competencies for interprofessional practice that are integrated as part of the Baccalaureate Essentials, which are standards for undergraduate nursing education. Within these competencies and essentials, the AACN recognizes communication as a core aspect of interprofessional collaborative practice, while also acknowledging the lack of communication knowledge and teamwork skills with healthcare students. These core competencies were developed as a much larger initiative of the Interprofessional Education Collaborative (2011) and identified a need for change in current healthcare education through an expert panel of professionals from the AACN, American Association of Colleges of Pharmacy, American Association of Colleges of Osteopathic Medicine, American Dental Education Association, Association of American Medical Colleges, and the Association of Schools of Public Health (AACN, 2011). The development of these competencies identified the need for a realignment of current healthcare education and brought about the incorporation of interactive learning between two or more disciplines to further support interprofessional communication skills within the healthcare setting (AACN, 2011).

Changes in today's healthcare arena are constantly impacting the safety and quality of patient care (Reising et al., 2017; Wagner, Liston, & Miller, 2011). The top leading causative factor for medical errors, ineffective communication, has been consistently identified in current literature (Engum & Jeffries, 2012; IOM, 2010; Joint Commission, 2012, 2016; Reising et al., 2017; Wagner et al., 2011; Wong, Gang, Syld, & Mahoney, 2016). According to the IOM (2010), patient deaths exceed a total of 98,000 annually in the United States due to a lack of interprofessional communication. Additionally, communication failures have affected healthcare in the hospital setting with discharge process and after-hospital care with adherence to treatment plans (Institute of Healthcare Communication, 2014). The Institute of

Medicine identified IPE as a key component of healthcare education to encourage collaboration among healthcare students while improving patient care (IOM, 2010; Reese et al., 2010). Within these competencies and essentials, healthcare organizations recognize communication as a core aspect of interprofessional collaborative practice, while also acknowledging the lack of communication knowledge and skills of health profession students. With these problems in mind, questions exist as to how academia will provide healthcare students with the skill set to communicate effectively in an interprofessional setting.

Based on current associated findings and inconsistencies within healthcare industry related to ineffective communication, there is a great need for the development of communication skills among healthcare students. Currently, there is a paucity of research regarding communication skill development and training with any one teaching modality (Aled, 2007; Bagnasco et al., 2014; Booth & McMullen-Fix, 2013; Bussard & Lawrence, 2019; Chant et al., 2002; Zavertnick, Huff, & Munro, 2010). Communication skill training studies have utilized a variety of teaching methodologies including didactic teaching, lab instruction, and clinical experiences. However, the evidence finds that these teaching methodologies lacked the necessary components for transfer of knowledge and communication skill obtainment (Aled, 2007; Bussard & Lawrence, 2019; Chant et al., 2002; Zavertnick et al., 2010). With limited evidence on communication skill training, an innovative approach is needed to determine an effective teaching methodology for this learning to occur.

Lack of communication skills training, along with faculty and clinical constraints, have left educators with the need to incorporate more realistic environments that will provide

students with the necessary experiences to develop communication self-efficacy and skill acquisition that is lacking in today's workforce. Simulation can provide an environment that is risk-free to patients and allows multiple learning opportunities to help develop interprofessional communication self-efficacy with debriefing and reflection. High-fidelity simulation is a teaching modality that has the potential to teach communication skills. However, minimal research exists on the effectiveness of simulation in teaching communication skills to health professionals in academic settings (Chant et al., 2002; Zavertnick et al., 2010). Research has shown that high-fidelity simulation has been utilized as a teaching method to promote teamwork and communication self-efficacy among healthcare students. However, these pilot studies have only measured student perception or student satisfaction of the simulation activity and did not directly measure the obtainment of communication self-efficacy (Bagnosco et al., 2014; Wagner et al., 2011).

It has been noted in current literature that communication failures have been found to be preventable and can be impacted through modifications and cultural changes in healthcare curriculums and training (IOM, 2010; Kruijver et al., 2000; Wong et al., 2016; World Health Organization [WHO], 2012). The use of healthcare simulation is a means to provide the necessary training and/or curriculum to fill the gaps to allow healthcare professionals to "effectively function in patient-centered, collaborative health care teams" (Wong et al., 2016, p. 118). Recognizing the need for change in teaching and training modalities to augment the realistic healthcare environment is imperative for healthcare students if they are to enhance communication skills. This need for a controlled practice environment to teach teamwork and interprofessional communication skills has been ongoing within healthcare education. Educators have recognized that simulation-based training provides a controlled environment

that allows skills obtainment without potential harm to patients. Healthcare and educational training requirements have shifted the need for high-fidelity simulation into nursing and medical curriculums, as well as other healthcare disciplines, to further assist with the ever-changing complex clinical settings and patient acuity (Klipfel et al., 2011; Leonard et al., 2010; Ohtake et al., 2013; Reising et al., 2017; Schiavenato, 2009). Additionally, simulation scenarios can be changed and replayed to evaluate learning, while also providing interactive methods to teach specific skills such as communication and teamwork (Lane & Rollnick, 2007; Leigh, 2008; Messmer, 2008). The use of simulation should facilitate "an increase in learning and retention, improve overall performance and communication skills, and enhance teamwork among health care professionals while reducing safety risks for patients" (Messmer, 2008, p. 321). Furthermore, healthcare education and training can no longer be dependent on available patients and possible scenarios when simulation can provide the learner with many different types of situations (Jeffries, 2005; Messmer, 2008; Reising et al., 2017).

CHAPTER 2

REVIEW OF LITERATURE

This chapter provides a review of the literature related to interprofessional communication skill training in healthcare education. The chapter begins by defining the concept of communication and its significance in healthcare. The chapter is an overview of current research on communication skill training in healthcare education. In addition, the literature review describes potential methodologies for communication skill training and the use of high-fidelity simulation in healthcare education with a focus on interprofessional education. Additionally, this chapter provides an overview of the theoretical framework applied to communication skill development with the teaching modality, high-fidelity simulation.

The Communication Process

Defining Communication as a Concept

Communication is commonly defined in two different ways: written and face-to-face. Written communication has been identified as the preferred form in healthcare, yet it lacks the uniqueness of face-to-face interaction, which includes body language and facial expression (Battey, 2009; McCabe, 2003; Vermeir et al., 2015). Written communication leaves out the subjective view of the individual and does not allow the dialogue that occurs after the actual processing of information. This lack of subjective interaction does not allow crucial conversations to take place among the healthcare team (Vermeir et al., 2015). Face-to-face communication helps to convey meaning during a conversation while engaging the receiver of the message in a unique process that is based on the sending and receiving of messages that may contain verbal and nonverbal meaning (McCabe, 2003; Vermeir et al.,

2015). Battey (2009) identified in her work that communication is "a dynamic interpersonal process involving continual adaptation and adjustments between two or more human beings engaged in face-to-face interactions during which each person is continually aware of the other" (p. 35).

Two common forms of communication in healthcare include nurse-patient communication and interprofessional communication. Nurse-patient communication is multidimensional and involves more than just the transmission of information, for there is the involvement and recognition of feelings related to patient care (McCabe, 2003). Interprofessional communication involves the transference of knowledge and information that takes place between disciplines of healthcare such as nurses, physicians, pharmacists, and therapists (Booth & McMullen-Fix, 2013).

Saxton (2012) believed that "communication can be described in terms of a three-dimensional space" (p. 606). The first dimension was defined as the messages that moved forward through the processing of facts or backwards when focused on feelings only. The second dimension involved the attitudes that are always affected in either a positive way that moves the communication forward or in a negative way that may halt the process of communication (Saxton, 2012). The third dimension was based on the interaction through the growth of interpersonal intimacy or toward feelings of separation (Saxton, 2012). The third dimension was defined as the patterns of interaction; the patterns of interaction most commonly associated with nursing and healthcare include communing, asserting, confronting, conflicting, and separating (Duldt-Battey, 2004). These patterns of interactions are fundamental as the final dimension for the collaborative relationships necessary for healthcare providers to communicate and function cohesively as a team. The three

dimensions of communication behavior are indispensable components of effective interactions that can influence the overall model of communication and can disrupt the process when positive interactions do not occur. Positive interactions of communication behavior among healthcare providers are essential elements for effective communication.

Significance of Communication in Healthcare

The importance of effective communication among healthcare teams, also termed interprofessional communication, is essential to safe quality care for all individuals. Ineffective communication in any healthcare setting can lead to negative outcomes for patients, including compromised patient care, discontinuity in patient care, patient dissatisfaction, and economic consequences of the healthcare institution (IOM, 2010; Joint Commission, 2012, 2016; Reising et al., 2017; Vernier, 2015). Medical errors caused by ineffective interprofessional communication continue to be the third leading cause of death for the past five years (Johns Hopkins Medicine, 2016). These statistics confirm that interprofessional communication among healthcare teams has not changed despite the identification of this problem almost a decade ago (Interprofessional Education Collaborative, 2011; Joint Commission, 2012, 2016; WHO, 2012).

Simulation as a Teaching Modality

History of Simulation

From a historical perspective, simulation was first used in aviation and the military as a mechanism to provide complex scenarios to help manage and respond to safety issues (King et al., 2016; Labrague et al., 2018; Messmer, 2008; Schiavenato, 2009). Medicine integrated simulation as a means to provide a simulated environment to focus on safety by learning from mistakes. Medical simulation was first introduced in the 16th century in

anatomy lab presentation; these presentations utilized human cadavers to teach medical, surgical, and diagnostic procedures and treatments (Rosen, 2008; Schiavenato, 2009). Medical education recognized the need for a more authentic method to enhance skill obtainment, critical thinking, and clinical judgment (Rosen, 2008; Schiavenato, 2009). Simulation was not formally introduced until the late twentieth century due to the need for a modernized approach through the development of advanced computerized technology that could realistically simulate a patient care environment (Rosen, 2008).

Different Forms of Healthcare Simulation

Simulation technology can be described as "the degree of realism or authenticity" (Munshi, Lababidi, & Alyousef, 2015, p. 13). These degrees of realism are commonly referred to as levels of fidelity that are based on the task assigned and the appropriate training stage for the simulation experience (Basak, Unver, Moss, Watts, & Gaioso, 2016; Munshi et al., 2015). Adams et al. (2015) further defined fidelity as "the degree to which a model or simulation reproduces the state and behavior of a real-world object, feature, or condition" (p. 778). Simulators have three common levels of fidelity: low-fidelity, medium-fidelity and high-fidelity. Low-fidelity simulation training has been characteristically associated with task-trainers or mannequins that serve to mimic basic physiological responses; task trainers are commonly used to teach assessment skills and basic skills that typically do not require a high level of knowledge transfer for the student (Adams et al., 2015; Basak et al., 2016; King et al., 2016). Medium-fidelity simulation includes a more technologically advanced form of the task trainer that can enhance learning with assessment skills and complex nursing skills (Ntlokonkulu, Rala, & Goon, 2018).

In the past decade, simulation technology has continued to change with the development of more advanced simulators that function at a high-fidelity level. High-fidelity simulators through the integration of computerized technology can physiologically respond, which allows a more realistic presentation of the patient care experience for the healthcare student (Basak et al., 2016; King et al., 2016). Research has shown that this innovative form of technology can assist with higher levels of knowledge transfer and improve clinical judgment, communication skills, and critical thinking (Adams et al., 2015; Basak et al., 2016; Labrague et al., 2018; Munshi et al., 2015). Furthermore, research has identified a statistically significant increase in student self-confidence, self-efficacy, and teamwork skills with high-fidelity simulation as an effective teaching strategy for healthcare students (Adams et al., 2015; Basak et al., 2016; Doolen et al., 2016; Labrague et al., 2018).

Review of Current Communication Training and Studies

Literature Review

This literature review included studies from nursing, medicine, healthcare education, computers, academics, psychology, and sociology. The literature review provides an insight into the use of the chosen theory and the relevance to the current research. A literature search was undertaken in the following databases: PubMed, ProQuest Nursing and Allied Health, Science Direct, EBSCO, and Psych INFO. The initial search consisted of the keywords: simulation, nursing simulation, communication, and interdisciplinary. This search was further developed to build on specific areas being examined by adding the keywords: interprofessional, self-efficacy, and communication skills.

Communication

Currently, there is a paucity of research with communication skill development and training. Prior communication training research has utilized a variety of mixed methods approaches through the collection and systematic analysis of both quantitative and qualitative data, but evidence indicating effective teaching methodologies is lacking (Aled, 2007; Bussard & Lawrence, 2019; Chant et al., 2002; Zavertnick et al., 2010). The study populations in this area have varied, with both nursing and medical students comprising the majority of participants when interprofessional communication was the focus of the research (Ammentorp et al., 2007; Birkhoff & Donner, 2010; Bussard & Lawrence, 2019; Messmer, 2008; Reese et al., 2010; Reising, Carr, Shea, & King, 2011; Reising et al., 2017). A limited number of studies included the use of nurses and physicians with interprofessional education and simulation (Ammentorp et al., 2007; Birkhoff & Donner, 2010; Messmer, 2008; Reese et al., 2010; Reising et al., 2011). The remaining simulation studies did not focus on interprofessional teams of students but instead conducted research on a single healthcare discipline (Bambini, Washburn, & Perkins, 2009; Kameg et al., 2010; Leigh, 2008). Additionally, studies have included respiratory care and physiotherapy students, with medical and nursing students; the focus of these studies was on changes in attitudes, an understanding of the team members' roles and responsibilities, and student perceptions (Andersen, Coverdale, Kelly, & Forster, 2018; Costello et al., 2017; King et al., 2016). Research findings varied based on the research participants and the variables that were being examined. The studies utilized a variety of teaching and evaluation methodologies including assessment and skills stations, medium and high-fidelity simulations with debriefing, role modeling, didactic instruction and educational workshops (Andersen et al., 2018; Bambini et al., 2009; Bussard

& Lawrence, 2019; Costello et al., 2017; Kameg et al., 2010; King et al., 2016). Two constant themes that emerged through the review of literature was the significance of effective communication in healthcare and the lack of communication skills in patient care (Andersen et al., 2018; Bambini et al., 2009; Bussard & Lawrence, 2019; Kameg et al., 2010; Reising et al., 2011; Reising et al., 2017).

Data collection for the studies consisted of pre-test, posttests, or surveys that evaluated the student's perception of the experience that measured self-efficacy or self-confidence. These tests or surveys reported positive outcomes based on student response and statistical analysis. An integration of Benner's novice to expert theory was used in conjunction with Bandura's self-efficacy theory with the examined studies. The evaluation of self-efficacy with simulation or the identification of communication was acknowledged as a consistent problem or theme. Despite these findings, studies have lacked theoretical frameworks to evaluate whether learning has occurred in interprofessional communication skills.

Communication, Simulation, and Self-Efficacy

Studies noted a consistent theme in the evaluation of self-efficacy using simulation when communication was a focus of the research (Bambini et al, 2009; Kameg et al., 2010; Leigh, 2008; Reising et al., 2017). Themes were present noting a problem with communication, yet no specific studies showed that communication self-efficacy and development were being researched. Multiple studies exploring interprofessional education identified the significance of this in health care, yet a gap exists in terms of evaluating the development of interprofessional communication skills associated with self-efficacy (Costello et al., 2017; Engum & Jeffries, 2012; Messmer, 2008; Nichols et al., 2019; Reising

et al., 2011;). Reising et al. (2011) examined the usage of simulation versus classroom lecture for development of interprofessional communication skills; yet with a limited sample size as well as no existing tools for measurement, the data only supported student perception of the experience with no mention of improvement in self-efficacy.

A few studies researched the role of self-efficacy in conjunction with the development of communication skills and acknowledged the importance of self-efficacy as an important concept in student learning (Bambini et al., 2009; Kameg et al., 2010; Li et al., 2019; Raica, 2009). Observational experiences, enactive mastery experiences, social and verbal experiences, and psychological experiences are the associated antecedents that structure and develop a student's self-efficacy (Bandura, 1997). Self-efficacy and the relationship with the development of communication self-efficacy have been explored with the use of different teaching modalities. Studies with simulation utilized Bandura's self-efficacy theory as their theoretical framework. Kameg et al. (2010) compared the difference between traditional lecture and high-fidelity simulation on student self-efficacy and communication skills in a mental health scenario. Their findings were consistent with other simulation studies in terms of increased self-efficacy when using high-fidelity simulation, further supporting the theoretical framework of Bandura (Kameg et al., 2010; Li et al., 2019). With the use of simulation as an enactive mastery experience, the findings consistently showed an increase in student self-efficacy with learning (Kameg et al., 2010; Li et al., 2019). Bambini et al. (2009) evaluated how simulation impacted student self-efficacy in pre-licensure courses; the research identified communication development, confidence in psychomotor skills, and clinical judgment as the three themes important for nursing education. Li et al. (2019) conducted a study to examine the impact of simulation-based

scenarios on communication, self-efficacy, and empathy in nursing students. The results of their research concluded that self-efficacy is impacted by the use of simulation-based learning activities and deliberate practice involving repetition and constructive feedback (Li et al., 2019).

Raica (2009) found a significant impact on communication self-efficacy in the workplace. Despite these findings, Raica also noted that low self-efficacy fostered a sense of low self-worth, stress, depression, and an overall perception concerning the performance behavior. These behaviors and perceptions could further affect the development of communication self-efficacy and clinical judgment. Pharmacy education also found a significant impact on increased self-efficacy that led to successful skill acquisition in the simulation environment (Bray, Schwartz, Odegard, Hammer, & Seybert, 2011).

Despite the use of self-efficacy in multiple disciplines, weaknesses in the use of Bandura's theoretical framework do exist. Factors that could affect the evaluation of self-efficacy may depend on students' perceptions of their clinical performance in the simulation setting. Bambini et al. (2009) reported several limitations to their study that examined student self-efficacy. A key limitation to Bambini et al.'s (2009) work was the use of a self-efficacy tool that examined self-reported data only. Another limitation was that debriefing and communication during the simulation could have altered the scenario that was varied in each student's experience (Bambini et al., 2009). To prevent this limitation, the tool or instrument utilized needed to examine self-efficacy as well as the effectiveness of the actual learning outcome for the simulation experience.

Theoretical Framework

Self-efficacy has been identified as an important concept in student learning. Self-efficacy and the relationship with the development of communication skills were explored with the use of different teaching modalities. Utilization of simulation to provide a form of enactive mastery experience with communication scenarios has resulted in an increase in self-efficacy that allows for further learning and development in this environment (Kameg et al., 2010; Leigh, 2008; Li et al., 2019;). Furthermore, self-efficacy has been noted to have a direct impact on the ability of an individual to learn new skills or knowledge; by increasing self-efficacy, an individual will follow through with the behavior to successfully learn a skill or acquire knowledge (Leigh, 2008). With inductive reasoning, an argument can be constructed that with repeated enactive mastery experiences and performance accomplishments, communication skills will increase with positive self-efficacy (Kameg et al., 2010; Leigh, 2008; Li et al., 2019). As self-efficacy increases, a student will set higher goals to obtain a continuation of learning and enhancement of their current performance (Robb, 2012).

Self-Efficacy Theory

Bandura's (1977, 1997) self-efficacy theory was chosen to provide the theoretical framework for the research study. Self-efficacy was initially one of the four constructs of Social Cognitive Theory, which examines overall human functioning which is dependent on reciprocal interactions that include the behaviors of an individual, internal personal factors, and environmental factors (Bandura, 1977; van Dinther, Dochy, & Segers, 2011). Self-efficacy has been defined as a "belief in one's capabilities to overcome the demands of a situation to achieve a desired outcome" (Kameg et al., 2010, p. 318). Self-efficacy and its

associated perceptions have been identified as a component of behavioral prediction (Harrison et al., 1997). Self-efficacy was later identified to have an association with academic performance of students in terms of high achievement outcomes based on their capabilities and perceptions (Luszcynska, Gutierrez-Dona, & Schwarzer, 2005). Attributes associated with self-efficacy in students consisted of confidence in one's perceived capability and the perseverance to see a task or goal through to the end (Robb, 2012). Research indicates that academic performance can be motivated by self-efficacy and that a positive relationship has been shown to exist between self-efficacy and performance (Robb, 2012). Self-efficacy has been examined and identified in higher education as "an important variable because it affects students' motivation and learning" (van Dinther et al., 2011, p. 95). Self-efficacy has a direct impact on the ability of an individual to learn new skills or knowledge; by increasing self-efficacy, an individual will follow through with the behavior to successfully learn the skill or knowledge (Leigh, 2008). The self-efficacy theory can be applied to the research focus through the use of simulation scenarios as a means of providing the experiences needed to facilitate increased communication self-efficacy and the development of interprofessional communication skills.

Bandura's (1977) self-efficacy theory focuses on the relationships that exist between self-efficacy, outcome expectancies, and behavior. The theoretical framework shows that an individual's efficacy beliefs, which can vary in level, strength, and generality, can influence and/or predict behavior which leads to an end outcome that is further influenced by the outcome expectancies (Bandura 1977, 1997). Self-efficacy and outcome expectancies are the two constructs central to the theoretical framework of the self-efficacy theory. Self-efficacy has been defined to be situation specific and to be involved more with perceived capability of

an individual rather than actual capability (Bandura, 1977, 1997). Outcome expectancies influence an individual and further define their ability regarding behavioral associated outcomes (Bandura, 1977). Outcome expectancies are also influenced by the physical, social, and self-evaluative aspects of an individual's everyday practices (Bandura, 1977). Bandura clearly explained the differences between outcome and efficacy expectations, stating that "an individual can believe that a particular course of action will produce certain outcomes, but if they entertain serious doubts about whether they can perform the necessary activities such information can influence their behavior" (Bandura, 1997, p. 193). With this statement, Bandura (1977, 1997) hypothesized that self-efficacy is more predictive of behavior, and that self-efficacy can be used as a determinant of performance based on previous learned behaviors and the ability to learn new skills and/or behaviors as noted in The Theoretical Framework (see Figure 2.1).

Figure 2.1. Bandura's Self-Efficacy Theoretical Framework

Self-efficacy as a construct is further developed from self-efficacy judgments. Self-efficacy judgments are established from four main sources; these four sources are defined as efficacy expectations (Bandura, 1977, 1997; Williams, 2010). Efficacy expectations are the efforts that an individual will expend and how long they will persist when faced with challenges (Bandura, 1977). Bandura (1977, 1997) concluded that efficacy expectations are specific to performance and vary with levels of difficulty with each different performance. Bandura identified the four sources of efficacy expectations: performance accomplishments, vicarious experience, verbal persuasion, and physiological states, with each source of information having a direct influence on self-efficacy and mastery of task, skill, or behavior.

Self-Efficacy Model

The Self-Efficacy Model (see Figure 2.2) identifies the four areas of efficacy expectations and the directional approach on the development of self-efficacy judgments that lead to a determined behavior or performance. Performance accomplishments or enactive mastery experiences are based on personal mastery experiences and are found to be the most influential of the efficacy expectations (van Dinther et al., 2011). Vicarious experiences examine the use of modeling successful behavior that is consistent with the success of others (Bandura, 1977, 1997). Social persuasion develops through the coaching and mentoring of others by direct encouragement or motivation; whereas, physiological states focused on how emotional factors such as stress, anxiety, and fear can alter or affect self-efficacy (Bandura 1977, 1997). Despite these four efficacy expectations and their sources, Bandura (1977) acknowledged that the overall impact from the information that is gathered through these experiences must still be processed to carry out the end behavior or performance. Bandura (1997) posited that repeated successes raises mastery expectations and self-efficacy, which

results in negative experiences having a smaller impact on learning. Induction models for this type of expectation include experiences that give repeated exposure to different scenarios to help master performance and skill acquisition (Bandura, 1997).

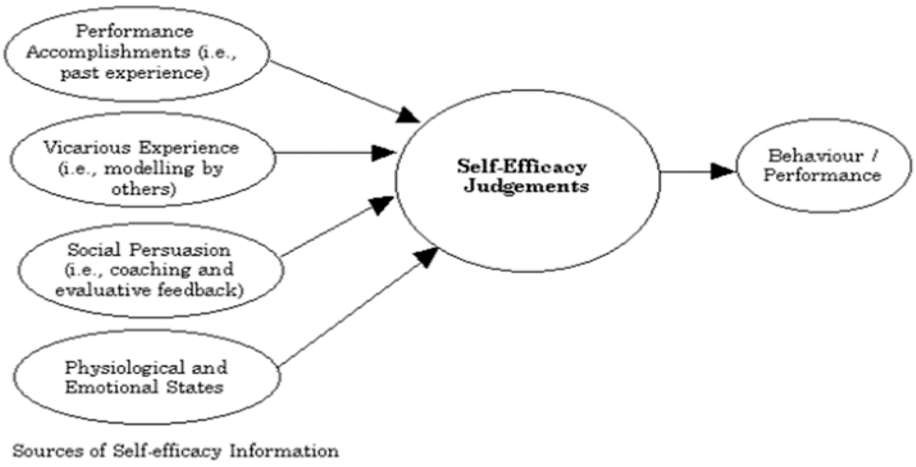


Figure 2.2. Self-Efficacy Model

The Concept of Self-Efficacy

The concepts of the self-efficacy theory are well defined in terms of the difference between self-esteem and perceived self-efficacy. Bandura (1977) defined self-esteem as an appraisal of oneself or a sense of self-worth, whereas perceived self-efficacy is one's assessment of their ability to perform a behavior or skill. Self-efficacy is a feeling or sense that is developed over time through learning and mastering of behaviors and/or skills and is not affected by one's self-esteem (Bandura, 1977). Bandura (1977) further posited that perceived self-efficacy contributes to an individual's ability to overcome obstacles and succeed, whereas self-esteem is an internal feeling that can produce negative thoughts preventing success.

The theory is clearly defined in terms of the relationships with self-efficacy and efficacy judgments that can lead to behavior and expected outcome performances. Multiple constructs are associated with self-efficacy. Bandura (1977, 1997) identified self-control with self-esteem and perceived control as the two constructs that are commonly associated with self-efficacy and the conceptual definitions in terms of academic achievement and motivation. Self-concept is defined as a generalized concept that incorporates self-knowledge and self-evaluative feelings, in which self-concept is measured in terms of self-esteem versus performance expectations with self-efficacy (Zimmerman, 2000). Bandura (1997) further supported this definition by stating that one can have high self-efficacy about a performance, but one does not necessarily have high self-esteem. Bandura (1977) acknowledged that conceptually there is no known relationship between a person's capabilities and their ability to like or dislike themselves. Furthermore, self-esteem does not affect the personal goals or performance that perceived self-efficacy beliefs have been found to predict (Bandura, 1997). Perceived control "refers to general expectancies about whether outcomes are controlled by one's behavior or by external forces" (Zimmerman, 2000, p. 85). Bandura (1977) termed this as locus of control where the tasks are neither domain nor task specific and did not predict academic performance. Locus of control is essential to the belief of whether actions will define or affect outcomes, yet self-efficacy is an established belief that an individual can produce certain actions (Bandura, 1997). The constructs of self-control and perceived control differ from a conceptual and operational standpoint when compared to self-efficacy with both lacking validity for predicting academic outcomes (Zimmerman, 2000).

Self-efficacy is a cognitive variable that consistently affects one's overall performance behavior and associated affective processes (Robb, 2012). Furthermore,

increasing student self-efficacy and associated beliefs have been found to decrease levels of stress and anxiety, allowing more efficacious management of their academic behaviors and performance (Bandura, 1997; Robb, 2012; Zimmerman, 2000). According to these definitions, the establishment and development of student self-efficacy can further close the gap between theory and practice and allow for the development of knowledge and skill acquisition.

The self-efficacy model and theoretical framework guides the use of simulation as a teaching modality to develop and enhance interprofessional communication skills and behaviors in healthcare students. Through self-efficacy expectations (performance accomplishments, vicarious experiences, social persuasion, and psychological/emotional stress), self-efficacy judgments will be made that lead to either increased or decreased levels of self-efficacy and the outcome behavior (communication skills and behavior). Simulation and debriefing provide a form of enactive mastery experience that can impact levels of self-efficacy and associated efficacy expectations, which can lead to positive behavioral change and the desired outcome for the research study (see Figure 2.3).

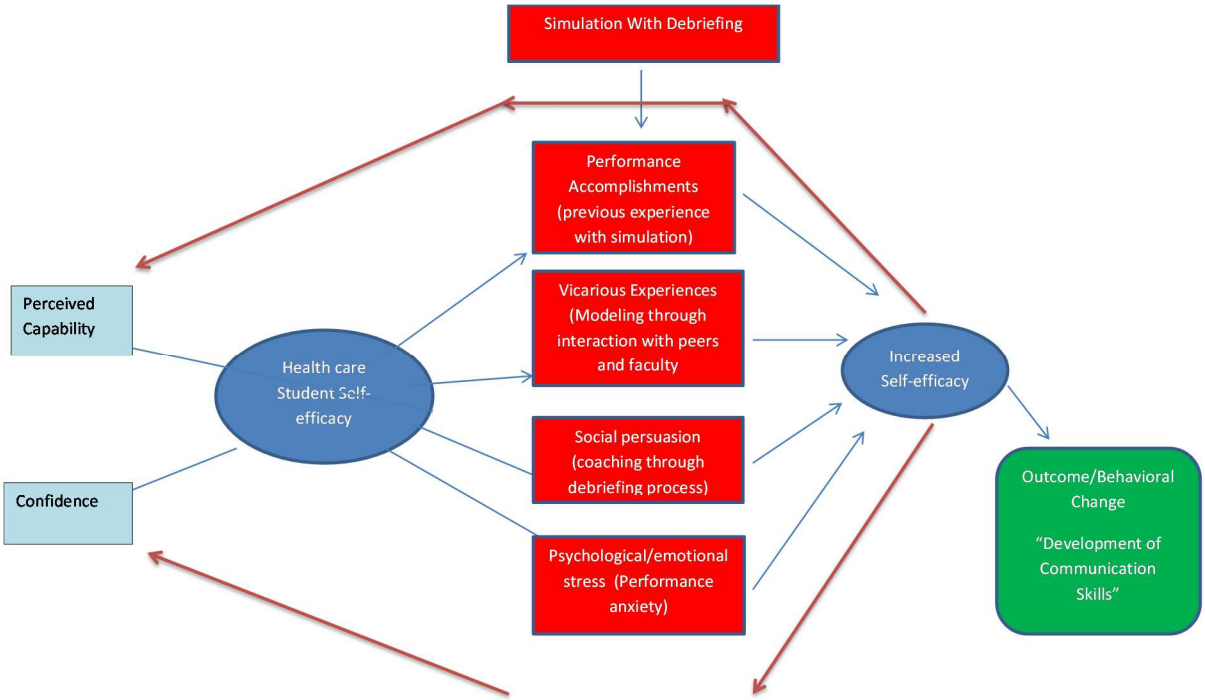


Figure 2.3. Self-Efficacy Research Model

CHAPTER 3

METHODOLOGY

This study was a randomized controlled trial to examine healthcare students' communication self-efficacy using a high-fidelity simulation intervention with an interprofessional group of students compared to a control group of intraprofessional students. An interprofessional group is comprised of students from more than two healthcare disciplines, whereas an intraprofessional group consists of students from one healthcare discipline. This chapter discusses the selected research design for the research questions.

Research Design

This study employed a randomized controlled trial design to examine healthcare students' communication self-efficacy with the use of a high-fidelity simulation intervention with an interprofessional group of students compared to an intraprofessional control group. Students were randomly assigned a number from 1 to 4 and a letter per discipline (N-Nursing, R-Respiratory, A-Allied Health) as a means to assist with random assignment to the two groups. The Allied Health group consisted of students in the following healthcare programs: diagnostic medical sonography, nuclear medicine technology, medical radiography, and radiation therapy. The first three students from one discipline were placed in a control group of intraprofessional students, whereas the last student of the same discipline was placed in the intervention group. This assignment was done with each discipline. High-fidelity simulation was chosen as the teaching modality and included post-intervention debriefing to examine communication self-efficacy and whether differences existed between the intervention group (interprofessional) and the control group (intraprofessional).

Setting

Participants were recruited from a baccalaureate health science college located in the Mid-South region of the United States. All graduates of this college are healthcare professionals who will care for patients of all ages, races, and genders for the region. The student population of the selected site was more radically diversified than the national demographics of nursing, respiratory, and allied health programs and allowed for more diversity in recruitment. The institution included the following student diversity: African-American 37%, Asians 2%, Hispanic 1.8%, Caucasian 59% in comparison with the American Colleges of Nursing report (2012-2013) that includes a minority of nursing students represented by 27.7% (comprised of African American, Hispanic, and Asian) and Caucasian 73% (American Colleges of Nursing, 2013). Approval to conduct the research was obtained from the provost of the institution and the Institutional Review Board of University of Missouri-Kansas City (see Appendix A).

Sample

Sample size was determined based on the literature review. Studies consistently included between 10 and 40 students, yet most of the studies involved either one discipline such as nursing, or two disciplines (Bambini et al., 2009; Kameg et al., 2010; Leigh, 2008; Raica, 2009). For those studies that conducted research examining interprofessional education, 10-12 participants were the average sample size (Engum & Jeffries, 2012; Messmer, 2008; Reising et al., 2011). The power analysis to determine sample size with a randomized control trial (effect size of .80, power .80, alpha of 0.05) indicated that the sample size should total 40 participants. From this calculation, a sample of 40 healthcare students were sought for enrollment.

Inclusion criteria included 1) Students were in their senior year of their healthcare programs (nursing, respiratory, and allied health programs) at the selected institution, and 2) Students had previous simulation experiences as part of their healthcare programs. Students were removed from the sample pool if they had not had any prior simulation experiences in previous courses. The sample consisted of a total of 40 senior level healthcare students in nursing, respiratory, and allied health programs. To ensure all disciplines were equally recruited, students were assigned based on discipline into the intervention or control group. Once the designated discipline participants were recruited, any additional student was placed on alternative list to have available for possible student attrition.

Students who met criteria but were not selected as part of the study were coded by their health care discipline along with the letter "A," designating the student was an alternate. Each alternate was coded with a number beginning with the number one. A retention plan was in place for those students who later chose not to participate in the study and/or to control for potential students who did not show up for the simulation experience. If a student decided not to participate, the researcher reviewed initial recruitment for alternate students who were willing to participate. Coding of participants allowed anonymity and confidentiality of participants' responses and information. Participants received a $25.00 gift card to a local coffee shop as an incentive to participate.

Instruments

Demographic Data

Baseline demographic data were collected on each participant. Data collected included the following: age, race, gender, healthcare discipline program, prior healthcare experience, and number of prior experiences with simulation.

Survey Instrument and Measurement of Self-Efficacy

To evaluate participant self-efficacy with communication, the Communication Skills Perceptions Questionnaire was selected as the research instrument for the study (see Appendix B for questionnaire). The Communication Skills Perceptions Questionnaire was originally developed to assess learning objectives developed from the Interprofessional Education Collaborative (IPEC) to evaluate communication skills among healthcare professionals (Hagemeier, Hess, Hagen, & Sorah, 2014). The questionnaire was a 33-item survey instrument including six items related to communication skills with patients and healthcare members, roles and responsibilities of team members, and hierarchies in healthcare teams and 27 items related to communication self-efficacy. The item response options were measured with the use of a 1-5 Likert scale that ranged from 1-strongly disagree to 5-strongly agree. Permission to use the survey was received from the primary author (see Appendix C for Communication Skills Perceptions Questionnaire Permission Request). In order to test for reliability, pilot-testing was conducted to allow for refinement of the instrument; revisions were made by faculty members of the professions involved, a survey methodologist, and communication skills scholars for clarity and relevance to the research study. No other psychometric testing was conducted to assess the validity and/or reliability of the developed questionnaire. The questionnaire was tested with nursing, medicine, and pharmacy students, allowing for the measurement of interprofessional communication among the healthcare team (Hagemeier et al., 2014). All selected participants were directed by the Principal Investigator (PI) to complete the questionnaire pre- and post-simulation scenario.

Procedure

Permission to conduct the study was obtained from the Institutional Review Board of the research site and the University of Missouri-Kansas City. Prospective participants were identified after consultation with the chairs of each student's respective healthcare program. Each identified student was invited to participate in the investigational study via email. This email included the purpose of the study, inclusion/exclusion criteria, and primary investigator contact information. Students who agreed to participate in the study were screened to determine whether they met inclusion/exclusion criteria. Students who met the criteria and agreed to participate were then randomized to either the intervention or control group. Informed consent including risks and/or benefits were explained to all participants (see Appendix D for Informed Consent).

To maintain fidelity/integrity of the intervention, an intervention protocol was developed that included the study purpose, goals, objectives, and steps of the intervention to be carried out. A simulation educator was trained by the primary investigator to facilitate the intervention protocol before the research was conducted. The simulation educator and the primary investigator were present at each intervention time to prevent any variation in the steps of the protocol. The primary investigator did not participate or observe the simulation intervention to prevent any bias in student response and was only present in the classroom where students signed their informed consent and completed pre- and post-intervention surveys. The simulation lab was utilized for each intervention to prevent any variation in supplies or setting with control and intervention groups. The simulation scenario included a critical event with a patient status change that required all students to communicate for provision of safe patient care. The simulation scenario was completed with both groups. The

simulation protocol intervention and debriefing incorporated all four constructs of the self-efficacy theory that included vicarious experiences, social persuasion, performance accomplishments, and psychological/emotional stress. A protocol checklist was utilized to verify accuracy and administration of the intervention protocol.

Prior to the simulation intervention, each participant completed the Communications Skills Perceptions Questionnaire. The simulation intervention protocol was conducted by the simulation educator, which included a 10-minute introduction to the simulation, 30 minutes of the simulation scenario, and 20 minutes of debriefing. The simulation intervention protocol was conducted with both groups. The debriefing focus for the intervention group was interprofessional, while the debriefing focus for the control group was intraprofessional (see Appendix E for Simulation Intervention Protocol-Intervention and Appendix F for Simulation Intervention Protocol-Control). Each participant then completed the Communication Skills Perceptions Questionnaire post-simulation intervention.

Data Management and Analysis

Data Collection

All data were de-identified; all paper surveys being stored and locked in a file cabinet in the primary investigator's office. Only the primary investigator and the dissertation chair who served as co-investigator for this study had access to the stored data. All data were saved on a password-protected computer, in a locked office; they will be stored for seven years, and then destroyed. Statistical Package for the Social Sciences (SPSS) software was used for all data analysis. Descriptive statistics (mean, SD, frequency) were used with the demographic data to depict the characteristics of the study population. Paired *t*-tests were used to examine whether a statistical difference in communication self-efficacy existed from

pre-test to posttest with the simulation intervention. Paired t-tests were also conducted to determine whether a statistical difference in communication self-efficacy existed between the intervention and control group.

Limitations

Limitations existed for the research in both the setting and instrument selection. Only one institution was used for the research study. The institution is comprised of a diversified group of healthcare students in multiple healthcare disciplines. A limitation was the use of the Communication Skills Perceptions Questionnaire as the research instrument. The questionnaire was developed and pilot-tested, allowing for stability of measures to be examined from a test-retest reliability, yet no other psychometric testing was conducted on the research instrument (Hagemeier et al., 2014). Without quality measures to assess the reliability and validity of an instrument, the measurements of constructs and/or concepts can be affected which can lead to possible errors in the measurement process, as well as the overall research outcomes (Kimberline & Winterstein, 2008).

Funding

Research funding was provided through a grant awarded to the primary investigator from the Sigma Theta Tau: Beta Theta International Chapter At Large. This grant supported the research budget that included expenses incurred from the simulation protocol training, simulation instruction, SPSS software, supplies, and research participants' incentives.

CHAPTER 4

DATA ANALYSIS AND RESULTS

The purpose of this quantitative study was to examine healthcare students' communication self-efficacy using a high-fidelity simulation intervention with comparison of intraprofessional groups (control) versus interprofessional groups (intervention). The study examined student communication self-efficacy pre and post a high-fidelity simulation intervention. Communication self-efficacy was measured with the Communication Skills Perception Questionnaire (Communication Self-efficacy Total Score). Additionally, subscales of the questionnaire were measured to examine components of communication self-efficacy and interprofessional communication. Descriptive and inferential statistics were used for analysis of data. Descriptive statistics were used to describe the data, with inferential statistics to answer the research questions and test the hypothesis. Data analysis and results of the study are presented in this chapter.

Sample Description

Study data were obtained from a health science college in the Mid-South region of the United States. Convenience sampling methodologies were used to obtain research participants for the study with a sample size of N=22. Inclusion criteria were that students must be seniors in their healthcare program and had participated in at least one simulation experience. A power analysis was conducted for this study that determined a sample size of 40 participants to achieve an effect size of .80. A total of 36 students met the criteria and were included in the initial sample size, but only 22 students participated in the study. Multiple variables contributed to a smaller sample size for this study. Cohort size for the institution's respiratory program normally ranged from 6 to 10 students. The senior

respiratory student cohort size during the time of the study included only four students. This decrease in cohort size was due to academic attrition in that program. Additionally, the Allied Health cohorts were experiencing the same problem with academic attrition and smaller cohort numbers. These variables led to a larger percentage of nursing students in the study and an overall smaller sample size. Another variable that contributed to a smaller sample size was conflict in scheduling the study protocol times. Students had a variety of classroom/clinical schedules that conflicted with their availability to participate in the study at the designated times. The conflict with scheduling impacted several students who were willing to participate but could not make the accommodations with scheduling to do so. This scheduling conflict was the primary reason that 14 of the willing 36 students were unable to participate.

Students who had agreed to participate in the study were contacted via email to schedule their date to participate in the study. Upon agreement to participate, students were then randomized to either the control or intervention group. The randomization process included the following: students were randomly assigned a number from 1 to 4 and a letter per discipline (N-Nursing, R-Respiratory, and A-Allied Health) as a means to assist with random assignment to the two groups. The first three students from one discipline were placed in a control group of intraprofessional students, whereas the last student of the same discipline was placed in the intervention group. This assignment was done with each discipline. All groups (intervention and/control) consisted of three students, except one control group that included four students. This exception occurred because the other participating members of that particular control group did not show up for the scheduled simulation scenario, and the student was placed in a control group of her prospective

discipline. After randomization of students, there were four control groups (two nursing, one allied health, one respiratory) and three intervention groups (interprofessional groups of students).

This study in the area of process and available resources should be deemed a pilot study because of its small sample size. Pilot studies can assess a scientific method and/or procedure at a smaller scale to determine if the methodology is feasible and then can be reproduced at a larger scale at a later time (Thabane et al., 2010). Pilot studies are typically conducted at a small single institution due to a lack of resources or participants (Thabane et al., 2010). In this study, the sample was not representative of the target study population of senior healthcare students at a small healthcare institution in relation to the diversity and student composition of the institution. In order to obtain a larger sample size more representative of the institution's student population and diversification, the researcher would have to wait until the next academic year to recruit new senior healthcare students.

Upon entry of student data into SPSS, all identifiers were removed. Students were assigned a designated letter for their healthcare program (N=Nursing, R=Respiratory Care, A=Allied Health) and a number that allowed for randomization into the control group (intraprofessional) or the intervention group (interprofessional). Data analysis was completed. Descriptive statistics of the study population were performed and included the following areas: ethnicity, age, gender, healthcare program, simulation experiences, and previous healthcare experience.

Descriptive statistics of the ethnicity of the study population (N=22) are presented in Table 4.1. The majority of the study population was Caucasian (n=16), with African-American (n=4) and Hispanic (n=2) and no Asians (n=0), accounting for the rest of the study

population. The majority of the control groups (*n*=13) was Caucasian (*n*=8), African-American (*n*=3), and Hispanic (*n*=2), while the majority of the intervention groups was Caucasian (*n*=8), African-American (*n*=1), and Hispanic (*n*=0). The sample population is not representative of the institution's reported student diversification. The institution reported a diversification of students that included 59% Caucasian, 37% African-American, 2% Asian, and 1.8% Hispanic. The sample population of this study over-represents the Caucasian population at 72% and the Hispanic population at 9%, while under-representing the African-American population at only 18% and no Asian representation.

Table 4.1

Ethnicity of Study Population

Control Groups	Frequency	Percent	Intervention Groups	Frequency	Percent
Caucasian	8	61.5	Caucasian	8	88.9
African American	3	23.1	African American	1	11.1
Hispanic	2	15.4	Hispanic	0	0
Asian	0	0	Asian	0	0
Total	13	100.0	Total	9	100.0

Descriptive statistics for age of study population (*N*=22) are presented in Table 4.2. The majority of the study population (*n*=17) were between the ages of 19 and 25 years with all other age ranges consisting of 1-2 participants only. No participants were noted in the all age groups above 31 years old for the intervention group.

Table 4.2

Age of Study Population

Control Groups	Frequency	Percent
19-25 years	9	69.2
26-30 years	1	7.7
31-35 years	1	7.7
36-40 years	1	7.7
41 years or older	1	7.7
Total	13	100.0

Intervention Groups	Frequency	Percent
19-25 years	8	88.9
26-30 years	1	11.1
31-35 years	0	0
36-40 years	0	0
41 years or older	0	0
Total	9	100.0

Descriptive statistics for gender of the study population (*N*=22) are presented in Table 4.3. The majority of the study population (*n*=20) were of female gender, with males as the minority group (*n*=2). Additionally, female gender was noted in the control groups (*n*=11) and intervention groups (*n*=9) as the majority study population.

Table 4.3

Gender of Study Population

Control Groups	Frequency	Percent
Female	11	84.6
Male	2	15.4
Total	13	100.0

Intervention Groups	Frequency	Percent
Female	9	100.0
Male	0	0
Total	9	100.0

Descriptive statistics for the healthcare programs of the study population (*N*=22) are presented in Table 4.4. The majority of the study population (*n*=12) identified their healthcare program as nursing, with the second largest group (*n*=6) identified as allied health.

Table 4.4

Healthcare Program of Study Population

Control Groups	Frequency	Percent
Respiratory	3	23.1
Nursing	7	53.8
Allied Health	3	23.1
Total	13	100.0

Intervention Groups	Frequency	Percent
Respiratory	1	11.1
Nursing	5	55.6
Allied Health	3	33.3
Total	22	100.0

Descriptive statistics for the number of simulation experiences (*N*=22) are presented in Table 4.5. The majority of the study population (*n*=11) indicated that they had participated in five or more simulation experiences, with the second largest group (*n*=6) indicating that they had participated in one to two simulation experiences prior to this study.

Table 4.5

Simulation Experiences

Control Groups	Frequency	Percent
1-2	3	23.1
3-4	3	23.1
5 or more	7	53.8
Total	13	100.0

Intervention Groups	Frequency	Percent
1-2	3	33.3
3-4	2	22.2
5 or more	4	44.4
Total	9	100.0

Descriptive statistics for students who have had previous healthcare experience *(N*=22) are presented in Table 4.6. The majority of the study population (*n*=16) indicated that they had no previous healthcare experience, with the minority (*n*=6) indicating that they did.

Table 4.6

Previous Healthcare Experiences

Control Groups	Frequency	Percent
No	10	76.9
Yes	3	23.1
Total	13	100.0

Intervention Groups	Frequency	Percent
No	6	66.7
Yes	3	33.3
Total	9	100.0

Hypothesis Testing

The hypothesis for this study was that the participation in a high-fidelity interprofessional simulation scenario will lead to increased communication self-efficacy for healthcare students. Inferential statistics with the use of paired *t*-tests were used to test this hypothesis. The paired *t*-test was chosen to examine pre and post data (repeated measures) with Likert-scale data. Controversy with the use of paired *t*-tests with Likert scale data currently exists with the argument that the Wilcoxon test is more statistically robust to use with this type of data. Despite this argument, research continues to show that the use of paired *t*-tests with Likert scale data with small sample sizes is actually more robust and leads to fewer Type II errors, has a higher power, and tends to reject the false hypothesis more frequently than the Wilcoxon signed ranks test (Meek, Ozgur, & Dunning, 2007).

Prior to analysis, the assumptions and conditions of the paired samples *t*-test were reviewed. One assumption was that the "independent variable is dichotomous and its levels (or groups) are paired or matched in some way" (Morgan, Leech, Gloeckner, & Barrett, 2007, p. 150). The first assumption was met with the use of pre/posttest design to evaluate the simulation intervention. The dependent variable must be continuous or termed as normal (scale) and normally distributed; this assumption was met with the use of Likert scale data

that is considered to be approximately normally distributed data (Morgan et al., 2007). Additionally, the assumption that the observations are independent of one another must be met. This assumption is not typically one that can be observed but is met if the data collection is random and done without replacing an individual. When all assumptions were met, data analyses were conducted.

Paired *t*-tests were conducted to examine pre and post Communication Self-efficacy scores from the questionnaire. Subscales of the questionnaire were developed and categorized by the researcher in order to measure different aspects of communication self-efficacy and components of interprofessional education. The subscales of questions included the following areas: communication skills, healthcare team communication skills, confidence with patient communication, confidence with healthcare team communication, roles of the healthcare team, and confidence with empathetic patient interactions. Components of interprofessional education were measured with the following subscales: roles of the healthcare team, confidence with healthcare team communication, and healthcare team communication skills. Paired *t*-tests were conducted to measure Communication Self-efficacy score and all subscales with the intervention groups and control groups.

Paired *t*-test results for the Communication Self-efficacy Questionnaire (total score) for the control group *(n*=13) are included in Table 4.7 and Table 4.8. The 13 participants had an average difference from pre-test to posttest with Communication Self-efficacy scores of -4 (*SD* 15.1), yet there was no statistical difference in communication self-efficacy post high-fidelity simulation intervention, *p*=.358 (two-tailed).

Table 4.7

Paired t-test Sample Statistics

Control Group	Mean	N	Std. Deviation	Std. Error Mean
Pre Comm Self-Efficacy	140.6154	13	12.03840	3.33885
Post Comm Self-Efficacy	144.6154	13	19.03303	5.27881

Table 4.8

Paired t-test for Communication Self-Efficacy Scores (Control Group)

Control Group	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Pre Comm Self-Efficacy Post Comm Self-Efficacy	-4.00	15.099	4.187	-.955	12	.358

Paired *t*-test results for the Communication Self-efficacy Questionnaire (total score) for the intervention group *(n*=9) are included in Table 4.9 and Table 4.10. The nine participants had an average difference from pre-test to posttest with Communication Self-efficacy scores of -8 (*SD* 8.82), *t*(8)= -2.76*, p* = 0.025 (two-tailed), indicating that the high-fidelity simulation intervention resulted in a significant increase in communication self-efficacy scores for the intervention groups. The resulting *p*-value 0.025 was less than α =0.05, leading to the null hypothesis being rejected. Therefore, the study hypothesis that states the use of high-fidelity simulation intervention by an interprofessional group leads to increased communication self-efficacy is accepted.

Table 4.9

Paired t-test Sample Statistics

Intervention Group	Mean	N	Std. Deviation	Std. Error Mean
Pre Comm Self-Efficacy	132.8889	9	9.67528	3.22509
Post Comm Self-Efficacy	141.0000	9	12.08305	4.02768

Table 4.10

Paired t-test Results for Communication Self-Efficacy Scores (Intervention Group)

Intervention Group	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Pre Comm Self-Efficacy Post Comm Self-Efficacy	-8.11	8.823	2.941	-2.758	8	0.025

Additionally, paired *t*-tests were conducted to examine the subscale areas of the Communication Perception Questionnaire. Subscales were examined pre-test and posttest for the intervention and control groups. Paired *t*-test results for each subscale area for students in the control group *(n*=13) are included in Table 4.11 and Table 4.12. For each subscale area in the control group, there were no statistical differences *(p* > 0.05) noted from pre-test to posttest.

Table 4.11

Paired t-test Sample Statistics

Control Group	Mean	N	Std. Deviation	Std. Error Mean
Pre Patient Comm Skills	4.4615	13	.51887	.14391
Post Patient Comm Skills	4.3846	13	.65044	.18040
Pre IPE Comm Skills	4.3077	13	.48038	.13323
Post IPE Comm Skills	4.3077	13	.63043	.17485
Pre IPE Roles	12.7692	13	1.58923	.44077
Post IPE Roles	12.6923	13	2.09701	.58160
Pre Patient Comm Confidence	50.6923	13	4.55311	1.26280
Post Patient Comm Confidence	51.4615	13	7.91218	2.19444
Pre IPE Confidence	50.6923	13	5.61819	1.55821
Post IPE Confidence	53.7692	13	6.58475	1.82628
Pre Confidence Empathetic Comm	17.6923	13	1.70219	.47210
Post Confidence Empathetic Comm	18.000	13	2.30940	.64051

Table 4.12

Paired t-tests for Communication Perception Questionnaire Subscales (Control)

Control	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Pre Patient Comm Skills Post Patient Comm Skills	0.769	.862	.239	.322	12	.753
Pre IPE Comm Skills Post IPE Comm Skills	.000	.577	.160	.000	12	1.000
Pre IPE Roles Post IPE Roles	.077	2.060	.571	.135	12	.895
Pre Patient Comm Confidence Post Patient Comm Confidence	-.769	6.79	1.885	-.408	12	.690
Pre IPE Comm Confidence Post IPE Comm Confidence	-3.077	5.837	1.619	-1.900	12	.082
Pre Confidence Empathetic Comm Post Confidence Empathetic Comm	-3.077	2.594	.719	-.428	12	.677

The paired *t*-test results for the intervention group *(n*=9) for the Communication Perceptions Questionnaire subscales are included in Table 4.13 and Table 4.14. Within the intervention group, two subscale areas were noted to be statistically significant: confidence with patient communication (*p*=.014) and confidence with interprofessional communication (*p*=.021). These findings further support the hypothesis that the use of a high-fidelity

simulation intervention with an interprofessional group of healthcare students leads to increased communication self-efficacy.

Table 4.13

Paired t-test Sample Statistics

Control Group	Mean	N	Std. Deviation	Std. Error Mean
Pre Patient Comm Skills	4.2222	9	.44096	.14699
Post Patient Comm Skills	4.2222	9	.66667	.22222
Pre IPE Comm Skills	4.1111	9	.60093	.20031
Post IPE Comm Skills	3.7778	9	.44096	.14699
Pre IPE Roles	12.0000	9	1.22474	.40825
Post IPE Roles	11.7778	9	1.39443	.46481
Pre Patient Comm Confidence	47.0000	9	3.93700	1.31233
Post Patient Comm Confidence	49.6667	9	5.00000	1.66667
Pre IPE Confidence	47.7778	9	3.89801	1.29934
Post IPE Confidence	53.1111	9	5.03598	1.67866
Pre Confidence Empathetic Comm	17.7778	9	1.85592	.61864
Post Confidence Empathetic Comm	18.4444	9	1.81046	.60349

Table 4.14

Paired t-tests for Communication Perception Questionnaire Subscales (Intervention)

Intervention	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Pre Patient Comm Skills Post Patient Comm Skills	0.000	1.000	.333	.000	8	1.000
Pre IPE Comm Skills Post IPE Comm Skills	.333	.707	.236	1.414	8	.195
Pre IPE Roles Post IPE Roles	.222	1.394	.465	.478	8	.645
Pre Patient Comm Confidence Post Patient Comm Confidence	-2.667	2.549	.849	-3.138	8	.014*
Pre IPE Comm Confidence Post IPE Comm Confidence	-5.333	5.567	1.856	-2.874	8	.021*
Pre Confidence Empathetic Comm Post Confidence Empathetic Comm	-.667	1.414	.471	-1.414	12	.195

*statistically significant

Conclusion

The convenience sample for this study was comprised of 22 students from three different healthcare programs (i.e., nursing, respiratory, and allied health) who were recruited from a health science college in the Mid-South region of the United States. This convenience

sample included senior healthcare students who had at least one to two prior simulation experiences as part of their clinical program requirements. Initial results indicated a statistically significant increase in the total survey score of the Communication Self-efficacy Questionnaire for the intervention group; therefore, the hypothesis that the use of high-fidelity simulation by an interprofessional group would lead to increased communication self-efficacy is accepted. Moreover, analysis of survey subscales indicates that the use of a high-fidelity simulation intervention with an interprofessional group of healthcare students not only leads to an increase in communication self-efficacy but also increases student confidence when engaging in patient and interprofessional communications.

CHAPTER 5

DISCUSSION

The purpose of this quantitative study was to examine the use of high-fidelity simulation as a teaching modality for improving interprofessional communication skills for healthcare students. This study sought to further acknowledge the need for innovative ways to teach interprofessional communication skills outside of the didactic and clinical realm of healthcare education. Studies that examine communication skills and training in healthcare education are sparse and have been limited to either an intraprofessional approach or have not gone outside of graduate education. The need for interprofessional communication skill training in undergraduate healthcare education is significant, especially the transference of knowledge into application in the practice setting. This study is one of the first to include more than two healthcare disciplines at the undergraduate level, while also including allied health programs such as radiography, sonography, and nuclear medicine technology as a means to incorporate interprofessional communication and teamwork. Additionally, this study has measured a change in communication self-efficacy and not the student's perception of the simulation experience itself.

Research Questions and Hypothesis

The research questions which guided this study were: 1) What effect, if any, does an intraprofessional high-fidelity simulation have on healthcare students' communication self-efficacy?, and 2) What effect, if any, does an interprofessional high-fidelity simulation have on healthcare students' communication self-efficacy? The hypothesis for this study assumed that healthcare students who participate in a high-fidelity interprofessional simulation scenario will have increased communication self-efficacy relative to students who participate

in a high-fidelity intraprofessional simulation scenario. The results of this study indicate a statistically significant difference from pre-test to posttest communication self-efficacy total scores for the intervention groups. Additionally, the subscale areas of confidence in patient communication and confidence in interprofessional communication were found to be statistically significant from pre-test to posttest scores for the intervention group. There was no statistically significant difference from pre-test to post-test scores in communication self-efficacy scores or subscale scores for the control group.

Limitations

Limitations for the study were identified. The first limitation was the availability of students to participate in the study. Due to conflicting clinical and classroom schedules, scheduling the simulation intervention around multiple healthcare programs proved to be difficult, especially for those who were randomized to the intervention group (interprofessional). Each healthcare program operates on a separate classroom/clinical schedule that is unique to their program. Conflicting classroom/clinical times for the different programs made it difficult to schedule the simulation scenario for these groups. These conflicts led to a decrease in study participation for students who met criteria and were willing to participate. Due to this limitation, the interprofessional group was smaller in number in comparison to the control group. A second limitation was the number of students from the respiratory care program. Normal cohort size for a senior respiratory class is typically 8-10 students. Due to natural program attrition and retention, the number of available respiratory senior students was decreased, which left only four senior respiratory students who could be invited to participate in the study. A third limitation was the use of the research instrument. The Communication Skills Perception Questionnaire had been used only

once and had multiple areas of communication self-efficacy that were being tested. In order to differentiate between the different types of communication such as patient communication versus interprofessional communication, the questionnaire was divided into subscale areas. Subscaling of questions was done in order to aggregate different communication aspects to examine for change pre and post intervention. Subscaling of questions was done after the survey was administered in order to assess and differentiate between the different types of communication that were examined in the survey.

Implications for Nursing Education

This study provides insight into the use of high-fidelity simulation as a teaching modality for communication skill training for healthcare students. Healthcare students need teaching modalities that allow the development of interprofessional communication and teamwork skills in an environment that mimics an actual practice setting. Applying innovative teaching methods that promote interprofessional communication is essential in preparing our healthcare professionals to practice as a team and communicate effectively for safe quality care. The results of this study show how the use of high-fidelity simulation can increase communication self-efficacy from an interprofessional team standpoint. By utilizing high-fidelity simulation, educators have a method to teach interprofessional communication in undergraduate healthcare programs and assist with preparation for practice while meeting their accreditation standards.

Furthermore, educators must recognize the impact that high-fidelity simulation can have on healthcare education. Simulation provides a learning opportunity outside of the "sage on the stage," didactic presentation or a clinical rotation that cannot provide the necessary experiences that healthcare students need to master application of concepts, critical

thinking skills, and communication skills. Simulation experiences can be modeled and/or easily tailored to provide these learning experiences needed for developing teambuilding skills, communication skills, and hands-on skills. Simulation allows the learning to occur in a safe environment.

Recommendations for Future Research

One recommendation for future research is to replicate the study with a larger sample. Additionally, the study could also be replicated to include healthcare disciplines that mimic the hierarchy of professionals seen in practice. By doing this, other disciplines of healthcare students including physicians, pharmacists, and other therapy-driven programs can be involved allowing undergraduate students to interact with other healthcare providers outside of their chosen field before transitioning into the practice arena. Furthermore, a replication of the study as described above with the use of the Communication Skills Perception Questionnaire with the subscales could provide useful information to help guide interprofessional communication skill training for a variety of healthcare disciplines.

Conclusion

The challenges presented by today's complex healthcare system require healthcare educators to adopt novel and innovative approaches when it comes to education. High-fidelity simulation as a teaching modality can provide a multitude of educational experiences that are needed to prepare the healthcare students to effectively communicate for the provision of safe patient care. The study explored the use of a high-fidelity interprofessional simulation as a teaching modality to increase healthcare student communication self-efficacy. The results of this study support the use of high-fidelity simulation to teach both patient and interprofessional communication with healthcare students.

APPENDIX A

INSTITUTIONAL APPROVAL LETTER

04/01/2019

Baptist Memorial Health Care Corporation-Institutional Review Board (IRB)

Re: Type of Research: "Interprofessional simulation among healthcare students: A randomized controlled trial to improve communication self-efficacy"

Principal Investigator: Angel Boling, Acting Program Chair Undergraduate BSN Program/Assistant Professor of Nursing

To whom this may concern:

As Dean of Nursing, I have reviewed this research proposal and that I attest to the importance of this study; to the competency of the investigator(s) to conduct the project and the time available for the project; that facilities, equipment, and personnel are adequate to conduct the research; and that continued guidance will be provided as appropriate.

She has my approval to complete the research at Baptist Memorial College of Health Sciences in the Nursing Division with the Senior Nursing Capstone Students and the Senior Respiratory Care Students.

If you should have any questions, please do not hesitate to contact me at (901) 572-8242.

Sincerely,

Anne M. Plumb, DNSc. RN Dean of Nursing

APPENDIX B

COMMUNICATION SKILLS PERCEPTIONS QUESTIONNAIRE-MODIFIED VERSION

Communication Skills Perceptions Questionnaire **De Identifier: _____**

The purpose of this questionnaire is to gather your perceptions about your communication skills. This project is considered research. Your responses are anonymous, and all information will be password protected and deidentified. This questionnaire should take you approximately 8-10 minutes to complete. If you have any questions, comments, or concerns, please contact Angel M. Boling (angel.boling@bchs.edu or 901-572-2460). Thank you for completing the questionnaire.

Name: _____ Pre -Simulation_____ or Post -Simulation_____

1.1 Please indicate your gender

☐ Female ☐ Male

1.2 Please indicate your race

☐ Caucasian
☐ Asian
☐ African American
☐ Hispanic
☐ American Indian
☐ Other

1.3 What is your age?

_____ years

1.4 In which Program are you currently enrolled?

☐ Respiratory
☐ Nursing
☐ Allied Health

1. 5 How many simulation experiences have you participated in as part of your healthcare program?

☐ 0
☐ 1-2
☐ 3-4
☐ 5 or more

On a scale of 1 (strongly disagree) to 5 (strongly agree), please indicate the extent to which you disagree/ agree with each of the following statements

1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree

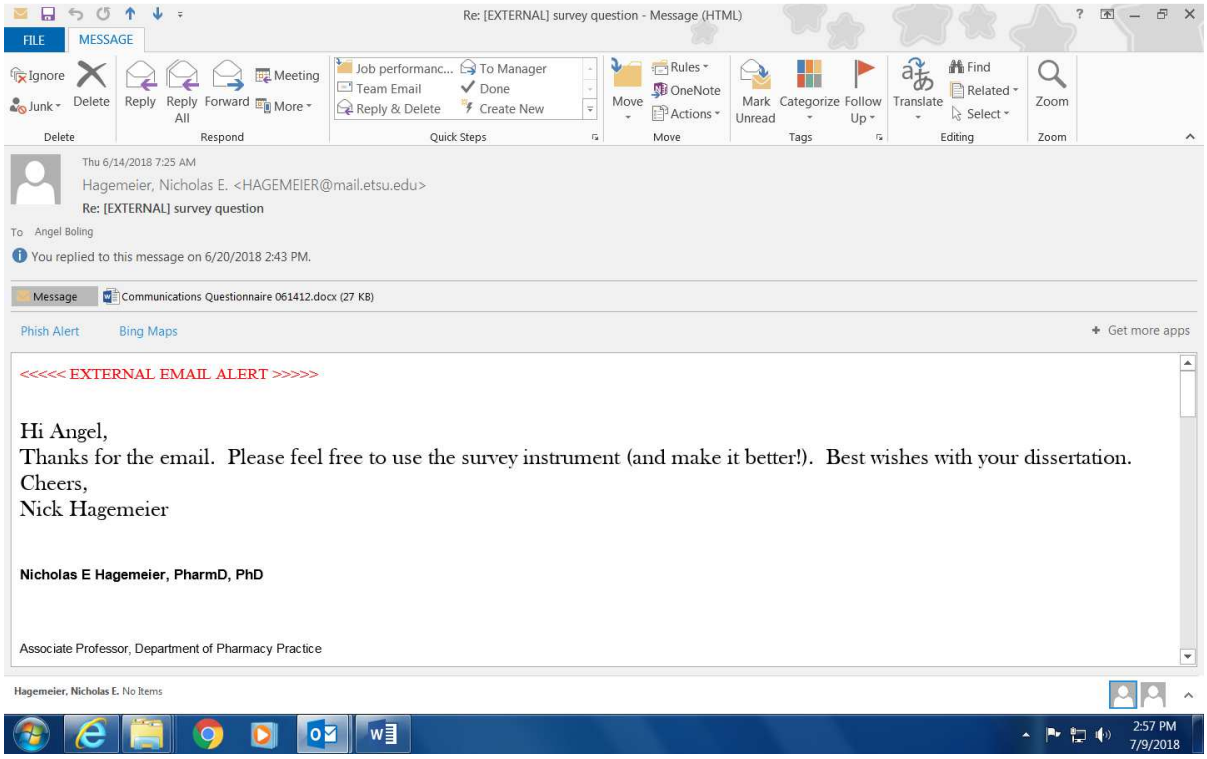
Please circle one number for each item	SD	D	N	A	SA
2.1 – I have the skills necessary to communicate effectively with patients.	1	2	3	4	5
2.2 – I have the skills necessary to communicate effectively with healthcare team members.	1	2	3	4	5
2.3 – I have a good understanding of the authority structure of hierarchies within healthcare teams.	1	2	3	4	5
2.4 – I have a good understanding of my role when participating as a member of a healthcare team.	1	2	3	4	5
2.5 – I have a good understanding of the roles of other healthcare team members.	1	2	3	4	5

Please circle one number for each item	SD	D	N	A	SA
I am confident in my ability to:					
2.6 – Clearly communicate information to patients	1	2	3	4	5
2.7 – Actively listen to patients to fully elicit their perceptions of illness	1	2	3	4	5
2.8 – Develop a good rapport with my patients	1	2	3	4	5
2.9 – Develop patient-centered agendas when meeting with patients	1	2	3	4	5
2.10 – Manage information obtained from patients so as to be certain I fully understand their needs and concerns	1	2	3	4	5
2.11 – Effectively address patients' feelings when communicating	1	2	3	4	5
2.12 – Use patient-engaging strategies to reach common ground when disagreements present in healthcare plans	1	2	3	4	5
2.13 – Communicate with patients in a compassionate manner	1	2	3	4	5
2.14 – Develop trusting relationships with patients	1	2	3	4	5
2.15 – Close discussions with patients in a manner that facilitates patient input	1	2	3	4	5
2.16 – Convey my opinions to patients in a professional manner	1	2	3	4	5
2.17 – Effectively explain the roles and responsibilities of other healthcare team members to patients	1	2	3	4	5
2.18 – Actively involve patients in their healthcare plans if they so desire	1	2	3	4	5
2.19 – Effectively communicate information to patients with low health literacy	1	2	3	4	5
2.20 – Clearly communicate my roles and responsibilities to patients	1	2	3	4	5
2.21 – Effectively communicate limitations in my knowledge and abilities to patients	1	2	3	4	5
2.22 – Clearly convey my knowledge to other healthcare team members	1	2	3	4	5
2.23 – Respond to feedback from healthcare team members in a professional manner	1	2	3	4	5
2.24 – Effectively overcome communication barriers that hinder optimal healthcare team collaboration	1	2	3	4	5
2.25 – Give feedback to other healthcare team members in a respectful manner	1	2	3	4	5
2.26 – Encourage healthcare team members to openly communicate their opinions to each other	1	2	3	4	5
2.27 – Respond to interprofessional conflicts in a professional manner	1	2	3	4	5
2.28 – Develop positive interdependent relationships with other healthcare team members	1	2	3	4	5
2.29 – Respectfully convey my opinions to other healthcare team members	1	2	3	4	5
2.30 – Actively listen to healthcare team members	1	2	3	4	5
2.31 – Clearly convey respect for the expertise of other healthcare team members	1	2	3	4	5
2.32 – Develop trusting relationships with healthcare team members	1	2	3	4	5
2.33 – Effectively contribute as a member of a healthcare team	1	2	3	4	5
Thank you for your thoughts!					

APPENDIX C

COMMUNICATION SKILLS PERCEPTIONS QUESTIONNAIRE INSTRUMENT

PERMISSION FROM AUTHOR



APPENDIX D

INFORMED CONSENT

Consent for Participation in a Research Study

Interprofessional Simulation among Healthcare Students: A Randomized Controlled Trial to Improve Communication Self-Efficacy

Angel M. Boling, MSN, RN, PhD student, Primary Investigator
Dr. Carol Schmer, Co-Investigator

Request to Participate

You are being asked to take part in a research study. This study is being conducted at southern college of health sciences.

This study will be conducted by Angel M. Boling, a doctoral student at the University of Missouri-Kansas City, as well as Dr. Carol Schmer, a faculty member in the School of Nursing and Health Sciences.

The study team is asking you to take part in this research study because you are a senior healthcare student. Research studies only include people who choose to take part. This document is called a consent form. Please read this consent form carefully and take your time making your decision. The researcher or study staff will go over this consent form with you. Ask him/her to explain anything that you do not understand. Think about it and talk it over with your family and friends before you decide if you want to take part in this research study. This consent form explains what to expect: the risks, discomforts, and benefits, if any, if you consent to be in the study.

Background

The purpose of the research study is to examine the use of a high-fidelity simulation intervention with healthcare students and the effects on communication self-efficacy. Senior healthcare students have had the necessary training to safely care for patients through communicating with other healthcare disciplines. This level of student has already utilized simulation throughout their clinical component of their coursework and understands how simulation is used to assist students with learning.

You will be one of about 40 subjects in the study who will participate in this study.

Purpose

The purpose of the research study is to test the use of a high-fidelity simulation intervention with healthcare students and the effects on communication self-efficacy with different health care teams, interprofessional and intraprofessional. Ineffective communication is the basis of 70% of patient errors and leads to poor patient outcomes and patient dissatisfaction as noted

by the Institute of Medicine (2010) and the Joint Commission (2012). Despite the efforts by the Joint Commission in the development of the National Patient Safety Goals, interprofessional communication remains an area for ongoing improvements. Educators are challenged with ensuring that health care students have the necessary communication skills to prepare them for today's workforce. Traditional educational strategies in the form of lecture and clinical practice are ineffective for teaching communication skills, whereas high-fidelity simulation is an innovative teaching modality that has high potential to teach these skills. However, minimal research exists on the effectiveness of simulation in teaching communication skills to health professionals in academic settings which addresses the need to further examine the use of simulation as a form of teaching.

Hypothesis: Healthcare students who participate in interprofessional simulation interventions will have increased communication self-efficacy than those students who participate in interprofessional simulation interventions.

Research question that will be addressed is:
1. What effect, if any, does an intraprofessional high-fidelity simulation intervention have on healthcare students' communication self-efficacy?
2. What effect, if any, does an interprofessional high-fidelity simulation intervention have on healthcare students' communication self-efficacy?

Procedures

Participants will be randomly selected based on inclusion/exclusion criteria and then randomized to either the intervention or control group. Students will be randomly assigned a number 1-5 and a letter per discipline (N-Nursing, R-Respiratory, A-Allied Health) as a means to assist with random assignment to the two groups. The first five students of each discipline will be placed in a control group of that discipline, whereas the last student of each discipline will be placed in the intervention group.

Prior to the simulation intervention, each participant will complete the Communication Skills Perceptions Questionnaire. The simulation intervention protocol will be conducted by the simulation instructor which includes a 10-minute introduction to the simulation, 30 minutes of the simulation scenario, and 20 minutes of debriefing. Each participant will then complete the Communication Skills Perceptions Questionnaire post simulation intervention.

If you agree to take part in this study, you will be involved in this study for 2 hours.

Participation is voluntary and a subject may refuse to participate in the study at any time. If the participant chooses not to participate, the participant should contact the primary investigator via email or phone before the study is to take place.

Risks and Inconveniences

As a participant, you may feel uncomfortable working with new students. You may feel uncomfortable or have anxiety related to the associated performance during the simulation

scenario. All students will have the opportunity to discuss any discomforts during the simulation debriefing. This research is considered to be minimal risk. This means that the risks of taking part in this research study are not expected to be more than the risks in your daily life. There are no other known risks to you if you choose to take part in this study.

Benefits
Benefit to healthcare education will be acknowledged through the ability to assess the effectiveness of a teaching modality (high-fidelity simulation) as the study intervention to enhance the development of interprofessional communication skills of healthcare students. Another benefit of this study will be knowledge, useful in a clinical setting that will enhance communication among team members, thereby reducing medical errors. An indirect benefit to the participant is possible learning through the reflection of the simulation experience and debriefing.

Fees and Expenses
There are no monetary costs to the participant.

Compensation
Each research participants will be given a $25.00 gift card to be used at the college coffee shop and/or local coffee shop.

Alternatives to Study Participation
The alternative is not to take part in the study.

Confidentiality
While we will do our best to keep the information you share with us confidential, it cannot be absolutely guaranteed. Individuals from Baptist College of Health Sciences Institutional Review Board (a committee that reviews and approves research studies), Research Protections Program, and Federal regulatory agencies may look at records related to this study to make sure we are doing proper, safe research and protecting human subjects. The results of this research may be published or presented to others. You will not be named in any reports of the results.

All information will be de-identified for student privacy and will be kept under lock and key in a file cabinet of the primary investigator. All data that is kept on computers will be password protected.

Contacts for Questions about the Study
You may call the researcher, Angel M. Boling, at 901-572-2460 or via email, angel.boling@bchs.edu if you have any questions about this study. You may also call her if any problems come up.

Voluntary Participation
Taking part in this research study is voluntary. If you choose to be in the study, you are free to stop participating at any time and for any reason. If you choose not to be in the study or decide

to stop participating, your decision will not affect any care or benefits you are entitled to. The researchers, doctors or sponsors may stop the study or take you out of the study at any time if they decide that it is in your best interest to do so. They may do this for medical or administrative reasons or if you no longer meet the study criteria. You will be told of any important findings developed during the course of this research.

You have read this Consent Form or it has been read to you. You have been told why this research is being done and what will happen if you take part in the study, including the risks and benefits. You have had the chance to ask questions, and you may ask questions at any time in the future by calling Angel M. Boling at 901-572-2460. By signing this consent form, you volunteer and consent to take part in this research study. Study staff will give you a copy of this consent form.

_____ _____

Signature (Volunteer Subject) **Date**

_____

Printed Name (Volunteer Subject)

_____ _____

Signature (Authorized Consenting Party) **Date**

_____

Printed Name (Authorized Consenting Party)

_____

Relationship of Authorized Consenting Party to Subject

_____ _____

Signature of Person Obtaining Consent **Date**

_____

Printed Name of Person Obtaining Consent

APPENDIX E

SIMULATION INTERVENTION PROTOCOL-INTERVENTION

Simulation Intervention Protocol (Intervention Group)

Scenario: Change in Patient Status (Pulmonary Embolus)

Goal/Purpose: To identify change in patient status; To communicate and work as effective healthcare team members to provide patient care; To stabilize patient

Lab setup:

- Patient simulator: Simon 3G
- Patient Characteristics: a 25-year-old male from prison presents with syncope and hypoxia
- Environment/Setting: Emergency Room
- Lab staff: Simulation Educator

Learning Objectives:

The learner will be able to:

- Demonstrate effective communication skills with the patient
- Provide safe patient care
- Communicate effectively in transitions of care to ensure the safety of patients.
- Participate effectively in an interprofessional health care team to optimize patient safety.

Student Preparation (social persuasion through coaching)

No student preparation before the actual simulation event day.

Students will be introduced to the simulation environment in regard to equipment, meds, resources, etc. before the simulation.

Students will be given a handout during the introduction before simulation that gives a case presentation of the patient that they are caring for. They will have 10 minutes to review it and discuss it with their team.

Clinical Case Information:

25-year-old from prison presents with pre-syncope and SOB, found to be hypoxic. Transferred to KGH. History from patient reveals that he had fallen 3 weeks ago and since then he's had left knee swelling and pain. This AM while in church stood up and felt faint

and SOB. Collapsed back into the chair. Brought to infirmary, found to be hypoxic, transferred to local emergency room

Scenario:

Initial Parameters:

Patient: Awake alert, able to answer questions, feels quite SOB.

Vitals: BP 98/50, HR 118, RR 36, O2 sat 92% on 6L, Temp 36.8 C

Eyes: Open

Lungs: Clear bilaterally

Heart Sounds: Normal

Heart Rhythm: Sinus Tachycardia

Scenario:

BMP		
Sodium	138	136-144
Potassium	4.2	3.5-5.0
Chloride	100	95-105
BUN	32	7-20
Creatinine	2.4	0.6-1.1
Hematology		
Hemoglobin	8.2	12.5-17.5
White Cell Count	15.6	4.0-11.0
PT	13	10-14
PTT	32	26-36
Fibrinogen	4.3	1.5-4
D dimer	2816	<250

Table 3: Results from arterial blood gas sample taken from radial artery

TEST	RESULT	REFERENCE RANGE
pH	7.48	7.35 - 7.45
PCO2	39	35-45
Standard bicarbonate	25	24 - 32
PO2	62	60-80

Echocardiogram

An echocardiogram was requested and the following report was obtained:

The echocardiogram is poor image quality. The left ventricle is not dilated and there is no obvious left ventricular impairment. The right ventricle is moderately dilated with impaired function. There is a large amount of thrombus in the right ventricle apex. The right atrium is mildly dilated.

No obvious abnormality was noted on his chest x-ray.

******Students will be given above information on assessment and from the initial doctor's orders for lab work and an Echo.

Simulation Scenario

Timing (approximate)	Manikin Actions	Expected Interventions	May use the following Cues:
5 minutes	Manikin – pulse 126, oxygen sat 88, respirations 42,	Student will initiate a head-to-toe assessment of a patient	Role member providing cue: Manikin – monitors Cue: Patient will develop sudden onset SOB, increased respirations & pulse
5 minutes	Manikin – increase pulse to 132 oxygen sat to 85, respirations to 48, rhythm sinus tachycardia, coughing	Student needs to assess for signs and symptoms of pulmonary embolism, reposition patient for breathing ease, lungs sounds and heart sounds, increase oxygen needs	Role member providing cue: Manikin Cue: "My chest is killing me. I can't breathe."
5 minutes	Manikin – increase pulse to 138, oxygen sat to 80, respirations increase to 50 sinus tachycardia, C/O of SOB	Student needs to request help from additional team members	Requires communication between team members
5 minutes	Manikin – increase pulse to 142, oxygen sat to 78, respirations increase to 54 Sinus tachycardia with PVCs	Delegate tasks for continued assessment, call assessments to physician	Team members work together to delegate and communicate
5 minutes	Manikin – increase pulse to 142, oxygen sat to 78, respirations increase to 54 Sinus tachycardia with PVCs	Prioritize physician orders and carries out orders	Team members work together to prioritize and carry out orders

5 minutes	Manikin – decrease pulse to 58, oxygen sat to 72, respirations decrease to 11, cyanosis noted around lips and gums	Student needs to prioritize for continued care and recognize need for a higher level of care	Team members plan care together and communicate patient care needs

Steps of the Simulation Protocol

- 1. Introduce students to simulation environment (equipment, meds, supplies)
- 2. Review previous experiences and concerns with Sim (performance experiences)
- 3. Ask if students have any questions regarding simulation environment
- 4. Have students fill out Communication Skills Perceptions Questionnaire
- 5. Take students into classroom setting
- 6. Hand out case scenario to group of students for review (10 min). Instruct students to develop a plan of care with their team
- 7. Take students into simulation environment
- 8. Begin simulation scenario as noted above (30 min) (vicarious experiences)
- 9. Take students back to classroom
- 10. Debrief with the following questions below (20 min) (vicarious experiences, social persuasion, psychological/emotional/performance anxiety)
- 11. Have students fill out Communication Skills Perceptions Questionnaire post-simulation and debriefing

Debriefing: (vicarious experiences, social persuasion, psychological/emotional/performance anxiety)

1. Did you have the knowledge and skills to care for this patient?
2. During the scenario, was communication effective?
3. When was communication most important?
4. When was communication most important between team members?
5. Was care more effective because of communication among different team members?
6. How does having an interprofessional team present impact your patient's care?
7. What is the importance of interprofessional communication among team members?
8. How would you have changed any aspects of teamwork and communication?

APPENDIX F

SIMULATION INTERVENTION PROTOCOL-CONTROL

Simulation Intervention Protocol (Control Group)

Scenario: Change in Patient Status (Pulmonary Embolus)

Goal/Purpose: To identify change in patient status; To communicate and work as effective healthcare team members to provide patient care; To stabilize patient

Lab setup:

- Patient simulator: SimMan 3G
- Patient Characteristics: a 25-year-old male from prison presents with syncope and hypoxia
- Environment/Setting: Emergency room
- Lab staff: Simulation Educator

Learning Objectives:
The learner will be able to:

- Demonstrate effective communication skills with the patient.
- Provide safe patient care.
- Communicate effectively in transitions of care to ensure the safety of patients.
- Participates effectively in an interprofessional health care team to optimize patient safety.

Student Preparation (social persuasion through coaching)

No student preparation before the actual simulation event day.

Students will be introduced to the simulation environment in regard to equipment, meds, resources, etc. before the simulation

Students will be given a handout during the introduction before simulation that gives a case presentation of the patient that they are caring for. They will have 10 minutes to review it and discuss it with their team.

Clinical Case Information:

25-year-old from prison presents with pre-syncope and SOB, found to be hypoxic. Transferred to KGH. History from patient reveals that he had fallen 3 weeks ago and since then he's had left knee swelling and pain. This AM while in church stood up and felt faint and SOB. Collapsed back into the chair. Brought to infirmary, found to be hypoxic, transferred to local emergency room

Scenario:

Initial Parameters:

Patient: Awake alert, able to answer questions, feels quite SOB.

Vitals: BP 98/50, HR 118, RR 36, O2 sat 92% on 6L, Temp 36.8 C

Eyes: Open

Lungs: Clear bilaterally

Heart Sounds: Normal

Heart Rhythm: Sinus Tachycardia

Scenario:

BMP		
Sodium	138	136-144
Potassium	4.2	3.5-5.0
Chloride	100	95-105
BUN	32	7-20
Creatinine	2.4	0.6-1.1
Hematology		
Hemoglobin	8.2	12.5-17.5
White Cell Count	15.6	4.0-11.0
PT	13	10-14
PTT	32	26-36
Fibrinogen	4.3	1.5-4
D dimer	2816	<250

Table 3: Results from arterial blood gas sample taken from radial artery

TEST	RESULT	REFERENCE RANGE
pH	7.48	7.35 - 7.45
PCO2	39	35-45
Standard bicarbonate	25	24 - 32
PO2	62	60-80

Echocardiogram

An echocardiogram was requested and the following report was obtained:

The echocardiogram is poor image quality. The left ventricle is not dilated and there is no obvious left ventricular impairment. The right ventricle is moderately dilated with impaired function. There is a large amount of thrombus in the right ventricle apex. The right atrium is mildly dilated.

No obvious abnormality was noted on his chest x-ray.

******Students will be given above information on assessment and from the initial doctor's orders for lab work and an Echo.

Simulation Scenario

Timing (approximate)	Manikin Actions	Expected Interventions	May use the following Cues:
5 minutes	Manikin – pulse 126, oxygen sat 88, respirations 42	Student will initiate a head-to-toe assessment of a patient	Role member providing cue: Manikin – monitors Cue: Patient will develop sudden onset SOB, increased respirations & pulse
5 minutes	Manikin – increase pulse to 132 oxygen sat to 85, respirations to 48, rhythm sinus tachycardia, coughing	Student needs to assess for signs and symptoms of pulmonary embolism, reposition patient for breathing ease, lungs sounds and heart sounds, increase oxygen needs	Role member providing cue: Manikin Cue: "My chest is Killing me. I can't breathe."
5 minutes	Manikin – increase pulse to 138, oxygen sat to 80, respirations increase to 50 sinus tachycardia, C/O of SOB	Student needs to request help from additional team members	Requires communication between team members
5 minutes	Manikin – increase pulse to 142, oxygen sat to 78, respirations increase to 54 Sinus tachycardia with PVCs	Delegate tasks for continued assessment, call assessments to physician	Team members work together to delegate and communicate
5 minutes	Manikin- increase pulse to 142, oxygen sat to 78, respirations increase to 54	Prioritize physician orders and carries out orders	Team members work together to prioritize and carry out orders

	Sinus tachycardia with PVCs		
5 minutes	Manikin- decrease pulse to 58, oxygen sat to 72, respirations decrease to 11, cyanosis noted around lips and gums	Students needs to prioritize for continued care and recognize need for a higher level of care	Team members plan care together and communicate patient care needs

Steps of the Simulation Protocol

- 1. Introduce students to simulation environment (equipment, meds, supplies)
- 2. Review previous experiences and concerns with Sim (performance experiences)
- 3. Ask if students have any questions regarding simulation environment
- 4. Have students fill out Communication Skills Perceptions Questionnaire
- 5. Take students into classroom setting
- 6. Hand out case scenario to group of students for review (10 min). Instruct students to develop a plan of care with their team
- 7. Take students into simulation environment
- 8. Begin simulation scenario as noted above (30 min) (vicarious experiences
- 9. Take students back to classroom
- 10. Debrief with the following questions below (20 min) (vicarious experiences, social persuasion, psychological/emotional/performance anxiety)
- 11. Have students fill out Communication Skills Perceptions Questionnaire post simulation and debriefing

Debriefing: (vicarious experiences, social persuasion, psychological/emotional/performance anxiety)

1. Did you have the knowledge and skills to care for this patient?
2. During the scenario, was communication effective?
3. When was communication most important?
4. When was communication most important between team members?
5. Was care more effective because of communication among team members?
6. How does having an intraprofessional team present impact your patient's care?
7. Would care have been different if different team members were present on your team than just your discipline?
8. What is the importance of communication among team members?
9. How would you have changed any aspects of teamwork and communication?

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VITA

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Angel completed her BSN in 2004 at the University of Mississippi Medical Center and her MSN in 2011 at the University of Memphis. She taught as adjunct clinical faculty at Baptist College of Health Sciences from 2004 to 2011 and at Union University from 2007 to 2010. Upon completion of her MSN in 2011, she became an assistant professor of nursing at Baptist College of Health Sciences. In summer 2013, Angel enrolled in the Doctor of Philosophy in Nursing program at University of Missouri-Kansas City. Angel is a member of Sigma Theta Tau International. She has presented her work in the area of interprofessional education locally, regionally, and internationally. Angel has been published in the *American Journal of Biomedical Sciences & Research* on the topic of interprofessional education in undergraduate healthcare education. Angel received the Daisy Faculty award at Baptist College of Health Sciences in 2012 and 2018, as well as the Distinguished Faculty Award in 2018. She has also been awarded grants: one for her dissertation research from her local Sigma Theta Tau chapter and one from the Tennessee Hospital Associates for a transition to

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