IMPLEMENTING SIMULATION INTO ONCOLOGY EDUCATION

A Paper
Submitted to the Graduate Faculty
of the
North Dakota State University
of Agriculture and Applied Science

By

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In Partial Fulfillment of the Requirements
for the Degree of
MASTER OF SCIENCE

Major Department:
Nursing

March 2015

Fargo, North Dakota

North Dakota State University
Graduate School

Title

Implementing Simulation Into Oncology Education

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MASTER OF SCIENCE

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ABSTRACT

Nurses, who choose oncology, face complex challenges on a daily basis due to the disease itself and the effects of its treatment. The purpose of the project was to examine the effect implementing simulation into the education of oncology nurses, would have on participant confidence and perceived competence in caring for such complex patients. Two simulation scenarios based on oncologic emergencies were developed and incorporated into the education of oncology nurses at a Midwest hospital. Written pre- and post-evaluations were completed by simulation participants. The results revealed a positive increase in mean rating from pre- to post-evaluation, ultimately indicating achievement of the objectives. Simulation continues to provide a safe environment for nurses to build confidence and competence in practice.

ACKNOWLEDGMENTS

I would like to thank Dr. Kiser-Larson as she filled many roles during my graduate school journey. As my advisor, committee chair, and instructor she was always a great resource. No matter how full her plate, she always had time to answer my questions and guide me with such patience. For that I will be ever grateful.

I would also like to thank my other committee members, Dr. Thompson and Dr. Sylvester. Your input was invaluable and challenged me to do better. I appreciate the time you put into this project.

Last but certainly not least I would like to thank my husband. It is hard to put into words how much Justin's unwavering support has meant to me throughout this journey. Justin not only encouraged me to pursue graduate school but supported me when I needed it most. I wouldn't be the person I am today without him by my side.

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CHAPTER ONE: PROBLEM

Background

The training of new nurses has become increasingly complex over time. Patients are more acutely ill and possess comorbidities that challenge the team caring for them, especially in oncology nursing. Oncology nurses require specialized knowledge and skills in order to care for more complex patients (Askew, Trotter, Vacchiano, Garvey, & Overcash, 2012; Demshar, Vanek, & Mazanec, 2011; Kuhrik, Kuhrik, Rimkus, Tecu, & Woodhouse, 2008). In order to acquire the knowledge and obtain the skills necessary, nurses must have access to education/training that incorporates evidence-based teaching strategies to promote critical thinking and application of knowledge. One teaching strategy in healthcare, with increasing popularity and effectiveness in recent years, is simulation (Seropian, Brown, Gavilanes, & Driggers, 2004; Waxman, 2010).

Simulation has played a major role in military and aeronautic training for decades. Medical professionals have also been using this form of experimental learning for more than 15 years. However, implementation of simulation into the education of nurses has only begun to receive significant attention in the last five years as a way to bridge theory to practice (Kuhrik et al., 2008; Seropian et al., 2004; Waxman, 2010). The use of simulation in the education of nurses poses the following benefits:

- Creates a high level of realism and interactivity
- Provides a safe environment
- Increases confidence
- Allows for reflection
- Provides immediate feedback

- Verifies competence
- Enhances cognitive, psychomotor, and communication abilities

The benefits listed above allow for a smoother transition from classroom to the practice setting (Askew et al., 2012; Brannan, White, & Bezanson, 2008; Goldenberg, Andrusyszyn, & Iwasiw, 2005; Gordon & Buckley, 2009; Kuhrik et al., 2008; Waxman, 2010).

Literature support for simulation is building, however several barriers still remain. Simulation can be expensive, time consuming, and many educators still lack the knowledge to implement simulation in a meaningful way and experience the benefits (Seropian et al., 2004). As the demands of practice evolve, traditional teaching methods such as lecture, discussion, and written case studies may not be adequate. Educators are challenged to implement innovative teaching strategies such as simulation. Whether that means sharing simulation equipment with other facilities or purchasing prewritten, evidence-based clinical scenarios, nurse educators must advocate for teaching strategies that prepare professional nurses for practice (Waxman, 2010).

Overview

In order to provide more well-rounded training of new oncology nurses, simulation was incorporated into the existing Oncology Basics course and offered as continuing education. Incorporating simulation is supported by the assumptions of Malcolm Knowles Adult Learning Theory. Full-scale simulation presents a realistic, safe environment in which the learner can explore certain patient conditions and draw on previous knowledge and experience in order to remedy the problem. The ways of thinking developed in this type of scenario can be applied to an oncology nurse's daily practice almost immediately (Kaufman, 2003; Wang, 2011).

Two full-scale simulation scenarios, depicting sepsis and infusion reaction, were developed. Sepsis and infusion reaction were chosen, as they are very common emergencies

occurring in oncology that provide added complexity to an already challenging specialty (Chernecky & Murphy-Ende, 2009; Hallquist Viale & Sanchez Yamamoto, 2010; Hirayama, 2012; Kaplan, 2013; Vogel, 2010). One scenario was incorporated into Oncology Basics, a course offered to new oncology nurses within three to nine months of hire. The other scenario will be offered as continuing education. The participants complete pre- and post-evaluations, to determine if the objectives of the activity were met.

Environment

According to Komprood (2013), "Cancer remains the second leading cause of mortality in the United States and the leading cause of death worldwide" (p. E21). Cancer can affect people at any age; however cancer remains most common among older adults. As the baby boomers are aging, the number of Americans over the age of 65 is rapidly increasing. Therefore, the rates of cancer are also increasing. The demand for specialized oncology nurses to care for cancer patients is also at an all-time high (Komprood, 2013).

Oncology nursing can be very challenging due to the nature of the disease and the effects of the treatments (Askew et al., 2012; Demshar et al, 2011). Until the 21st century, oncology patients were being admitted to the Intensive Care Unit (ICU) for management of many of the classic oncologic emergencies such as sepsis, superior vena cava syndrome (SVC), tumor lysis syndrome (TLS), and malignant spinal cord compression. However, as knowledge of oncologic emergencies, such as early signs and symptoms, has increased and prevention strategies have been implemented, more and more oncology patients are being cared for on a general oncology or medical-surgical unit (Demshar et al., 2011). Since the bedside nurse is the primary caregiver, detailed education regarding oncologic emergencies is vital to an oncology nurse.

Undergraduate nursing programs are designed to prepare students as a generalist, not provide specialized training (Komprood, 2013). According to Komprood (2013) other barriers to implementing oncology specific information into the education of nurses include "the wide scope of oncology content, few oncology prepared faculty, and limited clinical sites" (p. E22). Therefore, many nurses entering oncology nursing are unprepared to navigate the complexities that are unique to oncology. Hospital leadership is then challenged with ensuring the competency of their staff. Essentially, nurses need education incorporating evidence-based teaching strategies targeted at enhancing the nurse's ability to think critically and respond appropriately (Askew et al., 2012; Kuhrik et al., 2008).

The oncology specific education available to registered nurses hired for the inpatient oncology unit at a midwest medical center consists of a six to eight week orientation on the unit with a preceptor, Oncology Basics (one-day course), Chemotherapy-Biotherapy (online modules), and an Intermediate Oncology Series (one hour presentations). During orientation the preceptor tries to expose the new nurse to a wide variety of patients with different diagnoses. However, ensuring that by the end of orientation the nurse is prepared to deal with every symptom, side effect of treatment, or procedure that may occur is possible. Oncology nurses are then offered the classes listed above. Oncology Basics is the only class that new oncology nurses are required to take within their first year of practice. Chemotherapy-biotherapy is available to a handful of nurses that are chosen as charge or chemotherapy nurses. The intermediate oncology series is completely optional and is not well attended by inpatient oncology nurses. All three oncology classes rely heavily on one teaching strategy, lecture, to convey the information.

Comprehensive, oncology specific education can also affect a nurse's attitude and confidence. Komprood (2013) found that "practicing oncology and non-oncology nurses often

have negative attitudes toward cancer and lack confidence in their oncology nursing skills" (p. E22). Negative attitudes and a lack of confidence can have an impact in many areas including nurse turnover and patient satisfaction (Kamprood, 2013).

Problem

A plethora of literature exists regarding the use of simulation in the education of nurses (Brannan et al., 2008; Goldenberg et al, 2005; Gordon & Buckley, 2009; Kim, Ko, & Lee, 2012; Lavoie, Pepin, & Boyer, 2013; Seropian et al, 2004; Waxman, 2010). However, literature is scarce related to specialized training of oncology nurses. As the incidence of cancer continues to rise due to the aging population and a variety of cutting edge treatments are implemented to treat these cancers, we must focus on advancing the education of nurses practicing in this complex environment. The main problem with the education offered in some hospitals for oncology nurses is the lack of an approach allowing the nurse to develop and reinforce appropriate clinical skills such as assessment and decision making skills such as priority setting and delegation.

Purpose

Simply presenting information on topics such as cancer types, treatment approaches, and symptom management is no longer adequate. We must ensure oncology nurses possess the clinical skills and critical thinking capacity to detect and manage the potentially life-threatening situations cancer can inflict. Simulation is a form of experimental learning allowing the learner to synthesize and assimilate information and apply learned concepts to actual patient care situations (Brannan et al., 2008).

Gordon and Buckley (2009) suggest "one area of clinical nursing practice that may benefit from high-fidelity simulation is the assessment of and early intervention for patients with acutely deteriorating conditions" (p. 492). Novice nurses or experienced nurses transferring to

oncology may have yet to experience firsthand the early signs and symptoms of an oncologic emergency and therefore, lack the confidence and skill necessary to intervene. Developing a simulation scenario that allows the nurse an opportunity to assess early signs of an oncologic emergency, establish priorities, and intervene could improve the problem.

CHAPTER TWO: LITERATURE REVIEW

Simulation

In 1999, the Institute of Medicine (IOM) issued a report titled, To Err Is Human: Building a Safer Health System, recommending the use of simulation in the training of novice practitioners. The IOM stated that implementing simulation could contribute to a reduction in medical errors (Kuhrik et al., 2008; Weaver, 2011). However there are different types of simulation.

Throughout the literature, the description of simulation has evolved over the years, from role-playing to high-fidelity patient simulation (Brannan et al., 2008; Rutherford-Hemming, 2012; Weaver, 2011). In order for simulation to be successfully implemented into education of any kind, one must have a basic understanding of the main categories of simulation as well as the accuracy of the equipment being used. Computer based simulation, task and skill trainers, and full-scale simulation are the three main types of simulation. Simulation categories are also broken down based on fidelity or degree to which the simulation resembles real-life (Seropian et al., 2004; Waxman, 2010).

Categories

Computer-based simulation involves using computer software to evaluate a participant's skills, knowledge, and critical thinking during a simulated situation, a technology very similar to video games (Okuda, Bryson, DeMaria, Jacobson, Quinones, Shen, & Levine, 2009; Seropian et al., 2004). The systems are evidence-based and allow for debriefing at the conclusion of each session. The biggest advantage to computer-based simulation is convenience. Learners can access the software outside of class, allowing for increased practice and independence (Seropian et al., 2004).

Task and skill trainers range from plastic-based, nondynamic training aides to virtual reality trainers that allow the student to hone technical skills and practice techniques. An example of a plastic-based, nondynamic training aide is a static arm used to learn IV insertion (Okuda et al., 2009; Seropian et al., 2004; Wang, 2011). Virtual reality trainers provide a realistic, graphical representation of a situation, allowing the student to practice a technique, such as IV insertion, while providing tactile feedback in the form of vibration or motion. Tactile feedback allows the student to gain a "feel" for the procedure (Seropian et al., 2004. Virtual reality may one day become the preferred method of training as the technology advances (Wang, 2011). Although more realistic than computer-based simulation, task and skill trainers still lack elements necessary to create an ideal learning enviroment. As Seropian et al. (2004) pointed out, "Students who learn to intubate on a plastic head reach a learning plateau because the training device is plastic and has only anatomical fidelity" (p. 168).

Full-scale simulation is the last type of simulation and perhaps, the most recognizable in healthcare. "Full-scale simulation attempts to recreate all of the elements of a situation that are perceptible to students" (Seropian et al., p. 168). The environment, equipment, and reactions experienced are made to closely resemble real life (Okuda et al., 2009; Seropian et al., 2004; Wang, 2011). Realism is often achieved through the use of high-fidelity simulators, such as SimMan (Gordon & Buckley, 2009). The experience requires the learner to utilize cognitive and technical skills to navigate the scenario. Full-scale simulation also includes a debriefing that allows the participants and observers to reflect on the experience (Seropian et al., 2004; Wang, 2011). Debriefing has been found to be one of the most useful attributes of simulation, providing reinforcement of appropriate intervention (Gordon & Buckley, 2009; Kuhrik et al., 2008; Parker & Myrick, 2010).

Fidelity

Seropian et al. (2004), define fidelity as "precision of reproduction, the extent to which an electronic device, for example, a stereo system or television, accurately reproduces sound or images" (p. 165). The fidelity of a simulation technique can be classified as low, moderate, or high (Kuhrik et al., 2008; Seropian et al., 2004). However, according to Wang (2011) the separation of fidelity into different categories is arbitrary as technology advances. Even low fidelity simulators are becoming more realistic and high fidelity simulators can be reduced to a skill trainer as needed (Wang, 2011).

Low-fidelity simulation is less detailed, lacks realism, and is often static (Seropian et al., 2004). An individual manikin part, such as a foam-injection simulator, is an example of a low-fidelity simulator (Kuhrik et al., 2008; Weaver, 2001). Low-fidelity simulators are often used to teach specific psychomotor skills (Okuda, 2009; Seropian et al., 2004; Wang, 2011; Weaver, 2011).

Moderate-fidelity simulation is more realistic than low-fidelity simulation. VitalSim is an example of a moderate-fidelity simulation manikin that has breath sounds, heart tones, and a pulse (Seropian et al., 2004). Moderate-fidelity simulators are often used to practice psychomotor skills but lack the technology to portray realistic patient situations (Weaver, 2011).

High-fidelity simulation is the most realistic form of simulation. High-fidelity manikins not only look realistic but also respond to intervention in a realistic manner. The manikins also include additional characteristics such as chest movement, eye movement, and the ability to provide subjective information using a microphone (Brannan et al., 2008; Kuhrik et al., 2008; Parker & Myrick, 2010; Seropian et al., 2004). Several studies done on participant perception of

simulation revealed that the most important feature of simulation is realism (Gordon & Buckley, 2009; Weaver, 2011).

Simulation, in all forms, is reported to add value to many different aspects of nursing education (Askew et al., 2012; Brannan, White, & Bezanson, 2008; Goldenberg, Andrusyszyn, & Iwasiw, 2005; Gordon & Buckley, 2009; Kuhrik et al., 2008; Waxman, 2010). Kuhrik et al. (2008) described simulation as being valuable to learners as well as educators. A highly interactive environment coupled with immediate feedback provides an adult with the most effective learning opportunity. Following simulation training, educators also feel confident students are competent in the skills necessary to practice nursing (Kuhrik et al., 2008). As identified by the IOM, simulation can be used as a strategy to reduce the estimated 45,000-98,000 patient deaths each year in the U.S. related to medical errors (Rutherford-Hemming, 2012).

Sepsis

Oncology is an area of nursing that is increasing in complexity. As advancements in cancer treatment are being made and patients are living longer, we are seeing more complications of treatment (Gabriel, 2012). One complication continuing to plague cancer patients is neutropenia. Most institutions define neutropenia as an absolute neutrophil count of less than 500 (Clarke, Warnick, Stretton, & Littlewood, 2011; Hawley, Loney, & Wiece, 2001). Neutropenia can be caused by the cancer itself or the treatment. Chemotherapy agents can suppress the bone marrow's ability to produce white blood cells. However, the white blood cell counts don't reach the lowest point, or nadir, until about seven to ten days following treatment. Patients need to be closely monitored throughout treatment as morbidity and mortality increase significantly with chemotherapy-induced neutropenia (Coughlan & Healy, 2008; Demshar et al.,

2011; Hawley, Loney, Wiece, 2011). The National Cancer Institute grades neutropenia on a scale of 1-4, with one being mild and four being life-threatening (Demshar et al., 2011). Cancer-related neutropenia accounts for 60,000 inpatient admissions in the U.S. annually (Demshar et al., 2011).

Oncology patients experiencing neutropenia are at greater risk for infection than are other populations. Yet the infection can be difficult to identify due to a decreased inflammatory response as a result of fewer white blood cells (Clarke et al., 2011; Demshar et al., 2001). The most common presenting symptom of an infection in a neutropenic patient is a fever and may be the only sign until the patient has progressed to sepsis or multi-organ dysfunction syndrome (MODS) (Clarke et al., 2011; Demshar et al., 2011; Hawley et al., 2011; Kaplan, 2013). However other classic signs and symptoms of sepsis can include generally not feeling well, mental status changes, chills, hypotension, tachypnea, and tachycardia (Clarke et al., 2011; Demshar et al., 2011; Gabriel, 2012; Kaplan, 2013).

Once a neutropenic patient develops an infection, rapid deterioration can ensue (Clarke et al., 2011; Gabriel, 2012). A patient can develop sepsis, septic shock, or even die within a few short hours (Hawley et al., 2011). It is estimated that 70%-75% of acute leukemia deaths and 50% of solid tumor deaths are related to an infection caused by neutropenia (Hawley et al., 2001). Therefore, prompt recognition of febrile neutropenia and immediate intervention is crucial to patient survival.

The recommended workup for a patient with febrile neutropenia can include any or all of the following: complete blood count with differential, serum chemistries, hepatic panel, serum creatinine, blood cultures (peripheral and central line), urinalysis/urine culture, stool culture, sputum culture, and chest x-ray (Demshar et al., 2011; Gabriel, 2012; Kaplan, 2013). The goal is

to identify the microorganism causing the infection. Broad-spectrum antibiotics, such as cefepime or meropenem are to be started as soon as cultures have been drawn (Clarke et al., 2011; Demshar et al., 2011; Kaplan, 2013). Antibiotics should be started within one hour of temperature spike or identification of sepsis (Clarke et al., 2011; Kaplan, 2013). However once the microorganism has been identified, antibiotics should be adjusted accordingly. Kaplan (2013) reported that for every hour that antibiotic administration is delayed, mortality increased by 7.6%.

Infection in oncology patients can then develop into sepsis. According to Kaplan (2013) "sepsis is defined as a systemic inflammatory response to pathogenic microorganisms and associated endotoxins in the blood" (p. 287). Risk factors related to the oncology patient include: neutropenia, malignancy-related immunosuppression, chronic illness, age, long hospital stays, vascular access devices, and indwelling tubes and drains (Chernecky & Murphy-Ende, 2009; Kaplan, 2013). If the nurse suspects sepsis, a complete head-to-toe assessment and thorough history should be completed to identify the source of infection. The assessment should focus on areas of high-risk for infection such as skin, mouth, esophagus, lungs, sinuses, gastrointestinal tract, genitourinary tract and perirectal/perivaginal areas as well as any area causing discomfort (Chernecky & Murphy-Ende, 2009; Kaplan, 2013).

Some healthcare institutions have developed screening tools to guide nurses in the assessment of patients at risk for sepsis. Screening tools encourage the nurse to look at vital signs, white blood cell count, and possible sources of infection. Two or more of the following criteria plus a possible source of infection generally indicates sepsis:

- Oral temperature >100.4 or < 96.8 degrees Fahrenheit
- Heart rate >90 beats per minute

- Respiratory rate > 20 breaths per minute
- WBC count >12,000 cells/mm3 or <4,000 cells/mm3 (Kaplan, 2013; Lopez-Bushnell et al., 2014)

Screening tools can assist in the identification of signs of sepsis and prepare the nurse to report findings to the primary care provider.

Sepsis is estimated to occur in about 25% of cancer patients (Kaplan, 2013). The longer a patient is neutropenic and the more severe the neutropenia, the higher the risk for sepsis. Once sepsis is identified early intervention is imperative and should include rapid administration of intravenous fluids and antibiotics. Completing the workup listed above is also recommended if not already done. Serum lactate, indicative of tissue perfusion, may also be added to the workup (Kaplan, 2013; Lopez-Bushnell et al., 2014). Standard order sets or protocols for the treatment of sepsis can also be helpful. Order sets should address the use of medications such as vasopressors, intravenous fluids, and steroids; parameters for blood glucose, laboratory values, and blood pressure; and frequency of monitoring (Demshar et al., 2011; Lopez-Bushnell et al., 2014).

Sepsis then progresses to septic shock or "hemodynamic instability that persists despite aggressive fluid challenge" (Kaplan, 2013, p. 288). Septic shock often requires admission to the intensive care unit (ICU) for closer monitoring and aggressive management using vasopressors, inotropic agents, or ventilator support. Possible symptoms of septic shock are related to hypoperfusion and can include oliguria, confusion, dyspnea, cool and clammy skin, and insulin resistance. If not managed appropriately, septic shock leads to multiple organ dysfunction syndrome (MODS), which can lead to death without immediate intervention (Chernecky & Murphy-Ende, 2009; Kaplan, 2013).

As initially illustrated, oncology nursing is becoming more complex and patients are experiencing more complications as advancements are made. Sepsis remains one of the most common emergencies seen in oncology. Nurses must be trained to recognize early symptoms, complete a thorough history and assessment and intervene quickly in order to promote positive patient outcome.

Infusion Reaction

Hypersensitivity reactions are another potentially deadly complication that can be seen in oncology. The drugs given to treat cancer as well as the blood products given to combat the side effects of treatment place cancer patients at an increased risk for hypersensitivity reactions (Hallquist Viale & Sanchez Yamamoto, 2010; Hirayama, 202; Vogel, 2010). However, infusion reactions can present very differently in each patient. Several types of infusion reactions also exist but the most common reaction associated with drugs is Type I. Type I reactions involve an immunoglobin E mediated release of histamine and other related substances. Anaphylaxis is a severe form of Type I reactions (Hallquist Viale & Sanchez Yamamoto, 2010; Vogel, 2010). Hypersensitivity reactions can then be described as mild or severe, immediate or delayed, and uniphasic or biphasic.

Type I hypersensitivity reactions are considered true allergic reactions and account for most of the infusion reactions seen in oncology patients due to chemotherapy agents and blood products (Hallquist Viale & Sanchez Yamamoto, 2010; Vogel, 2010). When a patient is first exposed to the antigen, IgE antibodies may be produced. Upon subsequent exposure, the IgE antibodies react to the antigen causing immediate release of mediators such as histamines, leukotrienes, and prostaglandins. Release of these mediators causes many of the signs and symptoms attributed to a hypersensitivity reaction. Culprits of type I hypersensitivity reactions

include carboplatin, oxaliplatin, L-asparaginase, etc. Symptoms of a reaction generally occur within minutes after initiation of the drug. However, the reaction can occur after several cycles have already been given. Delayed reactions can also occur 10-12 hours after exposure but are not as likely (Hallquist Viale & Sanchez Yamamoto, 2010; Vogel, 2010).

Allergic reactions are less common when administering monoclonal antibodies. Non-allergic infusion reactions are the most common infusion reaction seen in patients receiving monoclonal antibodies. Monoclonal antibodies bind with antigens on the cell surface and initiate a process that will ultimately cause cell destruction. Upon cell destruction, cytokines are released into circulation, resulting in a reaction similar to a type I hypersensitivity reaction. Non-allergic reactions associated with monoclonal antibodies are generally mild-moderate, and occur with the first dose, when the tumor burden is at its highest. Management of this reaction generally consists of pharmacologic intervention as well as adjusting the rate (Hallquist Viale & Sanchez Yamamoto; Vogel, 2010).

Allergic reactions and non-allergic reactions can be described as uniphasic or biphasic. Hallquist Viale and Sanchez Yamamota (2010) describe uniphasic as "occurring while the treatment is being administered, and symptoms resolve within hours of treatment" (p. 349). Whereas biphasic "are characterized by initial symptoms of hypersensitivity that respond to therapy, with a recurrence from 1-72 hours after the apparent resolution of the symptoms" (Hallquist Viale & Sanchez Yamamota, 2010, pg 250).

The most severe hypersensitivity reaction that can occur is known as anaphylaxis (Ben-Shoshan & Clarke, 2011; Hallquist Viale & Sanchez Yamamota, 2010; Hirayama, 2012; Tinegate et al., 2012; Vogel, 2010; Zetka, 2012). The National Cancer Institute defines anaphylaxis as "an acute inflammatory reaction caused by the release of histamine and related

substances that trigger a HSR (hypersensitivity reaction) immune response and may lead to significant symptoms or death" (Hallquist Viale & Sanchez Yamamota, 2010, p 349). Quick recognition of the initial signs of a transfusion reaction and immediate intervention are required. Signs and symptoms may include fever, chills, rigor, myalgia, nausea/vomiting, hypotension, tachycardia, hives, pruritus, angioedema, dyspnea, hypoxia, hypotension, pain, and anxiety (Ben-Shoshan & Clarke, 2011; Hallquist Viale & Sanchez Yamamoto; Tinegate et al., 2012).

No matter what type of reaction, if a nurse suspects an infusion reaction, the infusion should be stopped immediately and vital signs assessed. Airway, breathing, and circulation should then be assessed while another person gathers/prepares emergency equipment. Interventions may include administration of oxygen, normal saline bolus, epinephrine, corticosteroids, histamine antagonists (diphenhydramine) and/or broncodilators. Placing the patient in a recumbent position with the lower extremities elevated can also help if the patient is hypotensive (Ben-Shoshan & Clarke, 2011; Hallquist Viale & Sanchez Yamamoto, 2010; Hirayama, 2012; Tinegate et al., 2012; Vogel, 2010; Zetka, 2012). If the patient is experiencing a severe anaphylactic reaction, additional support may be needed from a specialized team (rapid response team or resuscitation team) (Tinegate et al., 2012; Zetka, 2012). The appropriate documentation must also be completed following any type of reaction including timing and severity of the reaction, as well as drug or blood product involved (Tinegate et al., 2012; Vogel, 2010; Zetka, 2012).

Almost all chemotherapy agents and blood products have the potential to cause some sort of hypersensitivity reaction. However, only about 5% of patients receiving oncology related drugs experience a reaction (Hallquist Viale & Sanchez Yamamoto, 2010; Vogel, 2010). Hypersensitivity reactions in the oncology setting can also be very unpredictable. Some occur

immediately and uniphasic, while others can be delayed and biphasic. Therefore, in order to promote positive patient outcomes, nurses must always remain vigilant and be prepared to intervene whenever necessary.

Underlying Theory

The Adult Learning Theory (ALT) provides the foundation for this project. Malcolm Knowles believed adult learning to be more learner-focused, instead of teacher-focused, meaning the teacher doesn't simply transfer knowledge to another person (Knowles, 1980). Adults are more self-directed and problem centered. In order for learning to occur, adults need an environment that enables them to assume responsibility for their own learning and provides utility to what they are learning (Bastable, 2014; Kaufman, 2003; Knowles, 2008; Wang, 2011).

According to Kaufman (2003) and Wang (2011) the adult learning theory consists of five basic assumptions about adult learners:

1. Adults are independent and self-directed.
2. Adults have had multiple experiences throughout their lives that can provide a source of learning.
3. Adults value learning information that is immediately applicable to everyday life.
4. Adults find more motivation from internal factors (job satisfaction, self-efficacy, etc) than external.
5. Adults are more interested in problem-focused than subject-focused learning (Kaufman, 2003; Wang, 2011).

All five assumptions have implications for the way educators should plan, implement, and evaluate learning activities to best suite the adult learner (Bastable, 2014).

In fact, Knowles recommends the following seven guidelines for facilitation of adult learning:

- Establish effective learning climate where learners feel safe and comfortable expressing themselves.
- Involve learners in the mutual planning of curriculum and methods to be used.
- Involve learners in diagnosing their own needs; to promote internal motivation.
- Encourage learners to devise their own learning objectives.
- Encourage learners to identify resources and develop strategies to use the resources to meet learning objectives.
- Support learners in carrying out their learning plans.
- Involve self-evaluation by learners to promote and develop skills for critical reflection (Kaufman, 2003; Wang, 2011).

Simulation is especially suited for the education of adult nurses as it provides a safe learning environment that allows the nurse to see positive and negative outcomes of chosen interventions without harming an actual patient (Askew et al., 20012). McGaghie (1999), described simulation as "a person, device, or set of conditions which attempts to present (education and) evaluation problems authentically. The student or trainee is required to respond to the problems as he or she would under natural circumstance" (p. 129). Since adults are more problem-centered, simulation provides the ideal learning experience. Adults are able to draw on previous knowledge and experiences to assess the situation and intervene as appropriate (Kaufman, 2003; Wang, 2011). Simulation can also provide the learner the opportunity to identify the resources available such as the rapid response team and develop strategies to utilize them.

The introduction to the simulator, the facilitator, and the debriefing are also important aspects of simulation supporting the adult learning theory (Waxman, 2010). The introduction to

the simulator is important to allow the participants to become familiar with the technology and develop motivation to meet the learning objectives (Wang, 2011). Adults are motivated by the notion of being able to apply existing knowledge and skill to a problem in order to solve it (Bastable, 2014; Billings & Halstead, 2012). The facilitator is present for encouragement and guidance throughout the learning process. The facilitator must obtain a thorough understanding of the equipment and scenario prior to the activity. Supporting the learners as they devise a plan and implement it is the main role of the facilitator (Waxman, 2010). The debriefing allows the learner the opportunity to reflect on the scenario and further develop critically thinking skills. Self-reflection and feedback from the facilitator allow the learners to transfer the knowledge to clinical practice (Gordon & Buckley, 2009; Kuhrik et al., 2008; Parker & Myrick, 2010; Wang, 2001; Waxman, 2010).

CHAPTER THREE: INTERVENTION AND IMPLEMENTATION

Intervention

After reviewing literature regarding simulation related to nursing education, an opportunity to improve the education of oncology nurses was identified. The education provided to oncology nurses at a Midwest medical center, regarding oncologic emergencies, currently consists of lecture with PowerPoint as a visual aide, followed by written case studies. While lecture provides the nurse with a basic understanding of oncologic emergencies, it lacks the depth needed to ensure development of the skill and cognitive ability necessary in real-life situations. Incorporating Human Patient Simulation (HPS) scenarios into the education of oncology nurses would help fill this void.

The Midwest medical center already had a moderate-fidelity, ACLS advanced mannequin and clinical skills lab available for education. However, oncology related simulation scenarios had not been developed. A template, created by the Bay Area Simulation Collaborative (BASC), was used to guide the development of two clinical scenarios. The template highlighted key attributes of an evidence-based scenario including learning objectives, validation, prescenario learning activities, facilitation, a debriefing plan, and an assessment plan and instrument; All of which will be expanded on in this chapter (Waxman, 2010). An article explaining another institution's experience with simulation in oncology education also served as a reference during implementation of the project (Kuhrik et al., 2008).

Learning Objectives

The BASC suggest a maximum of five primary objectives be written for simulation scenarios (Waxman, 2010). Learning objectives for the simulation exercise included the following:

- Report increased confidence in individual ability to recognize and provide care for a critically ill oncology patient.
- Demonstrate competence in assessing the critically ill oncology patient.
- Demonstrate competence in prioritizing and implementing appropriate nursing interventions involving the critically ill oncology patient.
- Determine nursing's role in managing the complex needs for the critically ill oncology patient.
- Experiment using critical thinking and decision-making skills in a controlled environment.

Scenario Development/Validation

The scenarios were developed based on real patient situations. Once the scenarios were drawn up into algorithms, the scenarios were presented to oncology educators, the service educator on the inpatient oncology unit and a simulation trained clinical educator, whom reviewed them for completeness and accuracy. The oncology educators and service educator were the oncology content experts in planning the simulations. The simulation trained clinical educator was consulted for his expertise in developing and conducting a well thought out scenario (appropriate supplies, adequate facilitation, etc).

The algorithms, similar in construction to algorithms used by Kuhrik et al. (2008), provided an outline for the experience and a guide for the mannequin operator. One simulation scenario depicting sepsis was incorporated into an existing course required for all new oncology nurses, Oncology Basics (Figure 1). A second scenario depicting an infusion reaction was offered to all oncology nurses as continuing education (Figure 2). The goal of both scenarios was

to allow participants the opportunity to assess early signs of an oncologic emergency, establish priorities, and intervene.

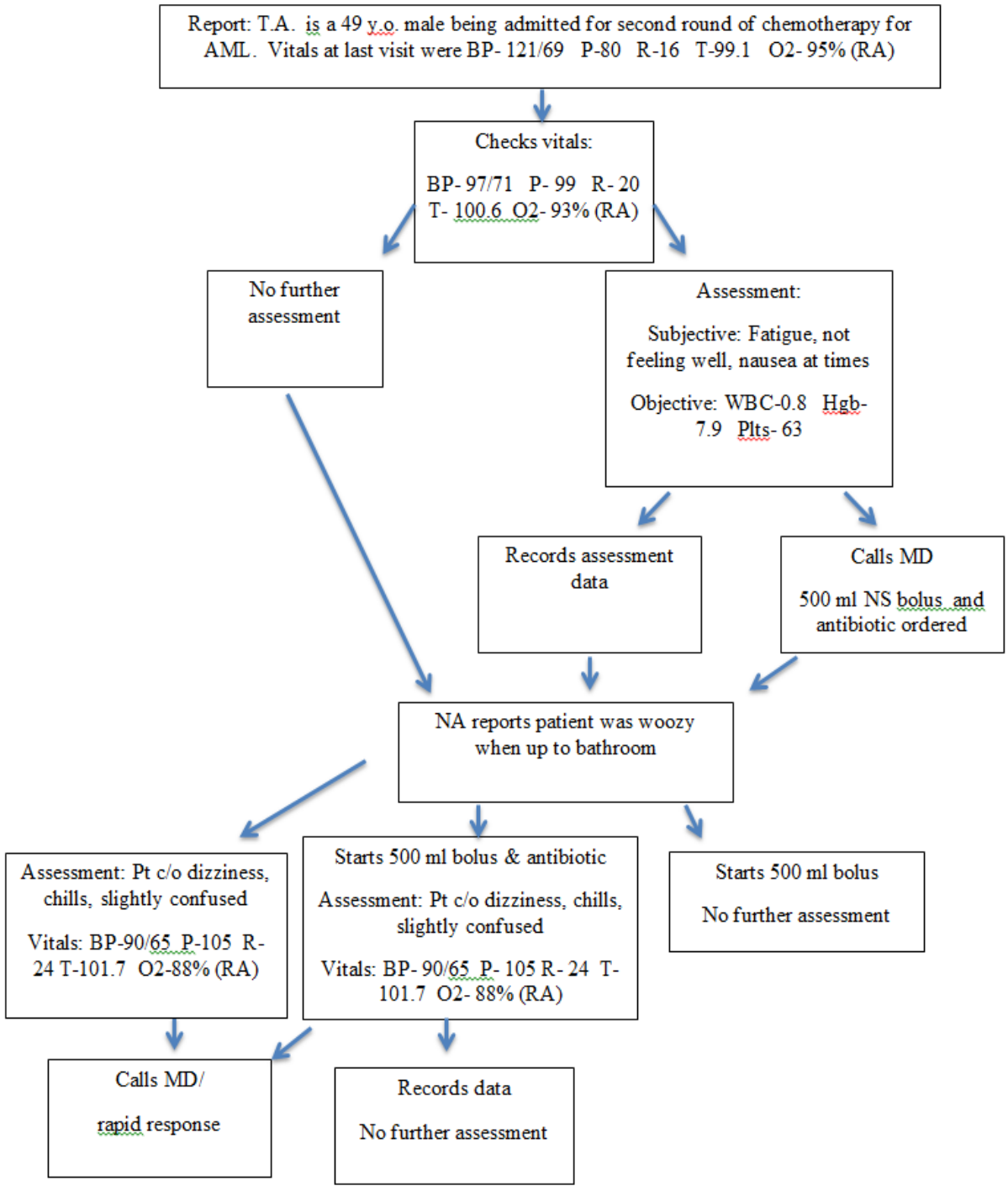

Figure 1. Sepsis Algorithm

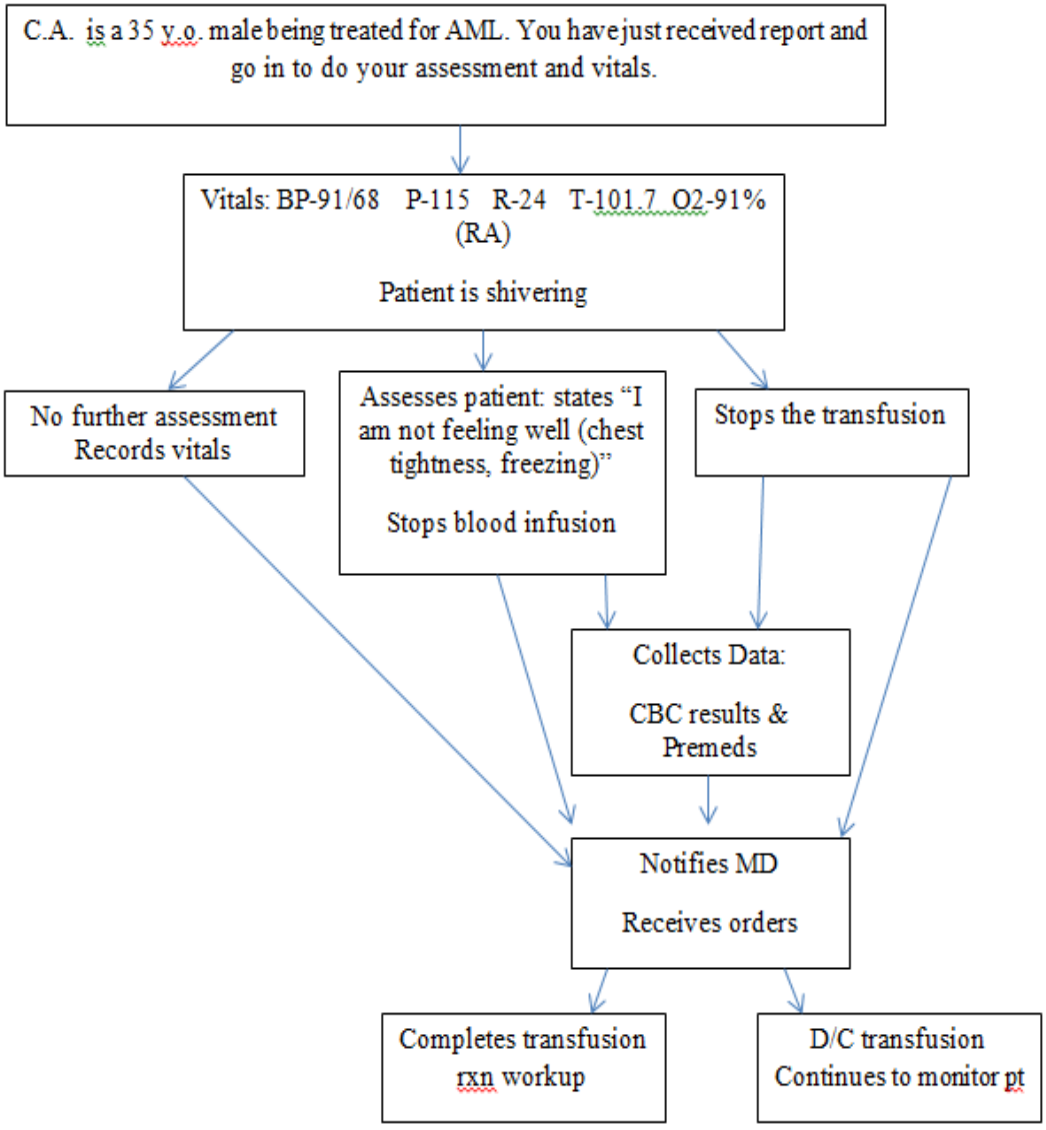

Figure 2. Infusion Reaction Algorithm

Prescenario Learner Activities

Prescenario learner activities are any psychomotor or cognitive competencies that the learner must possess prior to the simulation exercise (Waxman, 2010). The one activity the participants were to attend prior to the simulation exercise was Oncology Basics. Attendance meant the nurses had previously received information about oncologic emergencies that could be

utilized in the simulation. Allowing the learner to bridge theory with practice is one of the reasons simulation can be so beneficial (Kuhrik et al., 2008).

Facilitation

Facilitation of the simulation is key (Waxman, 2010). The facilitator was responsible for introducing the scenario, observing learner performance during the exercise and guiding the discussion following the simulation. The facilitator didn't intervene during the exercise but allowed learners to progress through the scenario. Learner actions were then discussed during the debriefing.

General Debriefing Plan

Each simulation consisted of direct and indirect participants. Direct participants were the learners that participated in the scenario as the one of the two nurses. The indirect participants were to strictly observe the scenario as it unfolded. The indirect participants were given an Observer's Tool (See Appendix D) prior to the scenario to collect their thoughts and use during the debriefing. The Observer's Tool ensured that all learners were actively engaged in the learning experience.

Upon completion of the simulation participants were taken into a separate room, where a debriefing took place. The facilitator of the scenario and operator of the mannequin/actor led the debriefing. The mannequin operator/actor had completed formal training on simulation and debriefing and was involved in all simulation education offered at the Midwent medical center. Sample questions are listed below.

- How do you think the scenario went?
- What were you thinking right away?

- How did you rule out other possible issues/diagnosis (sepsis, PE, transfusion reaction, etc)?
- What else could have been done?
- What if the patient had progressively gotten worse? What are your resources?
- Have any of you had a patient with a (transfusion rxn/sepsis)? What happened?

Debriefing is a vital part of simulation. The facilitators asked open-ended questions to uncover participant rational for actions or thoughts. Reflection allows learners the opportunity to further strengthen critical thinking skills. The process of reflection includes awareness of one's own thoughts/actions, critical analysis of the thoughts/actions, and a new perspective on the situation. The ultimate goal is that the learner will be able to utilize the new perspective in multiple situations (Dreifuerst, 2009; Lavoie, Pepin & Boyer, 2013; Waxman, 2010).

Guiding the discussion and ensuring feedback is given in a positive manner is an important part of the debriefing process (Waxman, 2010). Facilitators asked open-ended questions and listened carefully to responses while monitoring reactions. Constructive feedback was allowed. However, directions were given that all participants were to be respectful of one another making this was a safe space to explore thoughts and actions from the simulation and previous experience.

Assessment Plan and Instruments

The assessment plan consisted of a pre- and post-evaluation completed by the participants following the simulation exercise (See Appendix A and B). The evaluations were similar to ones used by another institution implementing simulation into oncology education. Nancy S. Kuhrik, MSN, PhD, RN granted permission to use the evaluations with minor edits

(See Appendix I). The statements on the evaluations reflect learning objectives chosen during development of the scenario.

1. I feel confident in my ability to recognize and provide care for a critically ill oncology patient.
2. I feel competent in quickly assessing critically ill oncology patients.
3. I am able to prioritize the complex needs of the oncology patient.
4. I feel competent in implementing appropriate nursing care for critically ill oncology patients.
5. I know my role as a member of the health care team that manages the complex needs of the critically ill oncology patient.
6. I was able to test my critical thinking and decision-making skills in a controlled environment.
7. I would recommend continued use of Human Patient Simulation for all nurses to further develop their clinical expertise in caring for the critically ill oncology patient.

The statements listed above were evaluated using a five-point Likert scale, with five being the most positive and one the least positive. Participants were also asked two short answer questions, listed below.

8. What part of the simulation was most helpful?
9. Suggestions to improve the effectiveness of this educational activity.

Sample

The desired population chosen for participation in this project was oncology nurses at the medical center. The sampling method was convenience as the participants in the project were the attendees of Oncology Basics and the nurses who choose to participate in continuing education.

Nine oncology nurses took part in the simulation exercise incorporated into Oncology Basics. Nine additional nurses participated in the simulation exercise offered as continuing education.

Implementation

The first step towards introducing simulation into the education of oncology nurses was gaining organizational support from the oncology education department manager, as well as the director of the inpatient oncology unit. The Center for Learning was also consulted regarding use of simulation equipment and laboratory space. Approval from the Institutional Review Board at North Dakota State University and Sanford Health was obtained prior to beginning the project (See Appendix G and H).

Once the evidence-based clinical scenarios, involving sepsis and an infusion reaction, were developed they were given to the operator of the simulation laboratory. The operator had completed the training necessary to program the simulator and assist in scenarios. He assisted in the operation of the manikin as well as the debriefing of the simulation participants.

The simulation scenario depicting sepsis was incorporated into Oncology Basics. The scenario lasted about fifteen minutes and the debriefing about twenty-five minutes. A moderate fidelity mannequin was used to portray the patient. Participants were given a brief backstory on the patient as well as a description of the expectations during the scenario (assessment, prioritization, implementation of interventions). Then the two nurses were taken into the skills laboratory that was set up like a patient room with many of the supplies that the nurses may need such as a stethoscope, vitals machine, intravenous pump, etc. They were to interact with the mannequin as if it was a real patient and ignore the facilitator in the room. The operator of the mannequin sat behind a screen and programed the mannequin according to the algorithm including vital signs, lung sounds, verbal responses, etc. The indirect participants were in a

separate room watching the scenario via webcam while completing the observer's tool. Once the scenario was complete the nurses were brought back into the room where the indirect participants were observing to debrief.

All learners were involved in the simulation scenario as either a direct participant or an indirect participant (observer). However, participation in the project was optional. Informed consent, as shown in Appendix C, was explained to participants prior to the scenario. Completion of the pre-evaluation and post-evaluation signified voluntary consent.

The simulation scenario depicting an infusion reaction was offered as optional continuing education. The scenario took about ten to fifteen minutes each time and debriefing twenty to twenty-five minutes. The scenario was run very similar to the sepsis scenario except an actor (clinical educator with simulation training) portrayed the patient as the mannequin lacked the ability to shiver.

All learners were involved in the simulation scenario as either a direct participant or an indirect participant (observer). The scenario was run a total of four times on two separate times, two separate days to accommodate various schedules. The education was advertised in all Oncology areas of the hospital and encouraged by leadership. Nurses who completed the simulation exercise and debriefing were asked to complete the pre- and post-evaluation as part of this project. Completion of the surveys was optional and signified voluntary consent.

CHAPTER FOUR: RESULTS

Analysis

The pre-evaluation consisted of five questions regarding the participant's confidence and competence in caring for a critically ill oncology patient. The post-evaluations consisted of the same five questions as well as an additional four questions about the simulation exercise itself. Pre- and post-evaluations were kept confidential. No identifying information was collected. The pre- and post-evaluations were stapled together so the investigator could identify changes from pre-evaluation to post-evaluation. Descriptive statistics were used to analyze the results.

Results

The first statement on the pre- and post-evaluation was "I feel confident in my ability to recognize and provide care for a critically ill oncology patient." When comparing pre-evaluation to post-evaluation, 56% (n-10) of participant responses remained the same from pre- to post-evaluation, 39% (n-7) improved, and 6% (n-1) decreased, as seen in Figure 3.

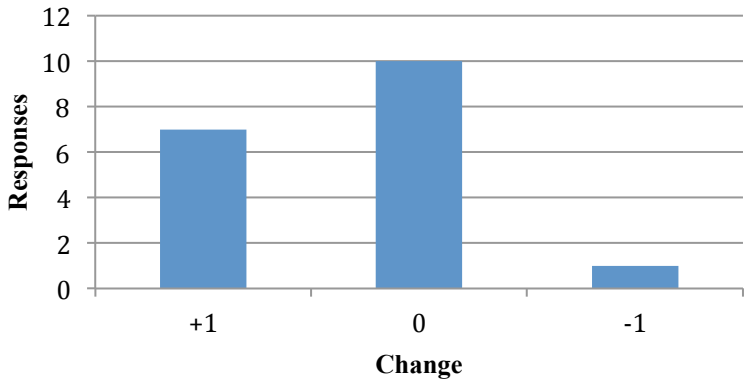

Figure 3. Confidence

The second statement on the pre- and post-evaluations was "I feel competent in quickly assessing critically ill oncology patients. When comparing pre-evaluation to post-evaluations,

50% (n-9) of participant responses remained the same from pre- to post-evaluation, 44% (n-8) improved, and 6% (n-1) decreased, as seen in Figure 4.

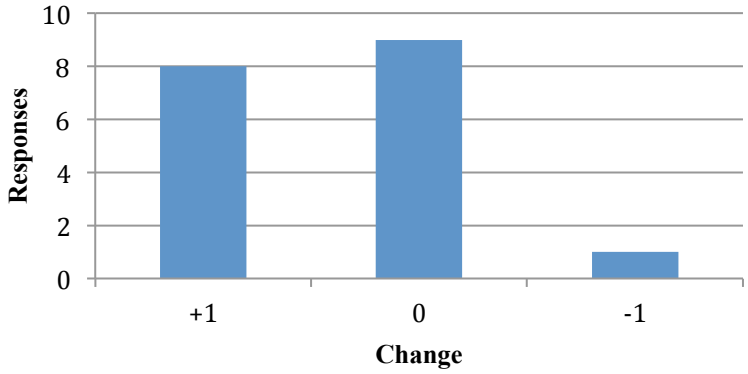

Figure 4. Competence with Assessment

The third statement on the pre- and post-evaluations was "I am able to prioritize the complex needs of the oncology patient." When comparing pre-evaluation to post-evaluations, 56% (n-10) of participant responses remained the same from pre- to post-evaluation, while 44% (n-8) improved, as seen in Figure 5.

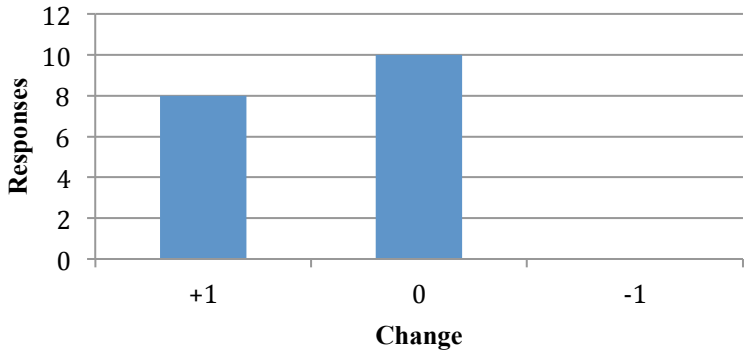

Figure 5. Prioritization

The fourth statement on the pre- and post-evaluations was "I feel competent in implementing appropriate nursing care for critically ill oncology patients." When comparing pre-

evaluation to post-evaluations, 78% (n-14) of participant responses remained the same from pre- to post-evaluation, while 22% (n-4) improved, as seen in Figure 6.

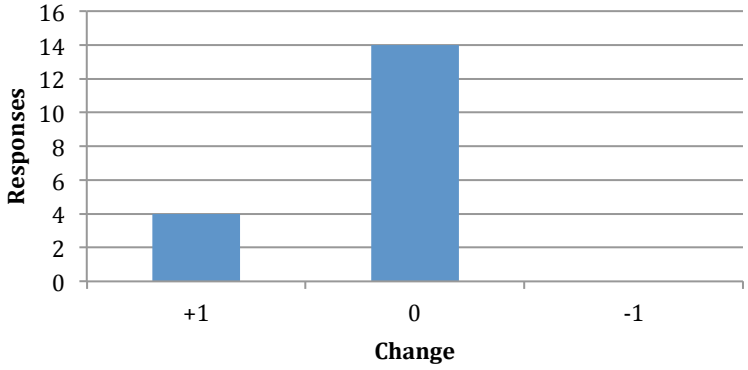

Figure 6. Competence with Interventions

The fifth statement on the pre- and post evaluations was "I know my role as a member of the health care team that manages the complex needs of the critically ill oncology patient." When comparing pre-evaluation to post-evaluations, 72% (n-13) of participant responses remained the same from pre- to post-evaluation, 22% (n-4) improved, and 6% (n-1) decreased, as seen in Figure 7.

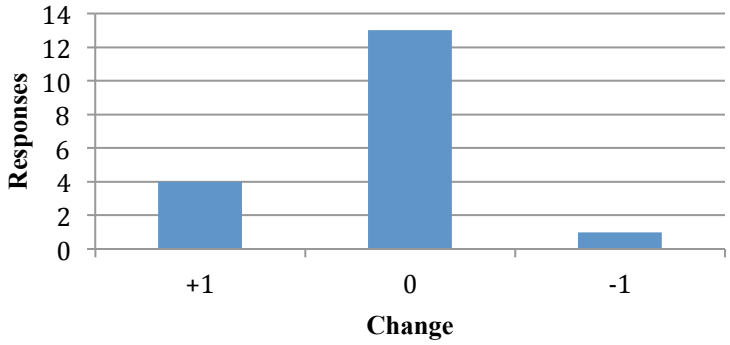

Figure 7. Knowledge of Role

The mean rating was also calculated for each of the statements. The mean increased from pre- to post-evaluation for each statement. Means are displayed in Table 1.

Table 1. Mean Ratings

	Pre-evaluation Mean	Post-evaluation Mean
Confidence	3.72	4.11
Competence in assessment	3.78	4.33
Prioritization	3.83	4.17
Competence in intervention	4	4.22
Knowledge of role	4.06	4.17
Tested critical thinking and decision-making	*	4.22
Recommend future use	*	4.33
*Only on the post-evaluation		

The next two statements on the post-evaluations pertained to the simulation exercise itself. When asked if the exercise allowed the learner the opportunity to test critical thinking and decision-making skills in a controlled environment, 33% (n-6) strongly agreed, 56% (n-10) agreed, and 11% (n-2) were neutral (as seen in Figure 8). When asked if they would recommend continued use of Human Patient Simulation in the future, 39% (n-7) strongly agreed, 56% (n-9) agreed, and 6% (n-1) was neutral (as seen in Figure 9).

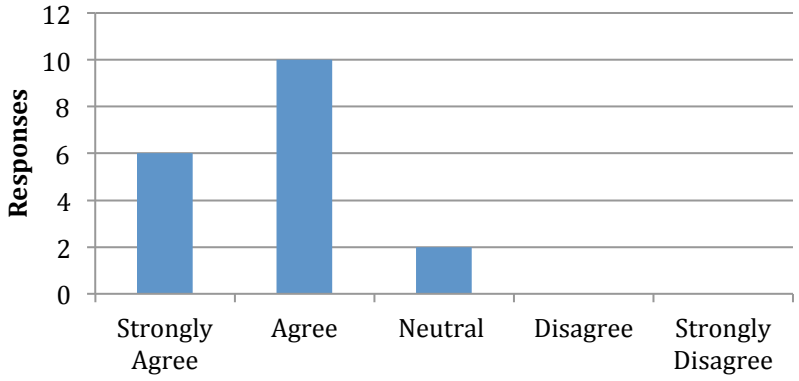

Figure 8. Tests Critical Thinking and Decision-Making

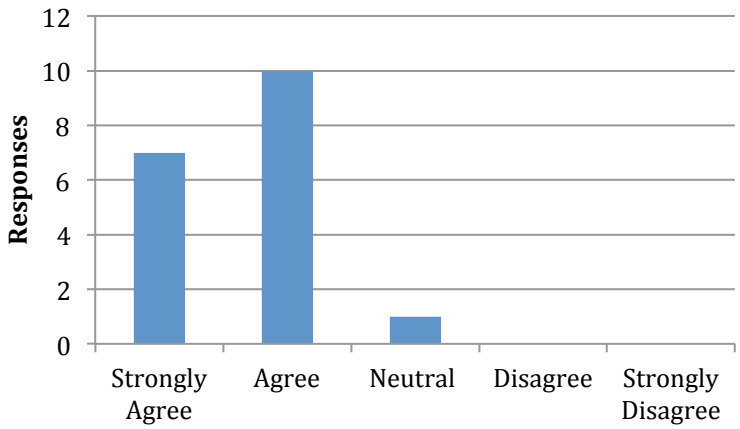

Figure 9. Recommend for Future Use

Participants were also asked what the most helpful part of the simulation was. More than half the participants commented on the debriefing as being the most helpful. Other comments included, "It's helpful to do high stress scenarios in a low stress situation" and "Being exposed to a very possible emergency that doesn't happen frequently while working." Overall, the comments were very positive and participants agreed that simulation should be used more in the future as a teaching strategy for oncology nurses.

CHAPTER FIVE: DISCUSSION

The purpose of this project was to examine oncology nurses' perception of simulation as a teaching strategy in the practice setting. Two scenarios were developed to allow the oncology nurse an opportunity to assess early signs of an oncologic emergency, establish priorities, and intervene. Pre- and post-evaluations completed by the participants were compared to determine if simulation affected individual's confidence or perceived competence. Participants were also asked a few questions regarding the simulation itself. Chapter V provides of interpretation of the results, limitations of the study, implications for nursing education, and recommendations for further research.

Interpretation

When comparing the mean rating for each of the first five questions, pre-evaluation to post-evaluation, a positive increase is shown. The findings are not statistically significant, due to small sample size. However, the findings indicate the simulation overall had a positive effect on the participants' confidence/competence as an oncology nurse.

Changes in individual evaluations were also examined. At least half of the participant responses remained the same, from pre- to post-evaluation, for each question. However, of the evaluation responses that remained the same, about 20-38% rated their confidence/competence at a five (strongly agree) on the pre-evaluation (See Table 2), therefore not allowing for any improvement. The high initial ratings could have been influenced by years of experience and/or belief that he or she should be "experts" in oncology.

Table 2. Analysis of Unchanged Responses

	Responded the same from pre- to post-evaluation	Rated 5 on pre-evaluation	Percentage
Confidence	10	3	30%
Competence in assessment	9	3	33%
Prioritization	10	2	20%
Competence in intervention	14	4	29%
Knowledge of role	13	5	38%

When examining individual questions for a change in rating, some questions seemed to evoke a more positive change than others. For instance, 44% of participants rated their competence in assessment and ability to prioritize as higher following the simulation. The simulation and debriefing discussion reflected a similar notion, as many of the nurses were able to assess the patient and prioritize concerns. In all of the simulations completed, the nurses were able to deduce the oncologic emergency (sepsis or infusion reaction) that was being displayed and prioritize needs of the patient.

Only 22% of participants rated their competence in implementing nursing interventions and knowledge of role on health care team as higher following the simulation. Some participants were unsure of all steps involved in completing an infusion reaction work-up during the simulation. The simulation allowed for interaction with the "physician." However, no other disciplines were involved (i.e. Respiratory Therapy, Pharmacy, etc).

About 39% of participants rated their confidence in ability to recognize and provide care for a critically ill oncology patient as higher following the simulation. According to Komprood (2013), many practicing oncology nurses "lack confidence in their oncology nursing skills" (p.

E22), and oncology simulation can promote mastery of skills and ultimately increase a nurse's confidence.

Over half the participants listed debriefing as the most helpful part of the simulation. Gordon and Buckley (2009) received a similar response. Participants rated debriefing as the most useful aspect of simulation (Gordon & Buckley, 2009).

Overall, the simulation was positively received. Almost all participants agreed that Human Patient Simulation should be continued in the future, as it was an opportunity to test critical thinking and decision-making in a controlled environment. Leadership and the oncology education department also supported the continued use of simulation in the education of oncology nurses.

Limitations

Several limitations were identified in this project. Eighteen oncology nurses participated in a simulation and completed the surveys. Currently approximately one hundred oncology nurses are employed at the medical center. However, the shifts that are worked vary and it can be difficult for nurses to attend education. No nurses from outside the facility participated in the project. Therefore, the results are not generalizable due to sample size and sampling method.

Two oncologic emergency scenarios were run a total of four different times. Many other oncologic emergencies exist that could have been developed. Increasing the number of times they were offered may have also increased the amount of data collected.

The evaluations were simple surveys using a five point Likert scale to evaluate participants' perception of their confidence and competence. A very similar instrument has been used before. However, reliability of the instrument has not been tested.

Demographic data was not collected. Therefore, a way to evaluate whether characteristics such as amount of experience had any influence on response ratings doesn't exist. Also, the data was mostly quantitative. The findings could have been more beneficial with the addition of qualitative data from a focus group following the simulation.

Implications

Oncology nursing can be very challenging due to the nature of the disease and the effects of the treatments (Askew et al., 2012; Demshar et al, 2011). However, many nurses entering oncology may be unprepared to navigate such a complex environment. Novice nurses or experienced nurses transferring to oncology may have yet to experience firsthand the early signs and symptoms of an oncologic emergency, and therefore lack the confidence and skill necessary to intervene.

Simulation is a teaching strategy that appeals to the attributes of the adult learner. Simulation is a problem-focused learning experience that allows the learner to draw on past experience in development of a new perspective that can be applied to their daily practice. The safe environment combined with feedback and reflection provides an ideal learning environment (Wang, 2011).

The benefits of simulation in nursing education are well documented to include providing a safe environment, increasing confidence, allowing for reflection, providing immediate feedback, and enhancing cognitive, psychomotor, and communication skills (Askew et al., 2012; Brannan, White, & Bezanson, 2008; Goldenberg, Andrusyszyn, & Iwasiw, 2005; Gordon & Buckley, 2009; Kuhrik et al., 2008; Waxman, 2010). Implementing simulation into the education of oncology nurses could help ensure nurses feel more prepared and confident in their abilities to assess the critically ill oncology patient and intervene appropriately.

Overall the participants of the project recommended that simulation continue to be offered as a teaching strategy for oncology nurses. Additional scenarios such as chemotherapy spill and extravasation have been recommended. Annual competency evaluation will likely be accomplished with chemotherapy spill simulations in the coming year, providing additional value to its use.

Recommendations

A plethora of literature exists regarding the use of simulation in the education of nurses (Brannan et al., 2008; Goldenberg et al, 2005; Gordon & Buckley, 2009; Kim, Ko, & Lee, 2012; Lavoie, Pepin, & Boyer, 2013; Seropian et al, 2004; Waxman, 2010). However, literature is scarce related to the use of simulation in the education of oncology nurses. Continued efforts ought to be made to strengthen the education of oncology nurses. Simulation is one teaching strategy that offers nurses the opportunity to bridge theory with practice (Kuhrik et al., 2008; Seropian et al., 2004; Wasman, 2010).

Small sample size of this project limits the generalizability of the findings. Therefore, a larger study of the population, including oncology nurses from other facilities, may be more beneficial. The results of the project could also be more appealing if the evaluation following the simulation focused more on knowledge or skill acquisition. Evaluating staff competency during the simulation with formal checklists or following the simulation, in practice, may yield more robust findings.

Future simulations could also be more beneficial if involving other members of the interdisciplinary team such as pharmacy, respiratory therapy, etc. Involving more team members would help the participants develop a better understanding of their role on the healthcare team as well as encourage collaboration with other disciplines. Involving interdisciplinary team members

in the planning/development of the scenarios may also be beneficial as it provides additional expertise to ensure quality.

Conclusion

As the number of people over the age of 65 increases, the incidence of cancer increases. The need for specialized nursing care for these patients remains at an all time high. Simulation is an evidence-based teaching strategy that allows oncology nurses the opportunity to test their knowledge and skill in a safe environment. Ultimately this project illustrates some of the perceived benefits of simulation in the education of oncology nurses, from the front line staff themselves.

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APPENDIX A: PRE-EVALUATION

{Oncologic Emergency or Infusion Reaction} Simulation

1. I feel **confident** in my ability to recognize and provide care for a critically ill oncology patient.
5= Strongly Agree 4=Agree 3=Neutral 2=Disagree 1=Strongly Disagree

2. I feel competent in quickly assessing critically ill oncology patients.
5= Strongly Agree 4=Agree 3=Neutral 2=Disagree 1=Strongly Disagree

3. I am able to prioritize the complex needs of the oncology patient.
5= Strongly Agree 4=Agree 3=Neutral 2=Disagree 1=Strongly Disagree

4. I feel competent in implementing appropriate nursing care for critically ill oncology patients.
5= Strongly Agree 4=Agree 3=Neutral 2=Disagree 1=Strongly Disagree

5. I know my role as a member of the health care team that manages the complex needs of the critically ill oncology patient.
5= Strongly Agree 4=Agree 3=Neutral 2=Disagree 1=Strongly Disagree

APPENDIX B: POST-EVALUATION

{Oncologic Emergency or Infusion Reaction} Simulation

1. I feel **confident** in my ability to recognize and provide care for a critically ill oncology patient.
5= Strongly Agree 4=Agree 3=Neutral 2=Disagree 1=Strongly Disagree

2. I feel competent in quickly assessing critically ill oncology patients.
5= Strongly Agree 4=Agree 3=Neutral 2=Disagree 1=Strongly Disagree

3. I am able to prioritize the complex needs of the oncology patient.
5= Strongly Agree 4=Agree 3=Neutral 2=Disagree 1=Strongly Disagree

4. I feel competent in implementing appropriate nursing care for critically ill oncology patients.
5= Strongly Agree 4=Agree 3=Neutral 2=Disagree 1=Strongly Disagree

5. I know my role as a member of the health care team that manages the complex needs of the critically ill oncology patient.
5= Strongly Agree 4=Agree 3=Neutral 2=Disagree 1=Strongly Disagree

6. I was able to test my critical thinking and decision-making skills in a controlled environment.
5= Strongly Agree 4=Agree 3=Neutral 2=Disagree 1=Strongly Disagree

7. I would recommend continued use of Human Patient Simulation for all nurses to further develop their clinical expertise in caring for the critically ill oncology patient.
5= Strongly Agree 4=Agree 3=Neutral 2=Disagree 1=Strongly Disagree

8. What part of the simulation was most helpful?

9. Suggestions to improve the effectiveness of this educational activity

APPENDIX C: INFORMED CONSENT

NDSU North Dakota State University
Nursing Department
PO Box 6050
Fargo, ND 58108-6050
701-231-7395

Title of Research Study: Implementing Simulation into Oncology Education

This study is being conducted by:

Norma Kiser-Larson	Megan Hills
Associate Professor at NDSU	NDSU Graduate Student
Norma.kiser-larson@ndsu.edu	Megan.r.halvorson@ndsu.edu
701-231-7775	701-520-1945

Why am I being asked to take part in this research study?
Participants in this project will be nurses attending Oncology Basics in August or November 2014.

What is the reason for doing the study?
The purpose of the project is to improve the education provided to oncology nurses at Sanford by allowing them the opportunity to assess signs of an oncologic emergency, critically think and establish priorities, and intervene.

What will I be asked to do?
Participants will be asked to complete a pre-evaluation prior to completing the simulation exercise and then a post-evaluation after participating in the simulation.

Where is the study going to take place, and how long will it take?
It will take place in the classroom (3-1 in the Center for Learning) during Oncology Basics.

What are the risks and discomforts?
There is potential for a minimal amount of anxiety while participating in the simulation scenario. However, there will be instruction prior to the simulation to increase the participant's familiarity/comfort with the scenario as well as constructive feedback following the exercise.

What are the benefits to me?
Following the simulation exercise, participants shall have a better understanding of the presentation of each oncologic emergency presented as well as how to appropriately intervene. Participating in the exercise and receiving constructive feedback should improve the nurse's comfort and confidence in caring for a critically ill oncology patient.

Do I have to take part in the study? Your participation in this research is your choice. If you decide to participate in the study, you may change your mind and stop participating at any time without penalty or loss of benefits to which you are already entitled.

What are the alternatives to being in this research study?
If you should choose not to participate in this research study, you will not be required to complete the pre- and post-evaluations.

Who will see the information that I give?
This study is anonymous. That means that no one, not even members of the research team, will know that the information you give comes from you.

What if I have questions?
Before you decide whether to accept this invitation to take part in the research study, please ask any questions that might come to mind now. Later, if you have any questions about the study, you can contact the researcher, Norma Kiser-Larson or Megan Hills (contact information listed above)

What are my rights as a research participant?
You have rights as a participant in research. If you have questions about your rights, or complaints about this research,you may talk to the researcher or contact the NDSU Human Research Protection Program by:

- Telephone: 701.231.8908 or toll-free 1.855.800.6717
- Email: ndsu.irb@ndsu.edu
- Mail: NDSU HRPP Office, NDSU Dept. 4000, PO Box 6050, Fargo, ND 58108-6050.

The role of the Human Research Protection Program is to see that your rights are protected in this research; more information about your rights can be found at: www.ndsu.edu/irb .

Documentation of Informed Consent:
You are freely making a decision whether to be in this research study. Completing the evaluations means that

1. you have read and understood this consent form
2. you have had your questions answered, and
3. you have decided to be in the study.

APPENDIX D: INDIRECT PARTICIPATION TOOL

What do you think is wrong with Corey?

What assessment data led you to think this?

How would you intervene?

What did the nurse do well?

What else could have been done?

APPENDIX E: SANFORD IRB APPROVAL LETTER

SANFORD HEALTH

July 10, 2014

PI: Norma Kiser- Larson, Ph.D.
Project: 03-14-077 Implementing Simulation into Oncology Education

The study submission for the proposal referenced above has been reviewed via the procedures the Sanford Health Institutional Review Board.

The activities described in your application are intended to contribute to quality improvement / assessment. Based on these findings, the project proposal does not meet the definition or regulatory requirements for human subject research. If in the future, you decide to collect information with the intent to develop or contribute to generalizable knowledge, you will be required to submit an application to the IRB for prospective review.

Please maintain a copy of this letter in your study file for documentation that your study does not meet the regulatory requirements for human subject's research.

Sincerely,

Deb Langstraat, CIP
Director-Sanford IRB

Sanford Health Human Research Protection Program, Route #5033 • 1305 W. 18th Street • Sioux Falls SD 57117-5039 • P 605-312-6430

APPENDIX F: NDSU IRB APPROVAL LETTER

NDSU NORTH DAKOTA STATE UNIVERSITY

August 26, 2014

Dr. Norma Kiser-Larson
Nursing
Sudro 222C

Re: IRB Certification of Exempt Human Subjects Research:
Protocol #PH15027, "Implementing Simulation Into Oncology Education"

Co-investigator(s) and research team: Megan Hills

Certification Date: 8/26/14 Expiration Date: 8/25/17
Study site(s): Sanford Health
Sponsor: n/a

The above referenced human subjects research project has been certified as exempt (category # 1) in accordance with federal regulations (Code of Federal Regulations, Title 45, Part 46, Protection of Human Subjects). This determination is based on protocol materials (received 8/26/14).

Please also note the following:
☐ If you wish to continue the research after the expiration, submit a request for recertification several weeks prior to the expiration.
☐ The study must be conducted as described in the approved protocol. Changes to this protocol must be approved prior to initiating, unless the changes are necessary to eliminate an immediate hazard to subjects.
☐ Notify the IRB promptly of any adverse events, complaints, or unanticipated problems involving risks to subjects or others related to this project.
☐ Report any significant new findings that may affect the risks and benefits to the participants and the IRB.

Research records may be subject to a random or directed audit at any time to verify compliance with IRB standard operating procedures.

Thank you for your cooperation with NDSU IRB procedures. Best wishes for a successful study.
Sincerely,

Kristy Shirley
Digitally signed by Kristy Shirley
DN: cn=Kristy Shirley, o=NDSU, ou=SPA, email=kristy.shirley@ndsu.edu, c=US
Date: 2014.08.26 15:33:49 -05'00'

Kristy Shirley, CIP, Research Compliance Administrator

For more information regarding IRB Office submissions and guidelines, please consult www.ndsu.edu/irb. This Institution has an approved FederalWide Assurance with the Department of Health and Human Services: FWA00002439.

INSTITUTIONAL REVIEW BOARD
NDSU Dept 4000 | PO Box 6050 | Fargo ND 58108-6050 | 701.231.8995 | Fax 701.231.8098 | ndsu.edu/irb
Shipping address: Research 1, 1735 NDSU Research Park Drive, Fargo ND 58102

APPENDIX G: INSTRUMENT PERMISSION

Megan,
Thank you for your interest in our articles and your request to use our pre- and post-evaluation tools. Feel free to adapt them as you need to in order to make them meaningful to your human simulation research.

Best of luck to you as you pursue your scholarly endeavors.

All best,
Nancy Kuhrik, RN, MSN, PhD
Marilee Kuhrik, RN, MSN, PhD