Research Article

Too anxious to learn? should the ongoing debriefing technique be amongst the best practices in simulation?

Abstract

Aim: The aim of this capstone project was to demonstrate benefit of the Ongoing Simulation Debriefing Technique on lowering anxiety levels amongst those participating in simulation activities. Ongoing Simulation Debriefing Technique is a method by which simulation participants, who are viewing simulations, are guided by a knowledgeable debriefer while the simulation is occurring.

Introduction: It has been established that moderate levels of stress are necessary for effective learning. In contrast, excessive stress and anxiety can not only impair but hinder psychomotor performance. There is scientific evidence that a relationship exists between high levels of stress in simulation and poor performance. However, the degree of stress and effects on learning and performance produced by simulation in Certified Registered Nurse Anesthetist (CRNA) training programs are unknown. In addition, it is unknown if these effects might affect their behaviors in future clinical settings.

Method: After IRB approval, the pre-simulation/post-simulation anxiety levels were evaluated in first year nurse anesthesia students (n=26) in three different scenarios using State Trait Anxiety Inventory (STAI). Students were divided into two groups - Control group (End Debriefing) and Experimental group (Ongoing Simulation Debriefing Technique). Both groups were exposed to identical simulations of increasing scenario complexity with the last scenario being the most difficult and complex (pediatric induction). The data were collected from 2012 to 2013.

Results: A quasi-experimental design was used to collect research data and analyzed for validity and significance utilizing SPSS and T–test analysis. The anxiety levels were reduced in both control and experimental groups post simulation as compared to their pre simulation values as evident by STAI scores. The overall mean STAI scores were reduced by 15.21 and 21.81 percentage points, respectively, in control and experimental groups. The difference between means was statistically significant (P < 0.001).

Conclusion: Ongoing Simulation Debriefing Technique reduces stress and anxiety levels generated by simulation more than when using the End-Debriefing Technique. The Ongoing Simulation Debriefing Technique creates a safer learning environment in which students can maximize their learning potential. This technique should be considered as a best practice for Simulation Based Learning with adults. This method has shown to exhibit more confidence in students but more research is needed to determine its implications on performance in the clinical setting.

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Introduction

Gaba[1] has defined simulation as a " ...technique, not a technology, to replace or amplify real experiences with guided experiences, often immersive in nature, that evoke or replicate substantial aspects of the real world in a fully interactive fashion". Simulation-based learning has been looming on the margins of health professions education for many years. Recently, insightful health professionals and their engineering and computer science colleagues have been developing increasingly sophisticated virtual learning environments. Educators, versed in simulation techniques, have laid the foundation for a curriculum framework that removes a considerable amount of the angst and mystery associated with incorporating simulation into health professions education. Nurse anesthesia has been an early adopter of simulation as it provides a rich learning environment for the development of practice competencies.

The goal of simulation is to replicate patient care scenarios in a realistic environment for the purpose of feedback, self-reflection, and assessment. Properly conducted simulation creates an ideal educational environment because learning activities can be made to be predictable, consistent, standardized, and reproducible. With all these overwhelming benefits, it seems counterintuitive to think that simulation may have a downside. It should be noted that learning by simulation does not fit all adults in terms of best learning styles. In some situations, simulation may not be the best method for teaching adult learners. Simulation, because of the complexity involved can be highly stressful for some learners.

It is vital that we create safe learning environments in which students can maximize their learning potential. As anesthesia simulation is increasingly a major component of the curriculums in Nurse Anesthesia Training Programs across the country, there is a need to evaluate the learner experience. While simulation has proven educational benefits, little is known about possible negative effects on adult learners.

The purpose of this capstone project was to investigate the effects of Ongoing Simulation Debriefing Technique in Simulation-

Based-Education (SBE) on Nurse Anesthesia Residents (NAR's) in the Program of Nurse Anesthesia at Samuel Merritt University. It is hypothesized that in certain individuals, the stress and anxiety levels produced by simulation may not be conducive to their learning. Data on stress and anxiety levels will be collected on a control group and an experimental group. The experimental group will participate in simulation activities using an Ongoing Simulation Debriefing Technique. The State Trait Anxiety Inventory (STAI) will be used as the tool to collect primary stress and anxiety data. This tool will be described and then reviewed for its validity and reliability. Further, the Lazarus Coping Model will be described. This model gives credence to the use of the Ongoing Simulation Debriefing Technique to reduce stress and anxiety in adults.

A proposal is being made to utilize the Ongoing Simulation Debriefing Technique in all mannequin-based simulations in first year anesthesia residents. This recommendation is made in an effort to reduce stress and anxiety, enhance the adult learning experience, and improve learning outcomes. Lastly, recommendations will be made for best practices for adult learners with future simulation implementation and opportunities for future research will be proposed (Appendix A).

Population of interest

"A nurse anesthetist, or certified registered nurse anesthetist (CRNA), is a licensed professional nurse who provides the same anesthesia services as an anesthesiologist (MD). After completing extensive education and training, CRNAs become nationally certified and may then practice in all 50 states.[2] Nurse anesthetists, the first healthcare providers dedicated to the specialty of anesthesia, have their roots in the 1800s, when nurses first gave anesthesia to wounded soldiers on the battlefields of the Civil War.[3] CRNAs provide anesthetics to patients in every practice setting, and for every type of surgery or procedure. CRNAs are the only anesthesia providers in more than two-thirds of all rural hospitals in the U.S. and they administer approximately 30 million anesthetics to patients nationwide each year.[2] Further, CRNA's are the main providers of anesthesia to the men and women serving in the U.S. Armed Forces.[3] Training programs to become a CRNA are rigorous.

"It takes a minimum of seven calendar years of education and experience to prepare a CRNA. The average student nurse anesthetist completes almost 2,500 clinical hours and administers about 850 anesthetics. More than 2,000 student nurse anesthetists graduate each year and go on to pass their certification examination. Nurse anesthetists were among the first specialty nurses to require continuing education. CRNAs must be recertified every two years, which includes meeting practice requirements and obtaining a minimum of 40 continuing education credits.[3]

The first known organized program in nurse anesthesia education was offered in 1909 in Portland Oregon. As of October 2011, there are as many as 113 nurse anesthesia programs with more than 1,800 clinical sites across the United States. These programs are affiliated with or operated by the school of nursing or health sciences department of a university.[3]

The Problem

In recent years, many anesthesia-training programs have incorporated simulation training into their curricula.[4] The use of simulation training has demonstrated benefits in developing students' critical thinking abilities as well as building clinical competence.[5]

On the other hand, simulation training is known to raise anxiety and stress levels amongst students, which may have a negative impact on their learning.[6] It has been established that moderate levels of stress are necessary for effective learning.[7] Anesthesia education is highly stressful.[6] Some stress motivates students, but excess stress leads to failure and unhappiness.[6] While stress cannot be eradicated from the practice of anesthesia, it can be managed, especially when its signs are recognized early.[8]

There are many new questions arising regarding the amount of stress and anxiety produced from anesthesia simulation. Are there unsafe levels of stress and anxiety produced in student nurse anesthetists participating in simulation activities? Chiffer-McKay et al.[9] were interested in the relationship between stress, anxiety and performance in simulation based training amongst nurse anesthesia students. In their prospective, descriptive research design, they found a statistically significant correlation between simulation and higher levels of stress and anxiety. The effect of this extra-added stress is unknown.

The degree of stress and effects on learning and performance, produced by simulation, in Certified Registered Nurse Anesthetist (CRNA) training programs, are unknown.[10] The effect of the Ongoing Simulation Debriefing Technique is the focus of this paper. Specifically, the paper will investigate the effect this technique has, if any on lowering stress and anxiety levels amongst those participating in simulation activities at the Samuel Merritt University in the Program of Nurse Anesthesia. Research findings found in the longitudinal cohort questionnaire survey from Moffat et al.[11] showed that stress and anxiety levels were high in graduate school students. "Graduate students experiencing depression: overall graduate student = 20%, medical school student = 41%, Nurse Anesthesia Resident = 51%. Stress amongst Nurse Anesthesia Residents is "high".[11] Moffat's study was conducted in 2005, before simulation really became more prevalent as a teaching modality.

In a recent study by Chiffer-McKay et al.[9] it was demonstrated that there are measurable, physiological changes associated with participation in anesthesia simulation. Additionally, the study correlated high stress levels' impact on decreasing performance scores. The results showed that a relationship exists between high levels of stress in simulation and poor performance.[9] The simulation center at SMU was established in 2006 therefore it might be concluded that more stress has been added to those in training as a result. Investigating this phenomenon should proceed in an orderly scientific method."

The first stage of any evidence-based practice process is formulating an answerable question. This forms the foundation for quality research. A well-formulated question will facilitate the search for evidence and will assist in determining whether the evidence is relevant to your question or not. The format of Patient/Problem, Intervention, Comparison, and Outcome (PICO) will be used to describe the identified problem with the selected patient population. The population of interest, Nurse Anesthesia Residents, and their high levels of stress, anxiety, and depression has already been reviewed above.[11] Further, it has been proven that simulation creates a certain amount of stress and anxiety in its participants.

Ongoing Simulation Debriefing Technique is a method by which simulation participants, who are viewing simulations, are guided by a knowledgeable debriefer while the simulation is occurring. It is hypothesizes that an Ongoing Simulation Debriefing Technique could be utilized to reduce this anxiety and stress in adult learners.

By comparing the pre and post anxiety levels one will be able to compare the control group (no intervention) to the experimental group (Ongoing Simulation Debriefing Technique). It is hypothesized that those experiencing the Ongoing Simulation Debriefing Technique (experimental group) will have reduced levels of stress and anxiety. Reducing stress and anxiety levels generated by simulation could help improve learning outcomes in adults.

Setting

Samuel Merritt University has extensively integrated the use of simulation into its Program of Nurse Anesthesia. The history of simulation-based learning at SMU began with the pioneering work of the nurse anesthesia faculty in the late 1990's. Over the past decade, our students have contributed a great deal to the national reputation of innovation and excellence that our simulation center - and especially our Program of Nurse Anesthesia - has garnered and sustained.[12] The University's state-of-the-art simulation center officially opened its doors on November 6, 2006. Two years later the simulation center was designated as a Center of Excellence by the Laerdal Corporation. Some 10,000 learners utilize the simulation center annually.

Best practices for education

Simulation has intense benefits in the training of adults. Early use of health care simulation dates back to the 1960s and includes the use of airway simulators for anesthesia training and Cardiopulmonary Resuscitation (CPR) instruction, as well as for medication administration training. The Institute of Medicine (IOM) recently published their 1999 report[13] which encourages the removal of practice barriers for advanced practice nurses. In its 1999 report, "To Err Is Human: Building a Safer Healthcare System" the IOM highlights the promise of deliberate practice in curbing medical errors through improved communications, team performance, education, and training, all of which can be accomplished with the use of simulation.[14] In 2008, SMU's HSSC was one of a handful of simulation centers nationwide that was selected by the Laerdal Medical Corporation as a Center of Educational Excellence (CoEE). Laerdal President Clive W. Patrickson, PhD, JD, MBA, says this honor is reserved for "centers that have consistently demonstrated excellence in educational philosophy and programs for the purpose of 'helping save lives.'" The SMU Health Sciences Simulation center is the perfect site for conducting this study.

Literature review for best practices for adult learners and coping and stress reduction theory

There are several theories that inform and explain the process of adult learning and the mechanism by which we establish best practices. The Father of Adult learning theory is considered Malcolm Knowles. "He contrasted the "concept of andragogy, meaning, "the art and science of helping adults learn",with pedagogy, the art, and science of helping children learn".[15] Knowles[16] propagated his theory some thirty years ago. He coined the terms andragogy, (andr - 'man'), contrasted with pedagogy, means "the art and science of helping adults learn".[16] Knowles labeled andragogy as an emerging technology, which facilitates the development and implementation of learning activities for adults. This emerging technology is based on five andragogical assumptions of the adult learner: Self-Concept: As a person matures, he or she moves from dependency to self-directness.[16] Some would contend that Knowles only introduced a theory of teaching rather than a theory of adult learning.[17] Never the less he presents some good points regarding adult learning that are in-line with simulation training. Adult learning theory was further developed by Mezirow who was interested in the potential of learning to transform adult thinking.

Jack Mezirow, known as the father of transformative learning theory stated, "transformative learning for emancipation education is the business of all adult education." This psychological approach to adult learning developed by Mezirow, in 1978, inspired many in the women's movement and focuses on deep changes in how adults see themselves and their world.[18] "Simply stated, transformative learning replaces a point of view or mind-set with one that is more developed or matures.[15] The goal of this learning theory is learner empowerment through critical reflection for a more participatory learning society.[18] This theory suggests a triggering event catalyzes the transformative learning process. This learning process requires thinking deeply about assumptions that change due to the triggering event. The learner constructs new meaning of their experience from the new context created by the triggering event and through conversation with others to assess and justify their assumptions. This transformative process results in reflective action from changes in life experience.[18] Although Knowles and Mezirow's work is noteworthy, I believe that the work by Miller[19] which focuses on the adult healthcare learner is better informs the simulation learning experience.

Samuel Merritt University subscribes to Miller's work in the area of health provider education. Miller's theory is a pyramidal-based theory.[19] His theory has four stages. "The first two stages, 'knows' and 'knows how', can be assessed using the traditional assessment tools of written and oral tests. However the top two stages, 'shows how' and 'does' clearly do not necessarily extrapolate to the application of knowledge in the workplace.[20]" "To demonstrate clinical competence, assessment at levels 3 and 4 becomes more important, but also more challenging. Level three, 'shows how', is currently assessed by simulations, practical examinations, observed long or short cases, or Objective Structured Clinical (OSCE) style examinations. However, the only way to assess level four, 'does', is to observe the practitioner at work in the real world.[20]" In other words, this measures our ability to perform at our clinical practices. Samuel Merritt has adopted Millers theory as a basis and foundation for their support of simulation integration into curriculum to reach the highest level of competence validation.

Adult learners bring a wealth of experiences and "readiness" to the learning process. As Miller, notes simulation has the potential to fulfill all the special requirements of adult learners.

The role of debriefing in simulation-based learning

Debriefing is known as a facilitated or guided reflection. The process provides adult learners with the bridge between experiencing an event and making sense of it. The debriefing process is known to increase the effectiveness of adult learning. The debriefing process involves the adult learner as an active participant. It is known that adults learn best when engaged and participatory. Adults learn best when they make sense of an experience in terms of their own worlds.[21]

Much of the research in teaching adults indicates that active "participation" is a learning activity is essential in producing positive learning outcomes.[22] When adults when are actively engaged in the process, participate, play a role, and experience not only concrete events in a cognitive fashion, but also transactional events in an emotional fashion. The learner must make sense of the events experienced in terms of their own world. The combination of actively experiencing something, particularly if it is accompanied by intense emotions, may result in long-lasting learning[21] this type of learning

is best described as experiential learning: learning by doing, thinking about, and assimilation of lessons learned into everyday behaviors. Kolb describes the experiential learning cycle as containing four related parts: concrete experience, reflective observation, abstract conceptualization, and active experimentation.[21]

Just as in non-educational debriefing, where there exists an ethical duty of facilitators to set a safe, confidential scene for facilitation, there is the ethical obligation for the facilitator in simulation-based learning to determine the parameters within which behavior will be analyzed, thereby attempting to protect participants from experiences that might seriously damage their sense of self-worth. To ensure a successful debriefing process and learning experience, the facilitator must provide a "supportive climate "where students feel valued, respected, and free to learn in a dignified environment.[21]

Participants need to be able to "share their experiences in a frank, open, and honest manner." An awareness of the vulnerability of the participant is needed, which must be respected at all times. This is highlighted by a Fanning and Gaba's recent study[21] regarding the barriers to simulation-based learning, where approximately half the participants found it a stressful and intimidating environment and a similar proportion cited a fear of the educator and their peers' judgment. It is essential that the facilitator creates an environment of trust early on, typically in the pre-briefing session.[21]

Theories of stress and coping should not be overlooked as these theories apply to the processes by which simulation participants handle the stresses produced by the simulation experience. Specifically, the stress and coping theories focus on the specific relationship between external demands and bodily processes can be grouped into two categories: The theories of stress can be divided into two basic components: the systemic component and psychobiology. Krohne,[23] in his most current revised theory describes stress as a relational concept. He describes it as a relationship between the individual and the environment. Psychological stress is one in which the individual perceives the stress as a threat to their emotional well-being. Coping is intimately related to the concept and essential to the reduction of stress. Lazarus describes the treatment of stress via coping as series of coping episodes in which the individual learns to change perceptions of the stress threat.[23] Conventional end of session simulation debriefing and Ongoing Simulation Debriefing Techniques fit Lazarus' theory for coping with stressful situations.

Evaluation of stress and anxiety

The concepts of stress and anxiety are often difficult to describe in outcomes research, perhaps because of the diversity in conceptualization (definition) and content. Types of stress and anxiety can range from emotions, psychological, social, and even economic. Stress is subjective therefore; it can be perceived or experienced. It is recommended that if stress is a focus of research, that it be accompanied by a measurement of both perception of stress and stressful experiences, as well as resources to deal with stress.[24]

A quasi-experimental design was created to measure perception of stress and stressful experiences. Both pre and post simulation questionnaires in addition to the primary tool that has been selected to measure anxiety levels (State Trait Anxiety Inventory) in addition to a demographics questionnaire. The primary tool selected for use is measuring anxiety levels before and after simulation is the State Trait Anxiety Inventory (STAI). Specifically this tool can measure anxiety levels both low and high. The STAI is one of the most widely used subjective measurements of anxiety in health and education

research. "The STAI or State-Trait Anxiety Inventory (STAI) is an instrument that can actually quantify adult anxiety. It should be noted that an adapted version is also available for children. This STAI is used to simplify the separation between state anxiety and trait anxiety, chronic feelings of anxiety and depression.[25]" This tool was initially conceptualized as a research instrument to study anxiety in adults. It is known as a self-report assessment device that includes separate measurements of state and trait anxiety. Data for self-report outcomes research can also be derived from various other measurement sources. Self-report data can come from surveys, personal interview, and web-surveys. The subject's perception of their anxiety can only truly be obtained through self-report.[24]

State anxiety is characterized as a transitory response in which the individual experiences anxiety, apprehension, or tension. It can manifest both emotionally as well as psychologically, but it is regarded as being short-term. In contrast, trait anxiety is identified as a persistent and stable anxiety response to environmental factors.[24] The STAI includes a 40-question response taking approximately 10-20 minutes for completion and the test is given in forty-eight different languages worldwide. This test is split into the S-Anxiety scale and the T-Anxiety scale, each having 20 items. These tests are answered based on a 1-4 Likert Scale, with the focused areas including: worry, tension, apprehension, and nervousness. "The most current variation is the STAI Form Y, which differentiates between temporary or emotional state anxiety versus long standing personality trait anxiety in adults. The STAI, Form X, was the first version of the STAI, which is still available to purchase. The third form is the STAI for children. The STAI, which is appropriate for those who have at least a sixth grade reading level, contains four-point Likert items. The instrument is divided into two sections, each having twenty questions. The STAI, Form Y, serves as an indicator of two types of anxiety, the state and trait anxiety, and measures the severity of the overall anxiety level in the subject".[25]

Reliability and validity of primary measurement tool: STAI

Measurement is a critical component to outcomes research. An important part of selecting a measure for use in a study is establishing usefulness of the measure. This involves assessing the reliability and validity of the measure. Assessing reliability involves showing that an outcomes measure produces reproducible results. Assessing validity means you are measuring what one intended to measure.[24] A form of reliability is test-retest reliability. This form of testing produces direct measure of reliability assuming the attribute measured is relatively stable over short periods of time (e.g., physical functioning or social functioning.[24] According to studies by Spielberger,[26] test-retest correlations were calculated to be .54 for the State section and .86 for the trait section. The STAI inter changeability rating related anxiety instruments was .80 for Taylor Manifest Anxiety Scale, .75 for IPAT Anxiety Scale, and .52 for the Multiple Affect Adjective Check List.[27] The Taylor Anxiety Score tool determines anxiety as a personality trait and the IPAT Anxiety Scale does the same. The Multiple Affect Adjective Check List is a checklist used to quantify the subject's mood with respect to depression and anxiety.

Technical and cultural considerations of measurement tool: STAI

There is concurrent validity for the STAI Form T when compared to other scales that measure anxiety. The Anxiety Scale Questionnaire (ASQ) and Manifest Anxiety Scales (MAS) have positive correlation of scores (.73 and .85) with the STAI version T, which is close enough

to show reliability but different enough to be useful in its anxiety determination.[28] Each STAI assessment is cost effective as each single assessment costs less than a dollar each. Assessments can be purchased in advance by credit card on the internet. Purchases can be made to only cover the intended number of subjects participating in the research. This ease of access makes the tool appealing. The STAI is appropriate to use for those attempting to gain employment in high stress or anxiety-prone activities, such as military service, changing career fields or higher education application. The STAI form Y is not meant for anyone under high school level or above age 70. For accurate completion, an approximate six grade reading level is required. Because of the short time, it takes to complete the tool and the affordability of the instrument, the STAI is practical for mass distribution and completion.[25]

Structure - process - outcomes

After Institutional Review Board approval, recruitment of subjects was accomplished using a convenience-sampling technique. Participation was voluntary and consent was secured by voluntary participation. Subjects reported to the simulation lab, at a specific time, for their simulation experience. In this single-blind experiment, the participants did not know if they were in the experimental of control group. On subjects' arrival at the simulation center, just prior to their simulation, the subjects were asked to complete a demographics questionnaire, and then complete the hard copy of the STAI-FormY2 with pencil.

Groups were be randomly assigned to one of two groups: a control group or an experimental group. The control group will not include any Ongoing Simulation Debriefing Technique but the experimental group will use the technique. This is the only difference between the two groups, excluding confounding variables. The Ongoing Simulation Debriefing Technique is relatively new and involves the instructor being physically present in the viewing room while the subjects are watching the live simulations while they wait for their turn to be in the simulator. This literature on this new technique is minimal. The instructor will be explaining the actions of those in the simulator while the simulation is ongoing. Those in the experimental group should be less anxious before and hopefully after their simulation experience as a benefit from the intervention. Those in the control group will not have anyone in the viewing room with them while they watch the scenarios with each other and wait for their turn in the simulator. Both groups will participate in conventional end-of-scenario debriefing.

One subject at a time will be taken from each group into the human patient simulator for a 15-minute basic induction simulation with a CRNA preceptor while the remaining subjects observe the simulation performance in a nearby conference room. There are no "universally standardized simulation programs" therefore; a basic induction program written by Laerdal will be used. Laerdal is a nationally known supplier of basic and advanced life support training products and emergency medical equipment. The basic induction will be performed on a healthy American Society of Anesthesiologists (ASA) Patient Status I or II patient (ASA I or ASA II).

The induction process involves putting the patient to sleep in the operating room for a routine surgery. Basic problems associated with the induction process will be randomly assigned to the subjects (hypotension with tachycardia, hypertension with tachycardia). As the subject's simulation is being run, the subject will evaluated by the researcher using a simple action-item checklist to rate performance. Action items will be checked as to completed or not completed. Although this data will not be used in this study, it could be helpful for

future research in this area. Ongoing Simulation Debriefing technique is an innovative term to describe the debriefing process as used for observers of simulation while they are watching live simulations in a conference room. The facilitator or instructor guides the students through an explanation of what is occurring in the simulation. It is a casual conversation with those observing the simulation to help the viewer make sense the simulation activity. It is anticipated that the Ongoing Simulation Debriefing Technique will reduce feelings of stress and anxiety in the experimental group (Appendix B). Further, it is anticipated that learning outcomes will improve although this will not be measured in this study.

Data Analysis

Data were collected through two different questionnaires, one with STAI Y1 and Y2 forms and the other with survey of 33-35 Likert type questions in three different scenarios. Both the control and experimental group were handed similar sets of questionnaires before the simulation started and right after the simulation. In pre simulation questionnaires, students were asked to fill Y1 and Y2 forms of STAI and few survey questions. In post simulation questionnaires, students were asked to fill only Y1 form of STAI and the survey questions. Sample population consisted of 26 students in three different scenarios, namely, cardiovascular emergencies, respiratory emergencies and pediatric emergencies. Both the control group and experimental group had similar population size (N=26*3=78).Students' demographic data like age, sex, race, and marital status were collected during the study.

Method

In this study, students were informed about their participation through a letter. They were explained that their participation is voluntary and their responses would be kept confidential. Institutional Review Board approval was ensured before the data collection. Data were collected from 2012-2013. A quasi-experimental design was used to collect research data and analyzed for validity and significance utilizing SPSS and T–test analysis. STAI scoring were done manually and then the scores and the questionnaire responses were documented into Microsoft Excel spreadsheets. Data were then transferred into SPSS software and analysis done through descriptive statistics and T-test tools.

STAI SCORES: The paired t-Test analysis of STAI scores are documented in the appendix table A and B. The mean STAI score in Experimental group (with ongoing debriefing technique) pre-simulation was 43.86 and post-simulation was 34.3. In control group (with no ongoing debriefing), mean STAI score pre simulation was 42.72 and post simulation was 36.21. The overall mean STAI scores were reduced by 21.8 and 15.24 percentage points, respectively, in experimental and control groups. The difference between means in both groups is statistically significant (P < 0.001).

Significance of results and suggestions for future

It is hoped that the Ongoing Simulation Debriefing Technique will become a best practice for simulation education. This research has proved that the use of this technique will result in decreased stress and anxiety levels amongst simulation participants. Further, it is also anticipated that by using the Ongoing Simulation Debriefing Technique learning outcomes will also improve in some participants because of the reduction of stress and anxiety.

Locally results of this study provide motivation for better simulation implementation into the SMU curriculums and as data is collected on outcomes, the benefits of this technique could spread

beyond the walls of Samuel Merritt University. The results of which could be international changes in the implementation of Ongoing Debriefing technique across the world as a best practices technique in simulation education. The area of simulation-induced stress and anxiety in adult learners is full of potential for additional research and benefits to adult learners. The possibilities for future research in this area should not be overlooked. It is recommended that the Ongoing Simulation Debriefing Technique should be used for all simulations in the future. An instructor should be present in the student viewing room providing ongoing debriefing to students for all beginning simulations. This activity will surely reduce the stress and anxiety of those students going into the simulator next and enhance their learning experience.

It may be possible to identify and screen for personality types that are particularly sensitive to simulation stress and anxiety. These individuals can be assisted in with dealing with the stress and anxiety of simulation in a proactive way so that their learning experience is maximized. Referrals to the SMU counseling center could be provided to sensitive learners. It is vital that we create safe learning environments in which adults can maximize their learning potential. Investigating and being aware of potential issues with simulation is an obligation for instructors. Being proactive in developing a screening tool for sensitive adult learners is essential. As educators, we should thoroughly investigate new education techniques before implementing them. The research being conducted on the Ongoing Simulation Debriefing Technique will answer some questions but perhaps not all. Is the stress and anxiety produced by simulations counterproductive to some learners? Further, do we need to create an emotion rapid-response for those learners who are harmed by participation in simulation activities? More research is needed in these areas.

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