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Volume 1 • Issue 1 • 2018

Research Article

Medical Research and Clinical Case Reports

Exploring the Benefits of a Medication Simulation in Teaching Nursing Students How Enhanced Clinical Environmental Awareness through Self-Care, Can Impact Patient Safety

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Received: February 14, 2018; **Published:** March 14, 2018

Abstract

Aim: The aim of this pilot study, was to determine the effect of providing final-year nursing students with information on self-care practices on their perceived levels of anxiety, stress, and distraction experienced while administering medications. Educating prelicensure nursing students on the importance of self-care and its impact on health care systems quality and safety measures to prevent medication errors, can enhance students' self-care awareness and patient safety.

Background: Recent evidence in the literature finds that nursing students are involved in medication errors while providing patient care. Creating awareness of factors potentially contributing to environmental stress, anxiety, and distractions that can lead to medication errors, can increase nursing students' awareness of the importance of self-care and how failure to be in-tuned to one's self and the clinical environment, can impact patient safety.

Methods: The Iowa Model was used for this project. With the Iowa Model, projects are piloted in small scale controlled environments with homogenous populations. The piloting of projects allows project teams to assess the effectiveness of the practice change. Eight nursing students volunteered to participate in the pilot project that examined medication error prevention in the clinical environment.

Results: A benchmark of a mean score of six for the New York Institute of Technology Department of Nursing Medication Simulation Evaluation Tool (NYIT, Table 3b) was used to evaluate the success of the simulation intervention; a score of five or more on the NYIT implied that learning occurred during the simulation. The mean score for the NYIT was 5.32. The Final-Year Student Group Questionnaire End of Project Feedback had a benchmark of a mean score of four (Table 4). The actual mean score was 4.67, therefore, statistically, although seven of the eight participants answered this questionnaire, results indicated that the educational information provided to participants on techniques to reduce stress, anxiety, and distraction, were beneficial. For the descriptive statistics of the Stress-Arousal Checklist (SACL), a decrease of approximately one point pre to posttest; with a pretest value of 5.38 to a posttest value of 3.00, occurred. Arousal had a paired t-test value of $p = 0.021$ while stress was $p = 0.325$. The Cognitive-Somatic Anxiety Questionnaire (CSAQ) had no significant pre and posttest changes; the cognitive value was $p = 0.364$ and somatic $p = 0.612$.

Conclusion: Teaching nursing students the principles of holistic nursing care whereby embodiment of the mind, body, and spirit interacting to impact overall health and well-being, is integral to students' future ability to cope with stressors within the clinical environment. Nursing students, when taught self-awareness of stress, anxiety, and distraction that are experienced within the clinical environment, and the importance of self-care at the prelicensure level, can be prepared to recognize and avoid situations that compromise their ability to focus on such nursing skills as medication administration.

Keywords: *Nursing students; Patient safety; Medication error; Stress; Anxiety; Distraction; Simulation; Aromatherapy; Exercise; Sleep; Healthy eating; and Positive affirmations*

Volume 1 Issue 1 March 2018

Introduction

Creating a culture of safety for patients is of the upmost importance. Therefore, preparation of prelicensure nursing students must be evidence-based practice focused and incorporate innovative ways to reduce the potential for medication errors. According to the World Health Organization (WHO, 2017), medication errors and improving the quality of patient care and safety are global issues. The cost associated with medication errors globally, was estimated to be approximately 42 billion in United States dollars (WHO, 2017). It is imperative that nursing curricula prepare nursing students to have an awareness and understanding of medication error prevention and the importance of patient safety (Latimer, Hewitt, Stanbrough, & McAndrew, 2017; Miller, Haddad, & Phillips, 2016).

Giving oneself permission to reflect on their own health and state of well-being, is self-care (Glass and Rose, 2008). In absence of self-care, one may potentially place themselves at risk for increased stress, anxiety, and distractibility; all of which when administering medications to patients on a clinical unit, could lead to a medication error. According to Smit (2017), "Having a holistic approach to self-care reduces the risk of stress, compassion fatigue and burn-out" (p. 33).

The Robert Wood Foundation funded the development of the Quality and Safety Education for Nurses (QSEN) project to create competencies in quality improvement amongst prelicensure nursing students (Cronenwett, Sherwood, & Barnsteiner, 2007). The QSEN competencies were created with the goal of nursing students bringing a culture of safety to their future places of employment within healthcare. QSEN has as its mission, "The QSEN Institute is a collaborative of healthcare professionals focused on education, practice, and scholarship to improve quality and safety of healthcare systems" (QSEN Institute, 2017).

Through the initiatives developed by the Institute of Medicine (IOM) reports more than 17 years ago, (2001, 2003, & 2006) and the QSEN competencies, nurse educators have the responsibility to integrate safety approaches within the clinical environment, into their curricula. Included within these curricula should be the prevention of medication errors. Hence, the use of simulation and self-care education for student nurses is both beneficial and necessary in teaching students about the importance of patient safety.

The Agency for Healthcare Research and Quality (AHRQ), a government agency that researches the quality and safety of patient care within the United States, indicated that one-third of United States adults "take 5 or more medications" (AHRQ, 2017). The Centers for Disease Control and Prevention (CDC) found that 82% of adults in America take at least one medication, while 29% take five or more medications. Approximately 280,000 hospitalizations and 1 million emergency department visits are associated with adverse drug events (CDC, 2016).

The severity of medication errors within the United States has led to the implementation of policies such as the Medical Error Reduction Act of 2000 and the Medication Error Prevention Act of 2000. Patient safety has been unintentionally compromised by health care facilities because of issues of continuity of patients' care (i.e. medication reconciliation) and an inability to determine frequency of error occurrence and patterns. MEDMARX is a national database whereby medication errors can be compiled and interpreted as to the frequency of types of errors made, origin, and by whom with regard to professional title or student status. MEDMARX was developed as a direct result of policies established by the United States government to address medication error reduction. This database is overseen by the United States Pharmacopeia (USP). While it is unknown how many medication errors are made by nursing students, schools of nursing and healthcare organizations are beginning to explore students' involvement in medication errors.

Wolf, Hicks, and Serembus (2006) examined the characteristics of medication errors that were made by student nurses while administering medications to patients. The researchers used the MEDMARX database to obtain a sample of student medication errors, totaling 1,305 from January 1, 1999 to December 31, 2003. The authors conducted a descriptive study and noted factors contributing to student medication errors ranging from distraction to workload increase. Patients that required healthcare (n = 760) after involvement with student medication errors, received care ranging from antidote administration to a prolonged hospitalization for up to five days for observation and care.

Reid-Searl, Moxham, and Happell (2010) used a grounded theory approach when interviewing undergraduate nursing students about their experiences with administering medications within the clinical environment. Participants included 135 final-year students in a bachelor of nursing program. The researchers applied the principles of grounded theory within their project, and a small sample of 28 nursing students was used for the participant sample size. Of the 28 students, nine reported near miss medication errors, whereby the error could have caused harm to patients had the error not been intercepted. Furthermore, a total of one third of the students had committed medication errors. In interviewing the students regarding factors involved in medication errors, the researchers noted that the commonality was no supervision by a registered nurse, in addition to distractions, stress, and fatigue. Additionally, medication errors made by nursing students compromised the quality of care provided to patients, effected patient safety, and caused students to perceive themselves as incompetent.

Herm, Scott, and Copley (2007) developed a simulation that evaluated the decision making processes of nursing students as they administered medications to patients. Nursing students that were perceived by faculty to have sound decision making skills, clinical competence, and accurate critical thinking, could not recognize crucial clinical information during medication administration (i.e. failure to use the medication rights). Simones., *et al*. (2014) used a qualitative design in exploring the thought processes of 48 nursing students from five baccalaureate nursing programs as they administered medications during a simulation. The researchers found that few studies in the literature have explored the thinking processes of students, and their perceptions during medication administration.

Factors contributing to students making medication errors included: gaps in knowledge, failure to use the medication rights, performance deficits, system factors, failure to look up the medication, feeling overwhelmed and stressed, lack of practice with decision making and medication administration, inexperience, lack of confidence, information overload, distraction, poor adherence to the five rights, little time between medication theory and practice, deficient knowledge, little time for reflection upon medication administration, and too much time between theory and practice of medication administration. Distraction (Sezgin, 2007) and exhaustion (Karadeniz & Cakmakci, 2002) were identified as being a cause for medication errors by nurses.

Gailbraith and Brown (2011) assessed interventions that could be effective in reducing the stress of nursing students through the completion of a quantitative systematic review with narrative synthesis. The key terms used were *student or students, stress or burnout, nurses or nursing*. Gailbraith and Brown found that skills for changing maladaptive cognitions, and skills for coping with stressful situations (usually relaxation techniques), were most effective.

Warning (2011) examined nursing students' anxiety levels and life orientation to pessimism or optimism using the State-Trait Anxiety Index (STAI) and the Revised Life Orientation Test (LOT-R). A pre and posttest was administered to 43 nursing students that had a preclinical visit to their assigned patients on an acute care medical-surgical unit. Communication with a patient was viewed as potentially anxiety provoking. Mean scores for participants was 15.4 with a norm mean of 14.33, indicating a higher level of optimism (P = .029). Six of the participants score on the LOT-R was less than 12, scoring above the norm mean for the trait and state anxiety index. Because there is an inverse relationship for the LOT-R scores and the state and trait anxiety index, nursing students with a pessimistic outlook on life had a higher level of trait anxiety.

There are gaps in the literature that link stress, anxiety, and distraction to medication errors. However, stress, anxiety and distraction are identified in the literature as contributing factors to the impairment of the function of nursing students, new graduate nurses, and experienced nurses. The latter compromising patient safety. This evidenced- based practice project served to fill a gap in the literature, by offering self-care techniques and increased awareness of medication error prevention to student nurses by their faculty. The goal was for nursing students to become aware of how their lack of self-care can impact medication administration safety.

Background

Simulation fosters the integration of theoretical classroom learning to the clinical environment (Bambini, Washburn, & Perkins, 2009). Medication safety is a concern within the clinical setting because medication errors compromise the quality of care patients receive (IOM, 2006). Sparacino and Della Vecchia (2013) when discussing the effectiveness of simulation in teaching nursing students safe administration of medications noted that, "As the concern for medication safety increases, nurse educators are compelled to implement teaching and learning strategies that allow students to gain knowledge, as well as analyze and synthesize information related to safe medication administration" (Sparacino & Della Vecchia, 2013, p. 1). Therefore, as the nursing profession evolves and clinical environments become more complex, simulation is a necessary means of teaching nursing students to maintain a safe environment for their patients.

For this pilot project, medication errors were defined as a preventable adverse events (Vaismoradi, Jordan, Turunen, & Bondas, 2013) and near misses as potential adverse events. Eight nursing students volunteered to participate in the pilot project that examined medication error prevention in the clinical environment. The necessity of this pilot was determined after a clinical faculty member at the 2-year diploma program observed final-year nursing students' excessive intake of caffeinated beverages, self-reported fatigue related to decreased sleep, stress related academics, and self-condemnation after receiving low grades on examinations. As a result of the latter, these students were noted by faculty to be susceptible to stress, distraction, and anxiety while administering medications to patients within the clinical environment.

The rigor nursing students experience while simultaneously, applying classroom theory to clinical practice, with continuous evaluation and synthesis of information, can be stressful and anxiety provoking. By applying holistic nursing practices of self-care such as aromatherapy, positive affirmations, healthy eating, exercising, and sleep hygiene, prelicensure nursing students can improve their health and well-being. Introduction of these self-care practices may assist nursing students in management of stress, anxiety, and distraction as they administer medications to patients in busy health care systems. High-fidelity simulation scenarios can emulate the disruptions that nursing students can experience within the clinical environment, while allowing for reflective practice during debriefing to discuss ways to emotionally and physically be cognizant of how self-care (i.e. receiving at least 8 hours of sleep) can impact patient safety.

Methods

This pilot was implemented as an evidenced-based practice (EBP) project to explore the benefits of the intervention of self-care on simulation learning focused upon safe medication administration. The Iowa Model was selected because of its use in EBP projects that are of small scale and piloted within controlled environments with homogenous populations. Piloting of projects allows project teams

to assess the effectiveness of the practice change. The Iowa Model can provide guidance to healthcare professionals in understanding the EBP process and preparation for the dissemination of project results to promote EBP, and the nursing profession (Titler, 2008; Titler, Klieber, Steelman, Goode, Rakel, Barry-Walker., *et al.* 1994).

Setting

The high-fidelity simulation pilot was conducted at the Bridgeport Hospital School of Nursing in Bridgeport, Connecticut. Simulations were held within the school's nursing lab using a high-fidelity simulation mannequin. Nursing students were randomly selected to play the roles of family members, nursing staff, other health care team members (i.e. lab and pharmacy technicians), healthcare providers, and observer/simulation recorder. Simulations were overseen by clinical faculty and the simulation lab coordinator; all whom received training through the National League for Nursing Simulation Program. Nursing students participated in a simulation whereby the objectives were for students to avoid potential medication errors while being distracted by a patient's family member, coping with an anxious patient that was nervous and ambivalent about the accuracy of the dose of medication (included was the requirement for successful completion of a medication math calculation), and lastly, effectively communicating with a stressed multitasking physician while monitor and intravenous pump alarms were beeping in the background.

Instrumentation

Student nurses (n = 8) were provided a demographic document which asked them to identify their age, ethnicity or racial background, highest degree or level of school completed, and marital status (Table 1). Instrumentation included the PPQ, NYIT, SACL, and the CSAQ. The PPQ was developed by the project implementer with the expert validity consultation of Dr. Charles Morgan, M.D., the Chief of Psychiatry at Bridgeport Hospital in Bridgeport, Connecticut in January of 2015. The PPQ consisted of five questions that addressed student nurse experience with stress, anxiety and distraction on the clinical unit; students were asked to prioritize by numbering, 1 to 6 or 1 to 5, situations that elicited stress, anxiety, and distraction.

The NYIT is a simulation evaluation tool used within the department of nursing simulation lab at the New York Institute of Technology. The instrument was used with the permission of Dr. Sparacino of the New York Institute of Technology School of Nursing and Dr. Della Vecchia of the University of Phoenix. The simulation evaluation tool is a Likert-type scale that is used to assess nursing students' "perception of the usefulness of the simulation experience and determine success in learning" (Sparacino & Della Vecchia, 2013, p. 5). The tool consists of seven statements and questions addressing knowledge of medication administration, communication skills, assessment skills, and application of theory to practice. The scale was weighted one to seven; one to two being not achieved, three to five being moderately achieved, and six to seven being achieved. At the end of the scale were three additional statements eliciting respondent feedback on the simulation experience; these were also rated using a Likert-type scale.

The reliability of the NYIT simulation evaluation tool was tested using test-retest to determine stability; nursing faculty used the tool for two years during simulation exercises in their nursing lab. The instrument was administered to nursing students after they had participated within a simulation scenario and a competency evaluation (i.e. medication math calculations) within a nursing skills practice lab. Sparacino and Della Vecchia (2013) noted the reliability coefficient to be 0.82.

The SACL, a 30–item instrument, was administered to participants as a pre and posttest after simulation. Permission to use the scale was granted by Dr. Tom Cox of the University of Nottingham, United Kingdom. Adjectives that described the psychological experience of stress were selected by participants based upon the varied moods and feelings felt at the moment. Because first reactions were most reliable, participants were instructed to choose their first response. For adjectives that *definitely* described their feelings, participants circled double plus (++) signs. A plus sign (+) was selected by participants if the word *more or less described* their feelings and a question mark (?) was selected if the participants could not describe (*cannot decide*) if the word accurately described how they felt. Lastly, a minus sign (-) was selected when participants felt the word(s) did not describe how they felt.

The scores for the SACL were the sum of positive and negative adjectives. Arousal scores ranged from zero to twelve and the arousal stress scores ranged from zero to eighteen. There were ten positive stress adjectives (1, 5, 6, 9, 10, 11, 12, 13, 18, and 23), the stress subscale had eight negative adjectives (2, 3, 5, 21, 22, 25, 27, and 28), and the five negative adjectives (8, 16, 17, 24, and 26). In studies, using factor analysis, adjectives correlated with other adjectives from the identical subscale of arousal or stress. Known-groups validity was noted in studies, with stress dimension increasing in response to stressful situations and arousal decreasing as a result of subjects engaging in prolonged repetitive tasks (Corcoran & Fischer, 2000; Mackay, Cox, Burrows, & Lazzerini, 1978).

The CSAQ, a 14-item instrument, was administered to the project participants as a pre and posttest. Permission was granted by Dr. Gary E. Swartz of the University of Arizona, to use the CSAQ. The CSAQ measures the cognitive and somatic presentation of anxiety and the effects of therapeutic techniques for anxiety reduction. Cognitive items on the questionnaire are 1, 3, 6, 8, 9, 10 and 13. Somatic items on the questionnaire are 2, 4, 5, 7, 11, 12, and 14. Scoring of CSAQ was completed after participants used a Likert-type scale one to five; one being "Not at all" and five being "Very much so" to rate each of the 14-items. Examples of statements contained within the 14-item instruments were "I feel jittery in my body" and "I can't keep anxiety-provoking pictures out of my mind." The CSAQ correlates with the State-Trait Anxiety Inventory and is reported as having good concurrent validity. (Corcoran & Fischer, 2000; Schwartz, Davidson, & Coleman, 1978).

Procedures

Institutional review board (IRB) approval for this pilot project was obtained from Bridgeport Hospital, owner of the Bridgeport Hospital School of Nursing and an affiliate of the Yale-New Haven Health System. The Iowa Model was used for this project. All eight of the nursing students were permitted to participate only after being informed by the project implementer of the risks and benefits of participation. Participants, after review of the written consent form, signed the form and were provided a copy. The nursing students (n = 8) completed the demographic document, PPQ, SACL, and CSAQ prior to participation in the medication error simulation. During the simulation, participants were intermittently interrupted while administering medications, by patient and family members talking to them, other healthcare providers requesting their assistance, and the random sounds of cardiac monitors, intravenous pumps beeping, and alarms. Prior to the medication error simulation, nursing students were provided the objectives of the simulation. After the initial simulation, students were given the NYIT simulation tool. During debriefing of the simulation which lasted approximately 8 minutes, objectives were reviewed and discussion facilitated regarding the simulation scenario.

Participants within the simulation pilot included 8 final-year pre-licensure nursing students aged 23 to 47 years. The purpose of this pilot project was to examine the effectiveness of simulation-based learning. Participants completed an initial medication error simulation in absence of prior education about stress, anxiety, and distraction in the clinical environment. Participants were then provided self-care education on the topics of aromatherapy, benefits of sleep, healthy eating, positive affirmations, and exercise for five weeks prior to a second simulation scenario.

The education sessions occurred over a period of 5-weeks. Students were provided fruits and vegetables, classical/meditative music to encourage sleep and relaxation, a book and magnet with positive affirmations, and essential oils (i.e. bergamot, lavender) prior to examinations. At the end of the 5-weeks, the nursing students were provided the PPQ, SACL, and CSAQ prior to the second simulation and upon completion of the medication error simulation, were provided the NYIT. Lastly, the students were provided a questionnaire entitled the Final-Year Student Group Questionnaire End of Project Feedback document. This questionnaire was administered to participants at the end of the EBP project and consisted of three Likert-type questions that elicited feedback as to whether the educational materials provided on stress, anxiety, and distraction reduction techniques were helpful. The PPQ questionnaire was used to trend nursing students' self-care behaviors, and stress, anxiety, and distraction causations in the clinical environment only.

Results

For the PPQ pretest (Table 2a), all respondents (n = 8, 100%) responded 'yes' to the question, "Do you ever feel anxious when you are administering medications on the clinical unit?" The top two answers for this question were: "Being observed while administering patients' medications by my Nursing instructor, the patient, family members and other healthcare providers" and "Overwhelmed with patient assignment and being worried about how my other patient is doing while administered medications to the second patient." For the question, "Have you ever had a near miss (i.e. could have been an error, but yourself or another person intervened) or an actual medication error?" five nursing students (n = 5, 62.5%) reported a near miss, one nursing student (n = 1, 12.5%) reported having both an actual medication error and a near miss, one wrote neither, and one student did not answer the question.

Question number three of the pretest PPQ (Table 2a) was "Do you find administering medications to patients a stressful experience on the clinical unit?" seven nursing students (n = 8, 100.0%) answered yes. The top three answers for this question were: "Fear of doing harm to a patient by administering an incorrect dose of medication(s)," "Being late with administering medications to my assigned patients," and "Feeling rushed by the Nursing Instructor because he or she has other nursing students to supervise their medication administration." Question number four was "Have you ever been distracted on the clinical unit when administering medications to patients, by persons talking to you, beeping IV pumps, or monitors?" Eight nursing students (n = 8, 100.0%) answered yes. The top two answers for this question were: "Nursing Instructor being present" and "Family members talking to you and the patient."

The final statement on the PPQ posttest (Table 2b) required participants to choose method(s) they currently used to reduce their stress and anxiety. The top three methods that participants used to reduce their stress and anxiety were: listening to music (n = 4, 50.0%), playing with a pet (n = 4, 50.0%) and prayer (n = 4, 50.0%). For the PPQ posttest (Table 2b), all respondents (n = 8, 100%) responded 'yes' to the question, "Do you ever feel anxious when you are administering medications on the clinical unit?" The top two answers for this question were: "Being observed while administering patients' medications by my Nursing instructor, the patient, family members and other healthcare providers" and "Overwhelmed with patient assignment and being worried about how other patient is doing while administered medications to the second patient." For the question, "Have you ever had a near miss (i.e. could have been an error, but yourself or another person intervened) or an actual medication error?" five nursing students (n = 5, 62.5%) reported a near miss, one nursing student (n= 1, 12.5%) reported having both an actual medication error and a near miss, one wrote neither, and one student did not answer the question.

Question number three of the PPQ posttest (Table 2b) was "Do you find administering medications to patients a stressful experience on the clinical unit?" seven nursing students (n = 7, 87.5%) answered yes and one nursing student (n = 1, 12.5) answered no. The top three answers for this question were: "Fear of doing harm to a patient by administering an incorrect dose of medication(s)," "Being late with administering medications to my assigned patients," and "Feeling rushed by the Nursing Instructor because he or she has other nursing students to supervise their medication administration." Question number four was "Have you ever been distracted on the clinical unit when administering medications to patients, by persons talking to you, beeping IV pumps, or monitors?" Seven nursing students (n = 7, 87.5%) answered yes and one nursing student (n = 1, 12.5%) answered no. The top two answers for this question were: "Nursing Instructor being present" and "Family members talking to you and the patient."

The final statement on the PPQ posttest (Table 2b) required participants to choose method(s) they currently used to reduce their stress and anxiety. The top three methods that participants used to reduce their stress and anxiety were: listening to music (n = 7, 87.5%), physical exercise (n = 6, 75%) and prayer (n = 4, 50%).

The SACL mean score for the stress subscale on the pretest was 9.13 and 8.13 on the posttest. The arousal subscale pretest mean was 5.38 and the posttest was 3.00. The benchmark of an overall mean score decrease of 10% pre and posttest reflected less arousal experienced by participants after the simulation, was met. Stress decreased on average, by one point from pre to posttest. Of significance, arousal had a paired t-test value of p = 0.021 while stress was p= 0.325. Stress scores decreased only by one point (Figure 3 and Figure 4).

The CSAQ participants mean cognitive subscale for the pretest score was 17.00 and the posttest score was 14.63. The pretest for the anxiety subscale was 20.00 and the anxiety posttest mean score was 20.75. Results of the paired t-test show no significant differences between pre and post scores for the cognitive scores (p = .364), nor the anxiety scores (p = .612).

The benchmark for the CSAQ was 10% for each subscale; cognitive and somatic. There was no evidence to show that the intervention of the stress reduction techniques were effective. Differences within the cognitive and anxiety scores (Figure 1 and Figure 2) pre and posttest, were not significant. Because the pilot consisted of only 8 participants, it is difficult to reach statistical significance.

A benchmark of a mean score of six for the NYIT (Table 3b) was used to evaluate the success of the simulation intervention; a score of five or more on the NYIT implied that learning occurred during the simulation. The mean score for the NYIT was 5.32. Frequencies of participant responses to the questionnaire provided evidence that per each question, higher percentages of participants answering between numbers six and seven, were relatively consistent. The Final-Year Student Group Questionnaire End of Project Feedback had a benchmark of a mean score of four (Table 4). The actual mean score was 4.67, therefore, statistically, although seven of the eight participants answered this questionnaire, results are indicative that the educational information provided to participants on techniques to reduce stress, anxiety, and distraction, were beneficial. The frequencies of participants' responses indicate while a benchmark of 6 for achievement of simulation learning was not achieved, 37.5% to 75% of participants reported achievement of learning.

Stress and Arousal Checklist (SACL)

Below are the descriptive statistics for the stress and arousal subscale scores of the SACL for both time points. The stress score decreased on average one point from pre to post and arousal decreased from 5.38 at pre to 3.00 at post.

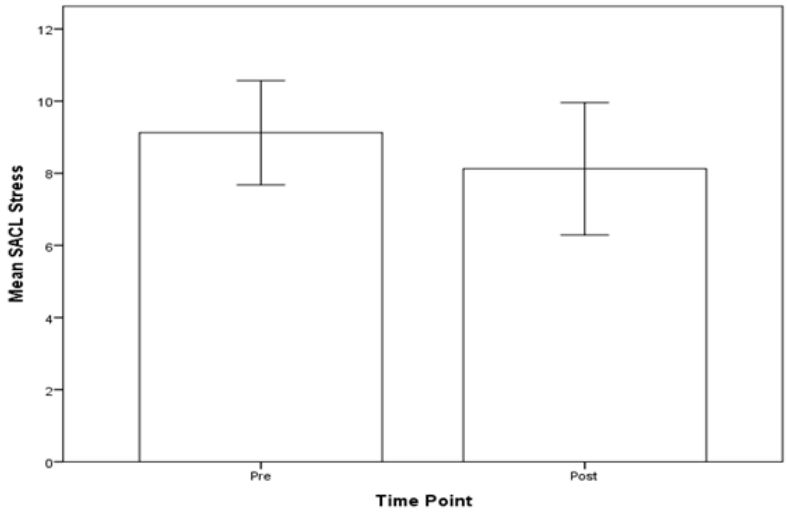
Descriptive Statistics					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
SACL Stress Pre	8	3	13	9.13	4.086
SACL Stress Post	8	2	14	8.13	5.194
SACL Arousal Pre	8	2	11	5.38	2.925
SACL Arousal Post	8	1	5	3.00	1.512
Valid N (listwise)	8				

A paired t-test was performed comparing pre to post test scores. For the stress subscale there was not a significant change from pre to post, the p-value (Sig.) is .325, which is greater than the alpha level typically used to declare statistical significance (.05).

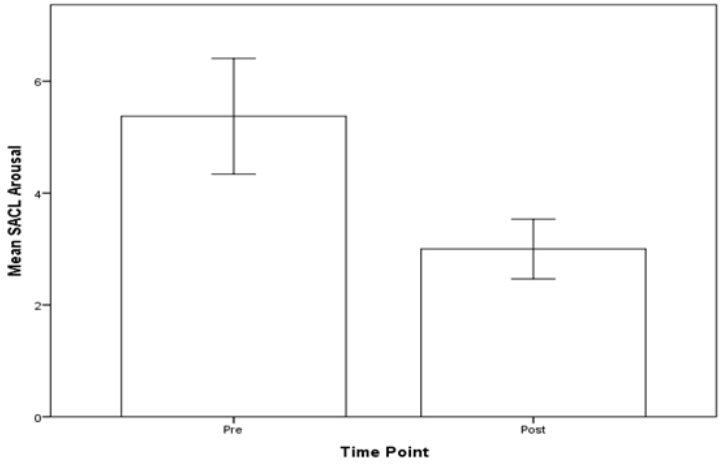
However, there was a significant decrease in the arousal subscale, since p = .021 is less than .05. You can conclude arousal significantly decreased after the intervention.

Paired Samples Test							
		Paired Differences			**t**	**df**	**Sig. (2-tailed)**
		Mean	**Std. Deviation**	**Std. Error Mean**			
Pair 1	SACL Stress Pre - SACL Stress Post	1.000	2.673	.945	1.058	7	.325
Pair 2	SACL Arousal Pre - SACL Arousal Post	2.375	2.264	.800	2.967	7	.021

Next is a graph of the mean stress score by time point with standard error bars. It's obvious there is overlap between the pre and post and thus no significant difference.



The next graph shows the arousal mean score at pre and post and verifies the paired t-test result in a decrease in arousal.



Cognitive-Somatic Anxiety Questionnaire (CSAQ)

The descriptive statistics for the cognitive and anxiety subscales of the CSAQ are shown below. The mean for the cognitive decreased a little from pre to post but the mean for anxiety did not change.

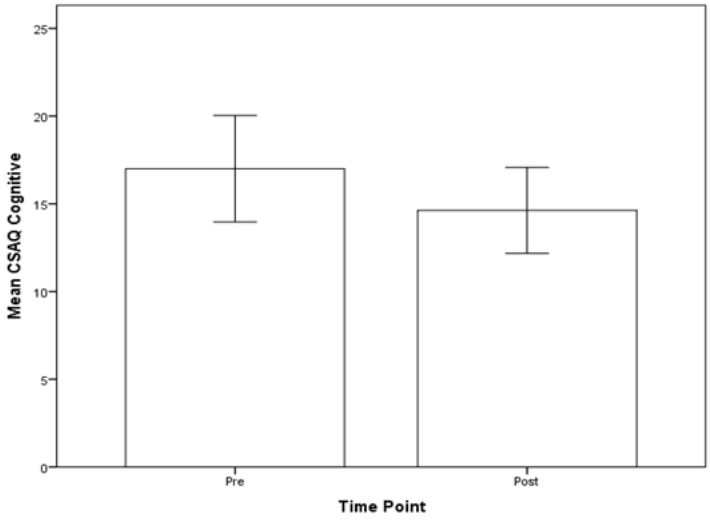
Descriptive Statistics					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
CSAQ Cognitive Pre	8	7	30	17.00	8.586
CSAQ Cogntive Post	8	8	29	14.63	6.927
CSAQ Anxiety Pre	8	12	27	20.00	5.425
CSAQ Anxiety Post	8	11	29	20.75	5.365
Valid N (listwise)	8				

The results of the paired t-test show the difference in cognitive scores between pre and post is not significantly different (p = .364) and the difference in anxiety scores between pre and post is also not significantly different (p = .612).

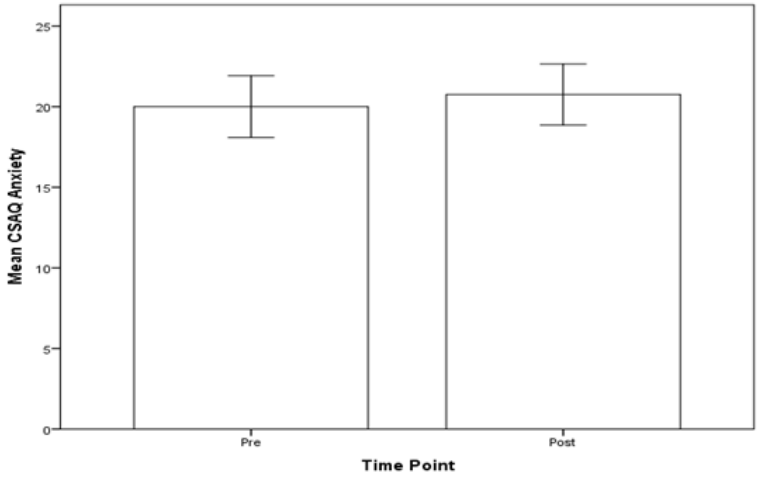
There is no convincing evidence to show the intervention reduced cognitive or anxiety scores. However, with only 8 subjects it's very difficult to reach statistical significance and makes the earlier finding for arousal even more impressive.

Paired Samples Test							
		Paired Differences			t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean			
Pair 1	CSAQ Cognitive Pre - CSAQ Cogntive Post	2.375	6.927	2.449	.970	7	.364
Pair 2	CSAQ Anxiety Pre - CSAQ Anxiety Post	-.750	3.991	1.411	-.532	7	.612

Here is a graph of mean cognitive subscale score by time point. While the post score looks lower there is overlap between the scores.



Next is a graph of the mean anxiety subscale scores by time point. It looks like there was virtually no change.



New York Institute of Technology Medication Simulation Evaluation Tool (NYIT)

The NYIT questions are Likert scaled so you could report descriptive statistics, such as the mean, minimum, maximum, and standard deviation if you want.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Did participation in the simulation experience support the transfer of knowledge/theory to practice?	8	4	7	6.00	1.069
Did participation in the simulation experience allow you to build/refine your patient communication skills?	8	2	7	5.12	1.553
Confidence in performing assessment skills was gained as a result of participation in the simulation experience.	8	2	6	4.63	1.408
Did participation in the simulation experience assist in understanding information learned in the classroom?	8	4	7	5.75	1.035
Did participation in the simulation experience help you with peer communication?	8	4	7	5.88	.991
The ability to better be able to prioritize time was gained as a result of participation in the simulation experience.	8	3	7	5.00	1.414
The self-learning modules helped increase knowledge with regard to medication administration?	8	2	7	4.88	1.959
Valid N (listwise)	8				

However, it might make more sense to just present the frequencies for each of the questions. The next seven tables show the frequency of responses for each of the seven questions.

Did participation in the simulation experience support the transfer of knowledge/theory to practice?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4 moderately achieved	1	12.5	12.5	12.5
	5 moderately achieved	1	12.5	12.5	25.0
	6 achieved	3	37.5	37.5	62.5
	7 achieved	3	37.5	37.5	100.0
	Total	8	100.0	100.0	

Did participation in the simulation experience allow you to build/refine your patient communication skills?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2 not achieved	1	12.5	12.5	12.5
	4 moderately achieved	1	12.5	12.5	25.0
	5 moderately achieved	2	25.0	25.0	50.0
	6 achieved	3	37.5	37.5	87.5
	7 achieved	1	12.5	12.5	100.0
	Total	8	100.0	100.0	

Confidence in performing assessment skills was gained as a result of participation in the simulation experience.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2 not achieved	1	12.5	12.5	12.5
	4 moderately achieved	3	37.5	37.5	50.0
	5 moderately achieved	1	12.5	12.5	62.5
	6 achieved	3	37.5	37.5	100.0
	Total	8	100.0	100.0	

Did participation in the simulation experience assist in understanding information learned in the classroom?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4 moderately achieved	1	12.5	12.5	12.5
	5 moderately achieved	2	25.0	25.0	37.5
	6 achieved	3	37.5	37.5	75.0
	7 achieved	2	25.0	25.0	100.0
	Total	8	100.0	100.0	

Did participation in the simulation experience help you with peer communication?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4 moderately achieved	1	12.5	12.5	12.5
	5 moderately achieved	1	12.5	12.5	25.0
	6 achieved	4	50.0	50.0	75.0
	7 achieved	2	25.0	25.0	100.0
	Total	8	100.0	100.0	

The ability to better be able to prioritize time was gained as a result of participation in the simulation experience.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3 moderately achieved	1	12.5	12.5	12.5
	4 moderately achieved	3	37.5	37.5	50.0
	6 achieved	3	37.5	37.5	87.5
	7 achieved	1	12.5	12.5	100.0
	Total	8	100.0	100.0	

The self-learning modules helped increase knowledge with regard to medication administration?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2 not achieved	1	12.5	12.5	12.5
	3 moderately achieved	2	25.0	25.0	37.5
	5 moderately achieved	1	12.5	12.5	50.0
	6 achieved	2	25.0	25.0	75.0
	7 achieved	2	25.0	25.0	100.0
	Total	8	100.0	100.0	

To present the frequencies it would probably be best to do it using one table with each row representing one question.

Question	Frequency	Percentage
Did participation in the simulation experience support the transfer of knowledge/theory to practice?		
1 - 2 not achieved	0	0.0%
3 - 5 moderately achieved	2	25.0
6 - 7 achieved	6	75.0
Did participation in the simulation experience allow you to build/refine your patient communication skills?		
1 - 2 not achieved	1	12.5%
3 - 5 moderately achieved	3	37.5
6 - 7 achieved	4	50.0
Confidence in performing assessment skills was gained as a result of participation in the simulation experience.		
1 - 2 not achieved	1	12.5%
3 - 5 moderately achieved	4	50.0
6 - 7 achieved	3	37.5
Did participation in the simulation experience assist in understanding information learned in the classroom?		
1 - 2 not achieved	0	0%
3 - 5 moderately achieved	3	37.5
6 - 7 achieved	5	62.5
Did participation in the simulation experience help you with peer communication?		
1 - 2 not achieved	0	0%
3 - 5 moderately achieved	2	25
6 - 7 achieved	6	75
The ability to better be able to prioritize time was gained as a result of participation in the simulation experience.		
1 - 2 not achieved	0	0%
3 - 5 moderately achieved	4	50

6 - 7 achieved	4	50
The self-learning modules helped increase knowledge with regard to medication administration?		
1 - 2 not achieved	1	12.5%
3 - 5 moderately achieved	3	37.5
6 - 7 achieved	4	50.0

Table XX: *Frequencies of Responses from NYIT Questionnaire.*

Final-Year Student Group Questionnaire End of Project Feedback

Similar to the NYIT, the final questions are Likert scaled and so you could report descriptive statistics, such as the mean,

Descriptive Statistics					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
1. Do you plan to utilize some of the stress and anxiety reduction techniques you learned?	7	4	5	4.86	.378
2. Did you find the educational materials about stress and anxiety helpful?	7	4	5	4.86	.378
3. Do you believe that you can use stress, anxiety and distraction reduction techniques while administering medications on the clinical units?	7	3	5	4.29	.756
Valid N (listwise)	7				

But again, it could be better to just report the frequencies. The next three tables show the frequency of responses for the three final questions.

1. Do you plan to utilize some of the stress and anxiety reduction techniques you learned?					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	4	1	12.5	14.3	14.3
	5 Very much so	6	75.0	85.7	100.0
	Total	7	87.5	100.0	
Missing	System	1	12.5		
Total		8	100.0		

2. Did you find the educational materials about stress and anxiety helpful?					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	4	1	12.5	14.3	14.3
	5 Very much so	6	75.0	85.7	100.0
	Total	7	87.5	100.0	
Missing	System	1	12.5		
Total		8	100.0		

3. Do you believe that you can use stress, anxiety and distraction reduction techniques while administering medications on the clinical units?					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	3	1	12.5	14.3	14.3
	4	3	37.5	42.9	57.1
	5 Very much so	3	37.5	42.9	100.0
	Total	7	87.5	100.0	
Missing	System	1	12.5		
Total		8	100.0		

Final Questions	**Frequency**	**Percentage**
Do you plan to utilize some of the stress and anxiety reduction techniques you learned?		
1 (not at all)	0	0.0%
2	0	0.0
3	0	0.0
4	1	14.3
5 (very much so)	6	85.7
Did you find the educational materials about stress and anxiety helpful?		
1 (not at all)	0	0.0%
2	0	0.0
3	0	0.0
4	1	14.3
5 (very much so)	6	85.7
Do you believe that you can use stress, anxiety and distraction reduction techniques while administering medications on the clinical units?		
1 (not at all)	0	0.0%
2	0	0.0
3	1	14.3
4	3	42.9
5 (very much so)	3	42.9

Table XX: *Frequencies of Responses from Final Questionnaire.*

Question	Frequency	Percentage
Did participation in the simulation experience support the transfer of knowledge/theory to practice?		
1 - 2 not achieved	0	0.0%
3 - 5 moderately achieved	2	25.0
6 - 7 achieved	6	75.0
Did participation in the simulation experience allow you to build/refine your patient communication skills?		
1 - 2 not achieved	1	12.5%
3 - 5 moderately achieved	3	37.5
6 - 7 achieved	4	50.0
Confidence in performing assessment skills was gained as a result of participation in the simulation experience.		
1 - 2 not achieved	1	12.5%
3 - 5 moderately achieved	4	50.0
6 - 7 achieved	3	37.5
Did participation in the simulation experience assist in understanding information learned in the classroom?		
1 - 2 not achieved	0	0%
3 - 5 moderately achieved	3	37.5
6 - 7 achieved	5	62.5
Did participation in the simulation experience help you with peer communication?		
1 - 2 not achieved	0	0%
3 - 5 moderately achieved	2	25
6 - 7 achieved	6	75
The ability to better be able to prioritize time was gained as a result of participation in the simulation experience.		
1 - 2 not achieved	0	0%
3 - 5 moderately achieved	4	50
6 - 7 achieved	4	50
The self-learning modules helped increase knowledge with regard to medication administration?		
1 - 2 not achieved	1	12.5%
3 - 5 moderately achieved	3	37.5
6 - 7 achieved	4	50.0

Table XX: *Frequencies of Responses from NYIT Questionnaire.*

Final Questions	Frequency	Percentage
Do you plan to utilize some of the stress and anxiety reduction techniques you learned?		
1 (not at all)	0	0.0%
2	0	0.0
3	0	0.0
4	1	14.3
5 (very much so)	6	85.7
Did you find the educational materials about stress and anxiety helpful?		
1 (not at all)	0	0.0%
2	0	0.0
3	0	0.0
4	1	14.3
5 (very much so)	6	85.7
Do you believe that you can use stress, anxiety and distraction reduction techniques while administering medications on the clinical units?		
1 (not at all)	0	0.0%
2	0	0.0
3	1	14.3
4	3	42.9
5 (very much so)	3	42.9

Table XX: *Frequencies of Responses from Final Questionnaire.*

Conclusion

In examination of the data, the interventions of the self-care education provided to the prelicensure nursing students were seemingly more beneficial than the actual simulation. The evidence of the effectiveness of simulation in educating nursing students within clinical scenarios in the literature is substantial. Within this evidenced-based practice project, these benefits were further substantiated by the NYIT (Table 3a and 3b) results, however students seemingly benefited more from learning self-care skills.

Prelicensure nursing students shared that they continued to experience anxiety while administering patients medications in the PPQ pre and posttest (n= 8, 100.0%), but direct observation by the patient, family members, and nurse instructor had a noticeable decrease in being associated with anxiety interfering with medication administration; n = 8, 100.0% pretest and 4 = 50.0% posttest. Stress and distraction dropped one point, pretest n = 8, 100.0% to n = 7, 87.5% in both categories. Interestingly, within the PPQ pretest (Table 2a) results, the top three methods that nursing students used to reduce their stress and anxiety were: listening to music (n= 4, 50.0%), playing with a pet (n = 4, 50.0%) and prayer (n = 4, 50.0%). Within PPQ posttest (Table 2b) results, the top three methods that participants used to reduce their stress and anxiety were: listening to music (n = 7, 87.5%), physical exercise (n = 6, 75%) and prayer (n = 4, 50%).

While prayer remained consistent at 50.0% for pre and posttests, music increased from 50.0% to 87.5% as an effective means of stress and anxiety reduction. Physical exercise was not selected by the nursing students during the pretest as a means of reducing stress or anxiety, but was replaced by playing with a pet at 50%. In posttest results, physical exercise had the highest percentage at 87.5%, surpassing pre and posttest percentiles.

The SACL arousal result of p = .021 was significant because it demonstrated that while stressors remained relatively unchanged in the nursing students clinical and academic experiences, their use of self-care practices impacted how they responded. Hence, the nursing students were able better cope with disruptions within the clinical environment, and potentially enhanced their ability to focus while administering medications to patients after learning the self-care techniques. The CSAQ results had no significance.

Teaching nursing students the benefits of self-care in the decreasing of anxiety, stress, and distraction in the clinical environment that can contribute to medication errors, is imperative. Nursing can be physically, emotionally, and mentally demanding. Given rigor of nursing education within the clinical and classroom settings, prelicensure student nurses develop lifestyles conducive to hours of study contributing to sedentary lifestyles, decreased sleep, and poor nutrition. Low self-esteem can occur as nursing students define themselves by grade achievement on the academically challenging multiple choice examinations in course work preparation for the National Council Licensure Examination for the Registered Nurse (NCLEX-RN). Positive affirmations can help nursing students recognize the importance of self and self-care despite the challenges they encounter while in nursing school.

The implementation and transition of evidence-based practice to the clinical environment is instrumental in the provision of safe patient care. The utilization of supportive literature facilitated the evaluation of best practices that could be used to educate nursing students about medication error prevention through increased awareness of stress, anxiety, distraction, and self-care. The results concluded that the use of simulation, in conjunction with education about self-care and medication error prevention with nursing students, was an effective means of learning.

Transition from the prelicensure to the registered nurse role, can be difficult. Adaptation to the noise, interruptions by others and having limited insight into handling one's own stress and anxiety in the clinical environment, can be overwhelming. The implementation of this EBP project allowed the project implementer and the participants to explore stress, anxiety, and distraction reduction techniques through the use of interactive educational exposure to the topics of aromatherapy, benefits of sleep, healthy eating, positive affirmations, and exercise. The educational materials provided were of benefit to participants' successful integration of knowledge of self-awareness and the importance of self-care with regard to medication error prevention. Participants were able to demonstrate through participation within a simulated clinical environment, the importance of maintaining patient safety despite the presence of extenuating internal and external factors.

Application to Holistic Nursing Practice

The integration of holistic nursing practices in the education of nursing students, can be beneficial in bringing awareness to the importance of their own self-care. Boswell, Cannon, and Miller (2013) conducted a qualitative study on nursing students' perceptions of holistic nursing care. The focus of the qualitative study was spirituality and integration of spiritual care into nurses' own lives and those of their patients. Boswell, Cannon, and Miller (2013) noted that, "Holistic nursing integrates the body, mind, and spirit into care. However, nursing students from a traditional program, an RN-BSN program, and a graduate nurse practitioner program voiced discomfort with providing such spiritual care" (p. 329).

Nursing students are taught to apply psychomotor, cognitive, visual, and auditory skills in nursing school in the provision of care to patients. These skills are also necessary in the development of clinical and critical thinking in the application and analysis of Bloom's Taxonomy level questions, as nursing students are prepared to take the National Council of State Boards of Nursing (NCSBN, 2017) NCLEX-RN examination, to test their competency as graduates of nursing programs. While holistic nursing care is discussed in nursing programs under the auspices of complimentary alternative treatment (i.e. acupuncture, massage therapy, and aromatherapy), holistic nursing practice integrates the application of holistic nursing into all facets of nursing care.

Nurses that have a holistic approach, are able to take concepts such as stress management, and examine acute and chronic stress in relation to illness and disease development in nurses, student nurses, and patients (Gregg & Twibell, 2016). Stress, in combination with

anxiety and distraction, particularly in relation to nursing students, can lead to difficulty concentrating within clinical environments. When performing the skill of medication administration, it is imperative that nursing students maintain focus so that medication errors are avoided and patients are kept safe. Hence, teaching nursing students about self-care through holistic nursing practices in nursing programs, in conjunction with simulation, can help students experience real-life clinical situations that can cause anxiety, stress, and distraction, while applying techniques that maintain nursing students bio psychosocial integrity.

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