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STUDENTS' PERCEPTIONS OF USING SIMULATION IN RESPIRATORY THERAPY PROGRAM

By

Ahmad E. Alhaykan

(Under the Direction of Professor Chip Zimmerman)

ABSTRACT

Respiratory therapy graduate students are going to face a clinical environment that commands greater responsibility and culpability than in years past. Therefore, respiratory therapy educators must prepare graduates for the multidimensional demands of the workplace. PURPOSE: The purpose of this study was to explore the perception of the undergraduate respiratory therapy (BSRT) and integrated graduate respiratory therapy (MSRT) students in the implementation of simulation in the educational laboratory setting. METHODS: Data were collected through a descriptive survey. The survey was distributed to a convenience sample of first year BSRT and MSRT students attending an accredited respiratory therapy program at an urban public research university in the southeast United States. The survey consisted of 10 questions presented in a four-point Likert-type scale to obtain students' perceptions regarding their simulation experience. The collected data were analyzed using descriptive statistics. RESULTS: Thirty-two students were surveyed, more than two-thirds of the participants were female. Approximately seventy-one percent of respondents were BSRT, females accounted for 87% and males 13%. Graduate MSRT were 28.1% of the total sample with 44.4% females and 55.6% males. More than two-thirds of MSRT students reported previous clinical experience while BSRT students reported less than one-quarter. Additionally, only two students from BSRT indicated that they have previous simulation experience, whereas more than half of MSRT students reported previous simulation experience. The study findings indicate BSRT and MSRT students' overall perceptions are similar, however, both perceive the experience of nervousness differently. BSRT students indicated high agreement with the statement that they experienced nervousness during the simulation with mean = 3.52 (*SD* ± .51). MSRT students indicated high agreement with the statement that simulation was a valuable learning experience with mean = 3.33 (*SD* ± .70). Both of BSRT & MSRT students agreed that simulation should continue to be an integral part of the respiratory therapy program. MSRT students demonstrated higher agreement with mean = 3.55 (*SD* ± .72). Finally, the majority of responses to a debriefing session after simulation experience supported their understanding and reasoning were positive from both BSRT & MSRT students with means respectively = 3.39 (*SD* ± .65), and 3.55, (*SD* ± .52). CONCLUSION: Respiratory therapy educators continue to strive to enhance respiratory therapy students' clinical reasoning, transference of theory to clinical practice, skills acquisition, and critical thinking. Use of simulation is essential to achieve these objectives. The results of this study support the implementation of simulation course in the curriculum as a mandatory requirement prior to clinical practice as evidenced by positive responses from students. Although students felt positively that simulation should be continued in the curriculum, they did not feel it should totally substitute for all clinical experiences.

Dedication

I thank God, the one who is most deserving of thanks and praise for his guidance and support during this research thesis as well as throughout my life.

I would like to dedicate this research thesis to my loving parents who praise my education since I was kid. My father, thank you for all what you have done. Your words still linger in my mind. To the loving memory of my mother who did not live to witness my graduation, may Allah grant mercy upon her soul. To my beautiful wife, Jawaher, who has supported me in all my endeavors. To my son, Eyad who makes life fun.

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CHAPTER I

INTRODUCTION

Respiratory therapy graduate are going to face a clinical environment that commands greater responsibility and culpability than in years past. Therefore, respiratory therapy educators must prepare graduates for the multidimensional demands of the workplace. Simulation is an innovative teaching approach that has been widely used in health care education and training over the last several years. It supports the efforts of educators to prepare students for practice (Hotchkiss, Biddle & Fallacaro, 2002; Nehring, Lashley & Ellis, 2002; Bearnson & Wiker, 2005).

In the 1960s, cardiopulmonary resuscitation programs (CPR) incorporated Resusci-Anne mannequin to provide hands-on resuscitation training for emergency situations such as cardiac arrest. Since then, Anesthesiology, Nursing and Respiratory Therapy programs have found mannequins useful in patient care education primarily because the possibility of human harm was eliminated. Clinical simulation in health care education has developed exponentially in recent years-and is expected to continue to do so in the future (American Association of Medical Colleges, 2000; American Association of Colleges of Nursing, 2005)

Moreover, there has been an increased emphasis on patient safety and optimal patient care. This is typically achieved by the quality of a health care provider's technical and non-technical skills, both of which can be improved by utilizing simulation modules (Ohtake, Lazarus, Schillo, & Rosen, 2013). There has been an extensive amount of research conducted on methods of optimal learning that have shown that students grasp the understanding of scientific concepts better when they construct them within practical or tangible models. Unlike the traditional classroom setting, the use of simulation in health care education combines both a hands-on

approach and the manipulation of apparatus allowing students the opportunity to apply their critical thinking. In a simulation lab, students are presented with a situation to work out that is similar to what they would encounter in a real clinical environment after which they receive feedback on their performance (Issenberg, McGaghie, Petrusa, Gorden, & Scalese, 2005). Simulation imitates actual life while providing a foundation for teaching, understanding, and practice.

In spite of the positive implications in respiratory therapy education, there is a lack of evidence to support overall respiratory therapy best practices for simulation. The development of an instrument to measure students' perceptions of using simulation in Respiratory Therapy program is a significant research challenge. The complexity of the health care system and the necessity of evidence-based approaches in health care education demonstrate the need for an evidence base describing and evaluating clinical simulations (Reed, et al., 2005).

There are many health professional schools currently using simulation in their programs. As a result of this increased use of technology, the need for an evaluation program arises that would ensure simulations are producing the expected outcomes. Simulation in respiratory therapy education has not been described or tested empirically, and there are only few studies that address this role (Tofil et al., 2011), (Rozansky, 2012), (Tuttle et al., 2007).

Problem Statement

The use of simulation in respiratory therapy laboratories has grown exponentially in recent years. Despite that fact, no instrument exists to measure the students' perceptions of using simulation in respiratory-therapy programs or how simulation affects their learning process through incorporating theory into practice.

Purpose of the Study

Due to the lack of respiratory education methodology resources, a nurse education simulation and an allied health program will be utilized to conduct this study. The purpose of this study is to evaluate students' perceptions of using simulation in respiratory therapy programs. There is a need for an instrument for assessment, evaluation, and feedback for respiratory educators who use simulations in their teaching. The conceptual framework for this study is derived from the nurse education simulation framework (NESF), which guides the design, implementation and evaluation of simulations (Jeffries, 2005). The following research questions were addressed to help steer the study:

1. What are the undergraduate respiratory therapy students' overall perceptions of the simulation course that is included in the undergraduate curriculum?
2. What are the graduate (IMP) respiratory therapy students' overall perceptions of the simulation course that is included in the graduate curriculum?
3. How integral are simulation experiences to clinical practice in the field of respiratory therapy?
4. Does the simulation debriefing experience support students' understanding and reasoning?

Significance the of study

The specific goal of this study is to advance respiratory therapy programs by implementing simulation courses in the curriculum as a mandatory requirement prior to clinical practice. The perception and feedback from students in using alternative learning methods are essential to modifying the respiratory therapy programs that utilize clinical simulation in a laboratory setting.

Definitions of Words and Terms

Standardized Patient: A standardized patient is defined as a person who has been carefully recruited and trained to present an illness or scenario in a systematic, constant manner affording the students an opportunity to learn in a simulated clinical environment (Barrows, 1993).

Simulation: Simulations are highly realistic operating models that contain relevant features of reality. Simulations are designed to symbolize, model, explain, predict and/or communicate the features, influence, and intrinsic behavior of the modeled system of interest. When persons participate, the task and task environment must be perceived as sufficiently real to produce pertinent real-world equivalent behavior (Streufert, Satish & Barach, 2001).

Human Patient Simulator: The human patient simulator can be defined as a life-like manikin with advanced computer controls that can be adjusted to provide different physiological parameter outputs of physical, electrical, or combinatorial nature. The parameters can be controlled through either automated software or respond to the actions of an evaluator in response to student actions. (Bradley, 2006).

Fidelity: Fidelity is the degree to which the simulations mimic the reality of the system used. Simulations may be categorized as low, medium or high-fidelity (Seropian, 2004). Advanced human patient simulators, which are designed to closely imitate reality, are considered to have a high degree of fidelity.

Summary

One of the main objectives in respiratory therapy programs is to prepare graduates for the multidimensional demands of the workplace. Simulation supports the efforts of educators to prepare students for practice. Using an alternative learning method is vital to student learning outcomes. Students' perceptions would provide an exploration of this teaching modality and provide valuable information to respiratory therapy programs that utilize simulation in a laboratory setting.

CHAPTER II

REVIEW OF THE LITERATURE

Literature regarding the use of simulation in respiratory therapy education as a teaching modality is sparse. As a result, a literature review of nursing, medical, and other health care professional training were utilized in this study. Many of these health professions incorporated clinical simulation in their respective fields of education. The search keywords used to gather studies for this review included the following: simulation, clinical simulation, nursing, medicine, physical therapy, respiratory therapy, respiratory care, and education. These search terms were utilized together to find articles in different databases such as Cochrane Reviews, the Cumulative Index to Nursing and Allied Health Literature, Science Direct and MEDLINE.

The literature on simulation in different health care specialties presents publications about: the classification of simulation, the history of simulation, clinical simulation labs, and how patient safety and care can be enhanced by improving technical and nontechnical skills of the health care provider. Some health care specialties have had more publications and in-depth discussions of what particular theories they employ for their simulation framework than-others. The nursing profession provides the most abundant publication sources about simulation.

The Classification of Simulation

Simulation is defined as ‘‘a person, device, or set of conditions that tends to present problems authentically’’ (Issenberg SB, et al., 2005). Simulation is often classified into four categories: a standardized patient, a computer, a partial-task, or a high-fidelity simulator (Okuda & Quinones, 2008). Standardized patients are trained persons acting as a real patient to give specific responses to a certain medical condition. Computer simulation is defined as an

interactive program that allows the students to give patient care and receive feedback on their medical intervention. “Part-task” simulation is a tool or device used to teach a particular skill or procedure, such as drawing an arterial blood gas sample or placing a chest tube. The high-fidelity simulator is a dynamic, computerized, whole-body mannequin capable of a multitude of tasks including: giving a history creating physical exam findings such as abnormal or normal lung and heart sounds, and displaying physiological changes in blood pressure, respiratory rate, and heart rate. Moreover, some high fidelity simulators are able to physiologically respond to medication and oxygen administration, receive electrical cardioversion, and receive diagnostic procedures such as peritoneal lavage and central lines (Sahu & Lata, 2010). These simulators provide authentic, clinically relevant opportunities for practical learning. Clinical simulation encourages students to become more engaged and actively participate in their learning. (Ohtake et al., 2013).

Overview of Historical and Modern Simulation Modalities

The root of modern day simulation lies within the aviation industry. As early as the 1920’s, pilots were learning to operate airplanes in hazardous situations without placing themselves, their passengers, or their airplanes at risk (Grenvik & Schaefer, 2004). Later on, this technology began to emerge in health care. In the early 1960’s, the Resusci-Anne mannequin was created by Peter Safar, an originator of the resuscitation movement, in collaboration with Laerdal, a doll-maker from Norway (Grenvik, & Schaefer, 2004). This mannequin still being used today, created a revolution in CPR. Rapidly evolving computer technology and decreasing costs of simulation development played an essential role in re-emerging interests in simulation-based medical education, particularly the use of high-fidelity patient simulators in the early 1990’s (Lam, Ayas, Griesdale, & Peets, 2010). These simulators became the precursors to the

popular commercialized simulators that are now being widely used in respiratory therapy education today and other health professions.

Clinical Simulation Labs

Clinical simulation labs have become an essential modality in the health care education for many reasons from the need to improve patient mortality rates to broadening health care practitioner experience levels among an environment that is increasingly difficult to staff. Respiratory therapists are health care professionals that must be adequately prepared to handle various clinical situations. Simulation labs are aimed to create an environment that mimics real world situations to enhance the student's education and to train them so that they will be well-equipped even under stressful circumstances. Simulation labs vary from the simple mannequin head on which to practice intubation skills to a fully equipped room with sophisticated computer equipment providing a controlled environment that mimic real situations. In the simulation lab, students can practice the clinical skills without a fear of harming the patient. Furthermore, simulation lab provides an unlimited number of trials and opportunities to challenge students in a controlled environment where they are permitted to make errors and learn from them. (Frey, M. V. 2012).

Simulation and teaching skills

Simulation training can be an effective modality for teaching technical skills. Much of the literature comes from the surgical realm. In particular, simulator trained residents have acquired laparoscopic surgical skills more rapidly than they have with traditional teaching methods. (Aggarwal, Ward, Balasundaram, Sains, Athanasiou, Darzi 2007). In addition, they have successfully transferred those skills to the operating room. Using simulation in surgical

operations has a significant effect on decreasing the required time to complete the procedure, reduces errors, lowers the likelihood of the attending surgeon taking over the procedure, and increases the overall operative performance (Aggarwal et al., 2007). In respiratory and critical care medicine there is an evidence suggesting that simulation training improves residents' performance of endotracheal intubation (Mayo, Hackney, Mueck, Ribaudo, & Schneider, 2004), and bronchoscopy (Davoudi & Colt, 2008) among other procedures. On the other hand, simulations have shown to have a substantial impact on teaching non-technical skills. The acquisition and refinement of nontechnical skills are critical to function effectively in the current team-based health care environment. In addition to targeted simulation training and debriefing, multi-disciplinary health care teams showed a significant improvement in their performance with increased collaboration and teamwork skills among all members. Moreover, physicians and other health professions have been shown to improve their critical thinking significantly by using simulation designed to enhance their leadership, communication, and delegation skills. (Holcomb, Dumire, Crommett, 2002; Ward, 2012).

Simulation in Physical Therapy:

High fidelity simulation is relatively new in physical therapy education. This modality has the potential to be beneficial in educating physical therapist students in the evaluation and treatment of patients in the complex acute care setting. Implementation of physical therapy rehabilitation on patients in the critical care settings has a positive impact on patients' outcomes. It plays a significant role in decreasing the duration on mechanical ventilators, decreasing the number of intensive care unit (ICU) days, and eventually shortening hospital length of stay (Ohtake, Lazarus, Schillo, & Rosen, 2013). Despite the fact that physical therapy intervention is essential in ICUs, delivery of these services varies significantly (Hodgin, Nordon, McFann,

Mealer, &Moss, 2009) and patients often remain immobile during their ICU stay (Winkelman, Higgins, and Chen, 2005). Schweickert et al. (2009) support that the implementation of ICU rehabilitation programs including early mobility. Many physical therapists often report being uncomfortable and inexperienced for work in this high-risk setting. (Gorman et al., 2010). In the physical therapy arena, there is a lack of a standardized system that would prepare physical therapists for ICU practice. (Gorman et al., 2010) Despite this fact, simulation plays an important role in enhancing a physical therapy student's confidence in managing patients in ICU. Ohtake et al. (2013) reported that incorporation of simulated critical care experiences into a physical therapy clinical course enhanced the confidence of physical therapy students. This experience improved the technical, behavioral, and cognitive skills of students, and resulted in a high student satisfaction rate. Students were introduced to the critical care settings through the high fidelity simulation model, which may possibly increase their interest in working in this practice area. Moreover, the students had a positive perception of the overall experience with the majority agreeing that the physical therapy curriculum would be enhanced through the incorporation of simulation practices within the clinical courses.

Faculty members from the physical therapy and physician assistant programs at Chatham University conducted a similar study (Bednarek, Downey, Williamson, & Ennulat, 2014). The aim of this study was to discuss the incorporation of simulation training into the curriculum for physical therapy and physician assistant students. Simulation experiences were integrated into the physical therapy curriculum in the cardiovascular and pulmonary course. Content covered in this experience includes examination and treatment of cardiovascular cases, pulmonary cases, wounds, and lower extremity amputation. In addition, the course represented the unique aspects of acute care and ICU settings, allowing students the opportunity to strengthen their skills in

reviewing medical charts in addition to identifying and managing different lines, tubes, and drains. This simulation experience aimed to create a therapist who has the ability to identify medical equipment, make appropriate clinical decisions and show self-confidence in a safe environment.

Simulation in Medicine:

In medical education, simulation-based teaching methodologies have been extensively used to teach technical, communication, and clinical skills. It provides a safe and efficient platform for practice without real harm. (Nuzhat, Salem, Al Shehri, & Al Hamdan, 2014). Exposure to simulation for medical students is a valuable tool to enhance knowledge and student self-confidence at a key transition period prior to beginning of internship (Halm, Lee, & Franke, 2010).

Simulation use in various levels of medical school education

Basic science. Simulation in basic science education has been widely used by medical educators (Kelsey, Botello, Millard, & Zimmerman, 2002). Via et al. (2008) conducted a study on second-year medical students in a pharmacology course. This study aimed to evaluate the students' perception of using simulation by using a full-body simulator to show changes in cardiac output, heart rate, and systemic vascular resistance in response to volatile anesthetics. Students' perceptions of using this method were considerably higher with as much as 95% of students noting that it was a valuable use of their time and 83% of the students preferring this method over traditional classroom lectures.

Physical examination. Simulation has been used to teach basic physical examination skills, and dealing with systems such as the heart and lungs. In a 1968 multicenter study involving 208 medical students, Dr. Michael Gordon developed a cardiology patient simulator to

teach different cardiac conditions for both normal and abnormal findings. This simulator mimicked respiratory sounds, heart sounds, pulses, jugular venous pulsations, and precordial pulsations. This part-task simulator was created to address the limitations of patient exposure and to help teach abnormal cardiovascular examination findings to medical students (Okuda & Quinones, 2008).

Skills training. Simulation in medical education is an effective method of teaching procedural and surgical skills training. A study conducted by Van Sickle et al. (2006) demonstrated that using a laparoscopic suturing part-task simulator improved the ability of medical students to learn advanced technical skills compared to those of senior level residents within a short period of time. For non-surgical skills such as central line insertion, chest tube and cricothyrotomy, medical students with simulation training showed more confidence and were more willing to do those procedures on their own in comparison to those trained without simulation.

Simulation in Nursing

In nursing education, it is essential to improve the learning of theoretical concepts by making theory appropriately relevant for clinical practice (Benner, 2010). In order to do so, simulation has been used as an educational method to assist students in transferring theory to specific patient situations in focus. Teachers play an essential role in facilitating and assisting students in providing nursing care in complex patient conditions (Benner, 2010). However, in clinical practice, such facilitation may be difficult due to time constraints and concerns for patient safety (Morgan, 2006).

Nursing education is being altered by technological developments in simulation. These active learning methods are imperative in solving one of the challenges that face many nurse

educators. Today, students are expected to be qualified to acclimatize to the multifaceted demands of the workplace upon graduation, which requires a learning environment that allows for critical thinking, self-confidence and experiential learning (Blum, Borgland, & Parcells, 2010). Students must be given opportunities to make a connection between classroom theory and the experiences of the clinical setting. Simulation is a vital link in this practice because it allows faculty to create laboratory environments that replicate actual clinical scenarios. In the simulation laboratory, students can practice nursing intervention procedures, prioritize patient care and improve communication skills within a safety environment. The outcomes that may result from integration of simulation in undergraduate nursing programs include reduced anxiety, increased knowledge retention, and development of psychomotor skills before encountering the reality of actual care settings (Billings & Halstead, 2012).

Based on the positive impact of using simulation in undergraduate education, many schools recommend the application of simulation throughout the nursing curriculum. Because this task is not easy to undertake, the foundational level of the nursing curriculum has become a primary point to initiate this type of educational method (Kardong-Edgren, Starkweather, & Ward, 2008). Students at this level are very concerned about treating patients clinically, lack of critical thinking practice, and are beginners in their psychomotor skills. Using simulation at this level has been proven to be beneficial in these three skills. (Dearmon et al., 2013).

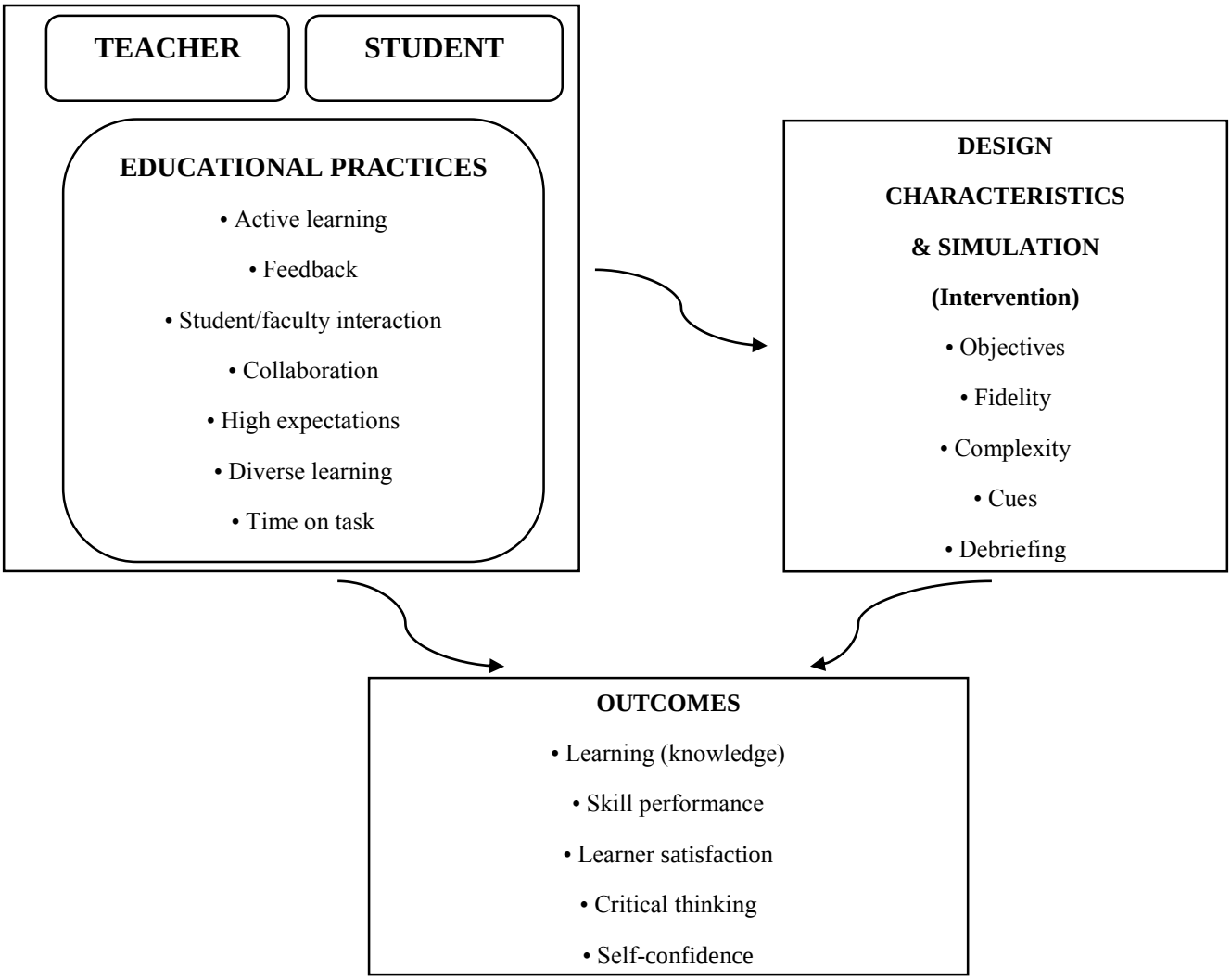
Overview of the nursing education simulation framework

The Nursing Education Simulation Frame Work (NESF) derived from the theoretical and experiential literature. It is intended for all types of simulation, regardless of the level of fidelity designed for use in nursing education today. A group of professional organizations, staff educators, (students and faculty at academic institutions) — schools of nursing, as well as other

health care professions, worked together to proposed this framework. NESF guides the processes of designing, implementing and evaluating simulations in nursing that aim to identify teaching and learning practices with simulation that contribute to positive outcomes, the role of the teacher in simulation, and the overall teaching and learning process (Jeffries, 2005).

Clinical simulation, in conjunction with clinical experience plus other teaching methods is considered an excellent tool to prepare students for the complexities of the workplace. (Morton, 1997).The five major components that presented in this framework are best practices in education, student factors, teacher factors, simulation design characteristics, and outcomes. Effective teaching and learning using simulations mainly depend on teacher and student interactions, expectations, and roles of each during these practices. Therefore, the two components of the framework that must work harmoniously together are the teacher and the student (Jeffries, 2005) (see Figure1).

Figure 1. Simulation Model (Jeffries, 2005).



Teacher Factors. Teachers play a significant role in the success of the simulation as an alternative learning experience. During simulation exercises, the teacher acts as a facilitator in the student learning process unlike the traditional classrooms setting where the teacher is the main speaker. The role of the teacher varies depending on whether the simulation is conducted for learning or evaluation purposes. (Jeffries, 2005)

Teachers must be ready and feel comfortable with the simulation activities they are using. They may need help in simulation design, setting up equipment and using technology. As Zerwic & Theis (1999) demonstrated that a faculty development workshop allowed teachers to practice feelings similar to those of students. Those feelings allow the teachers to identify the students' anxiety and discomfort in dealing with a new experience.

Student Factors. Despite the variability of simulation activities, students must be self-directed and motivated throughout the experience. In simulation lab, students may engage in a role-play simulation. For instance, one student may play a nurse and another the patient. The other students may act as observers or actively participate in other activities such as videotaping. Next, the students can rotate through the roles to learn different experiences (Jeffries, 2005). Cioffi (2001) discussed two roles of the student: response-based and process-based. In the response-based role, the learner does not act as an active participant and has no control over the material presented such as giving a participant the complete written case notes of a real patient. However in the process- based role, the learner acts as an active participant, selecting the information presented and its sequence over time (Cioffi, 2001).

Education Practices

According to Chickering and Gamson (1987), education practices can be classified into seven principles; active learning, prompt feedback, student-faculty interaction, collaborative learning, high expectations, allowing diverse styles for learning and time on task.

Active learning. Students are expected to learn more through activities that need their immediate response. For instance, a case in which an intubated patient who developed restless, agitated and coughing affecting his oxygenation status, the student is asked what are the best intervention in this case (Tomey, 2003).

Feedback. Simulations offer students the opportunity to learn and practice nursing theories with immediate feedback regarding their performance, knowledge, and decision-making, in order to achieve the desired learning outcomes (Byrne et al., 2002).

Student-Faculty interaction. Students and faculty should discuss course content and learning processes, along with personal and professional aims. One of the simulation goals is to facilitate discussions between faculty and students that helped promote the achievement of course objectives. (Roberts, While, & Fitzpatrick, 1992)

Collaborative learning. Students work together as a team in collaborative learning to solve problems and contribute in the decision making process. Using simulation promotes collaborative learning and efforts among students, instructors, and other health care practitioners imitating real-life situations (Gibbons et al., 2002)

High expectation. Students and faculty need to have high expectations for the simulation process that will reflect ultimately in positive outcomes (Tomey, 2003).

Diverse learning. The increasing diversity of the student requires the faculty to develop their teaching strategies, curricula, and program development. Implication of simulations can accommodate a number of learning styles and teaching approaches that may be conducive to the diversity of students who may have different cultural backgrounds. This modality would provide an array of options for the students to benefit from the experience (Jeffries, 2005).

Time on task. It is essential to provide the students an initial time, during which the learners operates the mannequin before simulation session started, will allow them to focus on the objectives of the session without distraction. Shearer and Davidhizar (2003) suggested that identifying learning objectives and providing a time frame has to be the first step in establishing simulation activities.

Simulation Design

Designing simulation must be suitable to course objectives, skill competencies, and learning outcomes. There are five areas that should be considered in simulation design including objectives, planning, fidelity, complexity, cues, and debriefing.

Objectives. Written objectives are essential when simulation activities are used to promote the students' learning and outcome achievements. Rauen (2001) suggested that objectives for the experience and learner knowledge and experience should be matched each other.

Planning. Simulation is a new experience for students. In order to familiarize students with these activities appropriate planning is necessary. They must be presented with information about the activity process, amount of time required, role expectations, and outcome expectancies prior to the simulation (Rauen, 2001).

Fidelity. Clinical simulations mimic health care reality. They must be authentic, convincing, and inclusive to as many factors as possible (Cioffi, 2001).

Complexity. Clinical simulations range from simple to complex. Task complexity may be presented as a patient with a complicated case with multiple problems such as confusion, ineffective airway clearance, and depression. All of these problems are interrelated, but the available clinical information is irrelevant (Hughes & Young, 1990).

Cues. In a simulation lab, faculty or other assigned persons may help the student in progressing throughout the simulation activities by providing information about the step the student is currently working on or may be approaching. (Jeffries, 2005)

Debriefing. It is a valuable tool in simulation activities. It reinforces the positive aspects of the activities and encourages deep learning, which allows the participant to incorporate theory into practice, think critically, and discuss how to intervene professionally in very complex circumstances. Debriefing occurs at the end of the session and usually involves the participants

reviewing the relevant teaching points as well as discussing the process, outcome, and application of the scenario (Rauen, 2001).

Outcomes

Knowledge. Fuszard (1995) demonstrated that didactic knowledge gained from simulations is retained longer than knowledge gained through traditional classroom lectures.

Skill performance. Procedural skills require more attention because of their significance to patient care. Fuszard (1995) found that this alternative method of education (simulation) will sometimes result in quicker acquisition of the skill than conventional training methods.

Learner satisfaction. Simulation activities can be evaluated by using instruments to measure students' perception of the simulation experience. Overall studies showed that students were very satisfied with this simulation experience (Engum, Jeffries, & Fisher, 2003).

Critical thinking. Many studies suggested that critical thinking skills are improved when simulation experience has been used with a variation in measurement tools (Rauen, 2001).

Self-confidence. Simulation activities help the learner in transferring simulation skills into the clinical settings resulting in increased self-confidence and improved clinical judgments (Cioffi, 2001).

Simulation in Respiratory Therapy:

In respiratory therapy education, simulation programs, either computer based or mannequin based, work hand in hand with the multi-faceted educational methods utilized today in health care education. Education is designed to teach students academic knowledge more so than practical application. This knowledge must then be utilized appropriately in patient care to: perform procedures, recognize the effect interventions have on patient outcome, and participate in continuous health education in order to maintain competence and learn about new developments in their professions (Shortliffe & Cimino, 2006). Simulation programs expose

students to patient scenarios prior to applying their knowledge to the patient's bedside and provide them with the opportunity to demonstrate skills and knowledge without compromising care or risking harm. In respiratory therapy, utilization of simulation programs provides an advantageous educational modality that should be used widely in the future (Barnes, Kacmarek, Kageler, Morris, & Durbin, 2011). According to the American Association of Respiratory Care (AARC), utilizing simulation training is recommended for continuing education in order to improve skills among current practitioners. In addition, this training technique will also be imperative in the future to educate students both didactically and clinically (Shortliffe & Cimino, 2006). A survey conducted by the AARC (2005) in which they interviewed educators and managers about respiratory care, determined that the use of simulation is an indispensable method for therapists training for the practices of neonatal and pediatric respiratory care (Barnes, Kacmarek, Kageler, Morris, & Durbin, 2011). Currently, the American Heart Association's program offers an electronic certificate of Advanced Cardiac Life Support (e-ACLS). In this program, a case-based approach of simulation is provided to teach different health care practitioners the advanced skills and knowledge they need to evaluate and manage life-threatening cardiovascular and respiratory crises. This program is composed of two sessions: computer-based simulations of patient scenarios and demonstration of ACLS skills on a simulation mannequin. Furthermore, training with simulators and task trainers provide respiratory therapists the opportunity to perform specific procedures such as endotracheal intubations and bronchoscopy (Rozansky, 2012). Simulation patients can be adjusted to mimic a variety of respiratory diseases, asthma or acute respiratory distress, and patients undergoing bronchoscopy.

Respiratory therapists either as college-based instructors or hospital department educators need to be advocates of simulation teaching in order to enrich students' skill development, refinement, and competency for clinical practice (Walsh, Gentile, & Grenier, 2011). Tuttle et al. (2007) demonstrated the implications of simulation technology in the teaching of mini Broncho-alveolar lavage procedure, one of which was an enhanced competency of this procedure within the respiratory therapy staff. Rozansky (2012) has suggested that the incorporation of simulation training into respiratory therapy education curricula is essential. One of the respiratory therapy programs that has done this is School of Respiratory Therapy in St Augustine, Fla at St Johns River State College. Students there gained experience from clinical simulation lab that they might otherwise not often find in the clinical setting. This training prepares students to be more ready for the workforce as respiratory therapists. (Scalese, Obeso, & Isenberg, 2008).

Barnes et al. (2011) have argued that the use of simulation undoubtedly will need to increase significantly in the future. There are numerous modalities, both in computer and human simulation that have a substantial impact on respiratory therapy education. One of the challenges in increasing the education requirement to the baccalaureate level might be in providing additional training opportunities. Despite the fact that the experience of direct patient care cannot be substituted, valuable knowledge, indirect patient care, and practice can be gained in the safety of the simulation environment.

MacIntyre (2004) demonstrated that respiratory system simulations and modeling is classified into three major types, beginning with simple mechanical devices to more complex systems that include advanced computer systems. He categorized simulators and modeling as patient signs and symptoms simulation, anatomic models of the respiratory system, and computerized physiologic models. The patient simulation system is a full-size human patient

simulator that includes ventilators, anatomical modeling of upper-airway and respiratory system mechanics, breathing sounds, and gas exchange. Airway simulation systems include bronchoscopy simulation with three-dimensional virtual bronchoscopy. These simulation systems and models can improve the understanding of disease processes and guide therapies for respiratory therapists and other health care provider.

Summary

Simulation continues to be an important part of respiratory therapy programs. It has been equally important in other health professions that have implemented strategies dedicated towards creating highly qualified health care practitioners. Physical therapy have been involved in this type of education method through simulation experiences in enhancing students', confidence in managing critical care patients. In medical education, simulation-based teaching methodologies have been broadly used to teach basic sciences, physical examinations and skills training. Other specialties have designated resources framework that can be used to design, implement, and evaluate simulations, such as in nursing. The clinical simulation in respiratory therapy education is continuously growing. Currently, respiratory therapy programs vary in their implementations of simulation prior to the clinical training. According to AARC, utilizing simulation training is recommended for continuing education in order to improve skills among current practitioners.

CHAPTER III

Methodology

In this study, the researcher evaluated using simulation in a respiratory therapy program as a mandatory requirement prior to the clinical practice course. Perceptions and impact on respiratory therapy students learning processes were examined. The study was completed using a survey to identify the need to implement a simulation course prior to the clinical practice in the hospitals. The survey was distributed to undergraduate respiratory therapy (BSRT) and integrated graduate respiratory therapy (MSRT) students at the participating school. Moreover, the committee members reviewed the instrument and discussed every element of the instrument to finalize a survey of ten questions. This chapter describes the methods and procedures that were used to develop this study.

Research Questions

This study was used to answer the following questions:

1. What are the undergraduate respiratory therapy students' overall perceptions of the simulation course that is included in the undergraduate curriculum?
2. What are the graduate (IMP) respiratory therapy students' overall perceptions of the simulation course that is included in the graduate curriculum?
3. How integral are simulation experiences to clinical practice in the field of respiratory therapy?
4. Does the simulation debriefing experience support students' understanding and reasoning?

Instrumentation

The instrument developed in this study was a survey that was designed by Howard et al. (2011). Their purpose was to implement and integrate the use of high-fidelity human simulation as a teaching and active learning strategy throughout the undergraduate-nursing curriculum. This survey was edited and modified to evaluate student perception of using simulation in respiratory therapy as a mandatory requirement in the curriculum prior to a clinical practice course. Permission was sought from the author to allow use of the survey instrument. After obtaining the permission of use, the survey was modified using a Q-sort method to evaluate the respiratory care students' perception of using simulation as a mandatory requirement in the curriculum prior to clinical practice course.

Validity and reliability refer to the consistency and accuracy of the used instrument (Burns & Grove, 2005). In the original study, the internal consistency was reported as Cronbach's alpha = .87, suggesting that the instrument was reliable. A four-point Likert-type scale was used to obtain the students' perceptions regarding their perception of simulation. An expert panel of respiratory therapy educators verified content validity.

Research Design

A survey of descriptive exploratory research design was used in this study.
A survey is a method of research that contains answering questions and/or interviews.
The purpose of a survey is using questionnaire interviews to collect data from a sample to report the population in a research. The survey design used in this study was intended to collect data from students on how they perceive using simulation in respiratory therapy program curriculum. One of the benefits of survey research is using only one instrument to collect a large amount of information from many participants. Other benefits of survey research include lower cost with

the use of online technologies and reaching large number of participants (Portney & Watkins, 2008).

Sample

The population of this study was a convenience sample of students attending undergraduate and graduate respiratory therapy programs at an accredited respiratory therapy program at a leading research university located in the southeastern part of the United States. Since it was a convenient sampling, subjects were chosen on the basis of availability. The sample was 32 respiratory therapy students in undergraduate and graduate respiratory therapy degree programs. Inclusion criteria included students who were enrolled in the undergraduate or graduate RT 3060/ 6050 course. Exclusion criteria included students from other levels of respiratory therapy programs, such as associate, diploma, bridge, traditional graduate program, and from alternate learning methods, such as distance or online. All participants are currently in their first year of a professional program that requires them to be at a minimum juniors in college, therefore none will be under the age of 18. A cover sheet was provided to the participants to inform them of the nature and purpose of the study and assure them of confidentiality.

Data Collection and Analysis

Georgia State University Institutional Review Board (IRB) permission was obtained prior to conducting this study. Participants' rights were protected at all times. Participation was completely voluntary with implied consent assumed with return of the completed survey. No names will be used for data collection. Also, there will be no risks associated with being included in this study. A four-point Likert-type-type scale was used to obtain the students' perceptions regarding their simulation experience. (Appendix A).

The collected data was analyzed using the statistical program of Statistical Package for the Social Sciences (SPSS) version 22. Descriptive statistics including frequency, percentage, mean and standard deviation were performed to identify the differences in students' perception regarding their previous simulation experience. Mean scores were calculated for each question, higher scores implied more agreement of using simulation and lower scores implied less agreement of using simulation.

Development of Cover Letter

Development of a cover letter occurred by the researcher after examining different examples and styles of previous similar surveys (Portney & Watkins, 2008). A cover letter sample was created, it was sent to the thesis advisor for additional examination. The final version was confirmed and then used in this study (see Appendix B).

CHAPTER IV

RESULTS

The purpose of this study is to explore the perception of respiratory therapy students' in the implementation of simulation in the educational laboratory setting, as well as to compare these perceptions in undergraduate degree respiratory therapy (BSRT) and integrated master's degree respiratory therapy (MSRT) students. Responses to the simulation evaluation survey are presented through descriptive statistics using Statistical Package for the Social Sciences 22 (SPSS 22). Students used a Likert-type scale method to respond to the survey statements. The scale ranged from 1 to 4 (1 strongly disagree, 2 disagree, 3 agree, and 4 strongly agree).
The results are presented in this chapter. Demographic information of the sample and results of the descriptive statistical analyses are provided.

Research Questions

1. What are the respiratory therapy students' overall perceptions of the simulation course that is included in the curriculum by the undergraduate degree respiratory therapy students?
2. What are the respiratory therapy students' overall perceptions of the simulation course that is included in the curriculum by the graduate respiratory therapy?
3. How integral to clinical practice in respiratory therapy are simulation experiences?
4. Does the simulation debriefing experience support students' understanding and reasoning?

Demographic Findings

Participant demographical information was collected to provide a description of the population, Table1. The sample of this study consisted of 32 respiratory therapy students with 23

(71.9%) participants from the baccalaureate degree program (BSRT) and 9 (28.1%) participants from the integrated graduate degree program (MSRT) in an accredited respiratory therapy program at a leading research university. The BSRT students' age mean = 23.7 (*SD* ± 4.8) while the MSRT students were (27.1, ± 3). A majority of the participants were females with 78.1% (n = 25) from both programs, in BSRT program were 87% (n=20) while in MSRT were 55.6% (n=5). Moreover, males totaled 29.1% (n = 7) of the sample for both programs, in BSRT program were 13% (n=3) while in MSRT were 44.4% (n=4). The number of students that they had any experience working in hospital varied based on curricular track. BSRT students accounted for 17.4% (n=4) and MSRT students 77.8% (n=7). In addition, regarding to the survey's item asking students to indicate if they had any experience with clinical simulation prior to entering the respiratory therapy program at GSU. Only 8.7% (n=2) of BSRT students reported that they had clinical simulation experience whereas 55.6% (n=5) of MSRT students had simulation experience.

Table1. Demographic data of Undergraduate Degree Respiratory Therapy (BSRT) and Graduate Degree Respiratory Therapy (MSRT) Students (n = 32)

Demographic	**BSRT** (n=23)	**MSRT** (n=9)
	Mean ±*SD*/%	Mean ±*SD*/%
Age (years)	23.7, *SD* ± 4.8	27.1, *SD* ± 3.0
Clinical Experience	17.4%	77.8%
Simulation Experience	8.7%	55.6%
Female	87%	55.6%
Male	13%	44.4%

Findings Related to Research Question 1

The first research question asked, "What are the respiratory therapy students' overall perceptions of the simulation course that is included in the curriculum by undergraduate degree respiratory therapy students?" Table 2 shows mean scores and standard deviation of the respiratory therapy students' overall perceptions evaluated by BSRT students. Data results were tabulated according to the number of survey's items. BSRT students indicated high agreement with the statement that they experienced nervousness during the simulation with a mean = 3.52, (*SD* ± .51).

Table 2: BSRT students' overall perceptions of the simulation course in rank order.

Item No.	Description	Mean	Std. Deviation
S6	Experienced nervousness during simulation	3.52	.51
S5	Knowledge gained can be transferred to the clinical setting	3.17	.71
S2	Was a valuable learning experience	3.04	.70
S3	Helped to stimulate critical thinking	3.04	.63
S1	Simulations helped them better understand concepts	3.00	.73
S4	Were realistic	3.00	.75
S7	Because of sim, I will be less nervous in the clinical setting when providing care for similar patients	2.95	.88
S8	Can substitute for clinical experiences	2.73	.75

Findings Related to Research Question 2

The second question asked, "What are the graduate (IMP) respiratory therapy students' overall perceptions of the simulation course that is included in the graduate curriculum"? Table 3 shows mean scores and standard deviation of the respiratory therapy students' overall perceptions evaluated by BSRT students. Data results were tabulated according to the number of survey's items. MSRT students indicated high agreement with the statement that simulation was a valuable learning experience with a mean = 3.33(*SD* ± .70).

Table 3: MSRT students' overall perceptions of the simulation course in rank order.

Item No.	Description	Mean	Std. Deviation
S2	Was a valuable learning experience	3.33	.70
S1	Simulations helped them better understand concepts	3.11	.60
S7	Because of simulation, I will be less nervous in the clinical setting when providing care for similar patients	3.11	.60
S3	Helped to stimulate critical thinking	3.00	.92
S4	Were realistic	3.00	.70
S5	Knowledge gained can be transferred to the clinical setting	2.88	.33
S8	Can substitute for clinical experiences	2.88	1.05
S6	Experienced nervousness during simulation	2.77	1.09

Findings Related to Research Question 3

The third question asked, "How integral to clinical practice in respiratory therapy are simulation experiences"? The descriptive statistical results related to this question are demonstrated in table 3. Both of BSRT & MSRT students responded positively that simulation should continue to be an integral part of the clinical experience in respiratory therapy program. MSRT students demonstrated higher agreement with a mean = 3.55 (SD ± .72) also BSRT students agree with this statement with a mean = 3.47 (SD ± .73).

Table4: BSRT & MSRT perception of the simulation course

Survey Item	**BSRT** (n=23)	**MSRT** (n=9)
	Mean ±*SD*	Mean ±*SD*
Simulation should continue to be an integral part of the clinical experience in respiratory therapy program.	3.47, (*SD* ± .73)	3.55, (*SD* ± .72)

Findings Related to Research Question 4

The fourth research question asked, "Does the simulation debriefing experience support students' understanding and reasoning"? The majority of the responses to this question agreed that a debriefing session after a simulation experience supported the understanding and reasoning from of BSRT & MSRT students. Table 5 depicts the statistical findings of this question.

Table5: BSRT & MSRT perception of debriefing session

Survey Item	BSRT (n=23)	MSRT (n=9)
	Mean ±*SD*	Mean ±*SD*
Debriefing experience supported my reasoning and ability to perform in the clinical setting.	3.39, (*SD* ± .65)	3.55, (*SD* ± .52)

CHAPTER V

INTERPRETATION OF FINDINGS

This chapter will present interpretation of the findings discussed in Chapter IV. It is divided into five major sections, including overview of the study, discussion of findings, implications for research, recommendation for future research, study limitations, and conclusion.

Overview of the Study

The purpose of this descriptive quantitative study was to explore the perception of respiratory therapy students' in the implementation of simulation in the educational laboratory setting. Data were collected from an accredited respiratory therapy program at a leading research university and represents a sample from both baccalaureate and master degree programs. The research questions leading this study were:

1. What are the undergraduate respiratory therapy students' overall perceptions of the simulation course that is included in the undergraduate curriculum?
2. What are the graduate (IMP) respiratory therapy students' overall perceptions of the simulation course that is included in the graduate curriculum?
3. How integral to clinical practice in respiratory therapy are simulation experiences?
4. Does the simulation debriefing experience support students' understanding and reasoning?

The survey instrument developed in this study was a survey that was designed by Howard et al. (2011). Their purpose was to implement and integrate the use of high-fidelity human simulation as a teaching and active learning strategy throughout the undergraduate-nursing curriculum. The survey was reviewed and modified using a Q-sort method to evaluate the respiratory care students' perception of using simulation as a mandatory requirement in the

curriculum prior to the clinical practice course. An expert panel of respiratory therapy educators at Georgia State University completed the revisions and modifications. The committee members met and discussed each item of the instrument and finalized a survey of ten questions (Appendix A).

Participants in the study were selected based on a convenience sample of first year undergraduate (BSRT) and graduate (MSRT) respiratory therapy students who were enrolled in the undergraduate or graduate RT 3050/ 6050 course. The researcher distributed the survey packets to thirty- two students of both BSRT and MSRT.

Discussion of Findings

Findings Related to Research Question 1

The first research question asked, "What are the undergraduate respiratory therapy students' overall perceptions of the simulation course that is included in the undergraduate curriculum?" The overall results of this study revealed that both male and female BSRT students rated (N =23) responded positively that the simulations helped them better understand concepts (mean = 3.0), were a valuable learning experience (mean = 3.04), helped to stimulate critical thinking (mean =3.04), and were realistic (mean =3.0). The respondents also perceived that the knowledge gained from simulations can be transferred to the clinical setting (mean = 3.17). Nevertheless, although the mean scores indicate the highest agreement with the statement that students experienced nervousness during the simulation (mean = 3.52) and that because of the simulation experiences, they will be less nervous in the clinical setting when caring for similar patients (mean =2.99). These responds of high agreement of nervousness occurred due to

the lack of simulation experience and clinical experience for undergraduate respiratory therapy students as reported in the demographic information. Finally, students did not agree with the statement that simulations can substitute for actual clinical experiences (mean = 2.73). These findings are similar to what academic programs have reported in other literature (Howard et al., 2011). Nursing studies have reported that students felt positively that simulation should be included in the curriculum, with disagreement that it should be totally substituted for all clinical experiences. Similarly, in pharmacy programs, participation in a high-fidelity simulation session improved pharmacy students' knowledge and understanding (Branch, 2013).

Findings Related to Research Question 2

The second question asked, "What are the graduate (IMP) respiratory therapy students' overall perceptions of the simulation course that is included in the graduate curriculum"? MSRT students indicated high agreement with the statement that simulation was a valuable learning experience with a mean = 3.33 (*SD* ± .70). The sample for this study (n=32) consisted of BSRT students (n= 23) and MSRT students (n= 9). Results of the simulation evaluation survey reported by MSRT students revealed that, on average, students responded more positively on all items than what BSRT students did with the exception of the item that they experienced nervousness during the simulation and that because of the simulation experiences, they will be less nervous in the clinical setting. These findings are expected from MSRT students due to their previous clinical and simulation experience as indicated in the demographic data, and suggest that these master-level students felt that, overall, the simulation was a positive experience.

Findings Related to Research Question 3

The third question asked, "How integral to clinical practice in respiratory therapy are simulation experiences"? Both of BSRT & MSRT students responded positively that simulation should continue to be an integral part of the clinical experience in respiratory therapy program. MSRT students demonstrated higher agreement with mean = 3.55 (*SD* ± .72). Similarly, BSRT students agree with this statement with mean = 3.47 (*SD* ± .73). This supports the findings of Nuzhat et al. (2014), and Medley & Horne (2005) in which a majority of students provided a positive feedback regarding role of implication simulation as a mandatory course in the curriculum.

Findings Related to Research Question 4

The fourth research question asked, "Does the simulation debriefing experience support students' understanding and reasoning"? The majority of responses to this question agreed that debriefing session after simulation experience supported their understanding and reasoning from both BSRT & MSRT. Nursing literature has reported similar findings in which nursing students indicated that students considered that debriefing session provided adequate opportunity to address their feelings after the simulation session as well as discussed and evaluated nontechnical skills, such as communication, clinical reasoning, leadership, and teamwork (Kable, Arthur, Levett-Jones, & Reid-Searl, 2012; Reese, 2009).

Implications for Research

Respiratory therapy educators are charged to develop and use evidence-based educational practices to prepare graduates for the multidimensional demands of the workplace. The findings of this study revealed that respiratory therapy programs recognize the requirement for implementation of simulation course in the educational laboratory setting as a mandatory

requirement prior to clinical practice. Another significant finding was the importance of the debriefing session to support student development of clinical reasoning abilities. Students should be encouraged to share and discuss what they have made during simulation experience. Respiratory therapy educators need to thoughtfully design the debriefing as these results add additional support to previous studies of the high quality learning that occurs during this time. The study also brings to light the current evidence-based practices for assessment, evaluation, and feedback for respiratory educators who use simulations in their teaching.

As a respiratory therapy program instructor is aware of students' perception regarding using of alternative methods of education that resulted in quicker acquisition of the skills than conventional training methods. Respiratory therapy educators must strive to form positive relationships with students to achieve positive learning outcomes. Finally, findings of this study will add to the literature given the scarcity of studies examining effective clinical education in the field of respiratory therapy.

Recommendations for Future Study

Due to the lack of studies in respiratory therapy training that address the subject of student perceptions of using simulation, further research is recommended. Since the sample chosen in this study represents respiratory therapy program in one university, generalization of findings in this study might be limited. Therefore, replication of this study is strongly recommended in order to generalize these findings with a larger sample size involving a number of accredited undergraduate and graduate respiratory therapy programs. The inclusion of faculty is also recommended in the future.

Limitations

This study was limited by a number of factors. The sample was selected from a single institution comprising of BSRT & MSRT and the number of participants involved was limited to first year students. The relatively small sample size must be taken into account with regard to the comparison of different levels of students. The study also did not consider the effectiveness of simulation as a teaching modality. Finally, this study did not take age, gender, and ethnicity into account.

Conclusion

Respiratory Therapy educators continue to strive to enhance respiratory therapy students' clinical reasoning, transference of theory to clinical practice, skills acquisition, and critical thinking. Using of simulation is essential to achieve these objectives. The results of this study support the implementation of simulation course in the curriculum as a mandatory requirement prior to clinical practice as evidenced by positive responses from students through the simulation evaluation survey. Although students felt positively that simulation should be continue in the curriculum, they did not feel it should totally substitute for all clinical experiences.

Appendix A: Simulation Evaluation Instrument

PART 1: Demographics

1. In which curricular track are you currently enrolled?

    A. Undergraduate respiratory therapy (BSRT)

    B. Integrated graduate respiratory therapy (MSRT)

2. What is your gender?

    A. Male

    B. Female

3. Do you have any experience working in a hospital prior to entering the respiratory therapy program at GSU?

    A. Yes

    B. No

4. Do you have any experience with clinical simulation prior to entering the respiratory therapy program at GSU?

    A. Yes

    B. No

5. What is your age?

_____

PART 2: Please circle the response that best describes how you feel about the simulation course.

(RT 3050/6050):

	Strongly Disagree	**Disagree**	**Agree**	**Strongly Agree**
1- The simulation course at GSU helped me to better understand respiratory therapy concepts in the clinical setting.	**1**	**2**	**3**	**4**
2-The simulation course provided a valuable learning experience.	**1**	**2**	**3**	**4**
3-The simulation course helped to stimulate critical thinking abilities.	**1**	**2**	**3**	**4**
4-The simulation course was realistic.	**1**	**2**	**3**	**4**
5-The knowledge gained through the simulation course can be transferred to the clinical setting.	**1**	**2**	**3**	**4**
6- I was nervous during the simulation experience.	**1**	**2**	**3**	**4**
7- Because of the simulation experience, I will be less nervous in the clinical setting when providing care for similar patients.	**1**	**2**	**3**	**4**
8- Simulation experiences can be a partial substitute for clinical experiences in the hospital.	**1**	**2**	**3**	**4**
9- Simulation should continue to be an integral part of the clinical experience in respiratory therapy program.	**1**	**2**	**3**	**4**
10- Debriefing after the simulation experience supported my reasoning and ability to perform in the clinical setting.	**1**	**2**	**3**	**4**

Thank you for completing this survey!

Appendix B: Cover Letter

Dear Respiratory Therapy Student,

You are invited to take part in a research study because you are an undergraduate or graduate respiratory therapy student who has attended RT 3050/ 6050 course. The purpose of this study is to evaluate the simulation course prior to the clinical practice. The study is being conducted by Ahmad Alhaykan, a master degree candidate from the Department of Respiratory Therapy at Georgia State University, under the guidance of Professor Chip Zimmerman. You will receive no direct benefit from participating in this study, but the information gained will be helpful to respiratory therapy program in determining which courses are most important to be continue as an integral part of clinical practice to facilitate students' learning. Should you decide to participate you will be asked to complete the following survey, which should take approximately 5-10 minutes to complete. Your participation is strictly voluntary and you can refuse to participate or stop taking the survey at any time without penalty or loss of benefits to which you are otherwise entitled.

Please note that your responses will be used for research purposes only and will be strictly confidential. Your identity will be strictly protected, no names or codes will be used to identify you or your survey. Once the study is complete, all surveys will be destroyed. Your completion and submission of the survey indicate your consent to participate in the study. You can stop participating at any time, skip questions, or submit a blank survey. The information from this study may be published in journals and presented at professional meetings. This study does not cost the participant in any way, except the time spent completing the survey. There will be no known risk or compensation for participating in this study. Once more, if you are uncomfortable about completing the survey, simply submit a blank survey.

If you have any questions about this research, now or in the future, please contact Ahmad Alhaykan aalhaykan1@student.gsu.edu or Professor Chip Zimmerman chip@gsu.edu. The department's mailing address can be found at the bottom of this page. You may also contact Research Compliance and Safety, Susan Vogtner svgtner1@gsu.edu at Georgia State University.

Please note: completion and submission of this survey implies that you have read this information and consent to participate in the research. Thank you in advance for your cooperation. Your participation makes an important contribution to the future of respiratory clinical education arena.

Sincerely,

Ahmad Alhaykan

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