

Simulation and Advanced Practice Nursing Education

A manuscript by

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## ABSTRACT

### Simulation and Advanced Practice Nursing Education

By Dawn I. Blue

This quantitative study compared changes in level of confidence resulting from participation in simulation or traditional instructional methods for BSN (Bachelor of Science in Nursing) to DNP (Doctor of Nursing Practice) students in a nurse practitioner course when they entered the clinical practicum. Simulation has been used in many disciplines over the last century, but has only been used in the last decade in nursing mostly at the undergraduate level. The majority of the current research is at the undergraduate level and has demonstrated positive added value. Because of these results, there has been increased funding in simulation for labs, equipment, and staff. Sample is volunteers from 3 groups of mental health, acute and primary adult nurse practitioner classes at a private BSN-DNP program on the West Coast. The students are in the 3<sup>rd</sup> year of a three year program. Faculty was blinded to the identity of students who participated in the study. Repeated measurements using two valid and reliable instruments were obtained by online survey at three different points. Two instruments were used to measure confidence. They are The General Self Efficacy Scale (GSE) which is valid and reliable with a Cronbach's alpha ranged from .76 to .90, (with most of them in the high 80's). Numerous correlation studies demonstrate criterion validity and are summarized online (GSE Online) and The Self-Confidence Learning Survey reliability (.87 Cronbach's alpha) developed in 2005 by Jeffries's team for the National League of Nursing. Data analysis was performed with SPSS 23 using Wilcoxon Signed Ranks Test. This study adds to the limited understanding of the pedagogy of simulation at the graduate level in nursing education.

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## Simulation and Advanced Practice Nursing Education

### Background and significance

#### *Assessment of the Phenomena (Problem Statement)*

The oft repeated phrase, “See one, Do one, Teach one” has been the basis for training in the medical field for many years. In an article by the John Hopkins Simulation Center, the authors contend that the old model is not acceptable because the practice is conducted on live patients and exposes them to harm. They propose a shift in medical education to include simulation . Their article was published after the 1999 report by the Institute of Medicine (IOM) “To Err Is Human” . IOM recommended that changes occur at the institutional level to remove or minimize the possibility of individual errors. Another recommendation involves improved communication at the bedside which will improve overall teamwork. In this analysis, the Agency for Healthcare Research and Quality (AHRQ) has made recommendations that include improving education practices to reduce mistakes by the use of simulation in healthcare provider training. The result of these changes would make practitioners better prepared at the time of graduation and help reduce the amount of time spent in higher education hoping to affect the healthcare provider shortage in a timelier manner. In a White Paper recently released American Association of Colleges of Nursing recommended using simulation in advanced practice registered nurse (APRN) education . In the document,

the recommendation is to develop and test simulations that will evaluate the APRN common competencies. In the task force report brief from AACN the first point is using simulation to enhance and replace traditional clinical experiences for APRN's.

### *Historical and Societal Perspective*

Many in the medical profession are under the opinion that simulation is a new type of learning system. It is actually an age old style of teaching, but has only been used in medicine since the last half of the 20<sup>th</sup> century. Many industries have employed and greatly advanced simulation in the last hundred years and it has been used by the military since ancient times.

It is documented that war games were used to train members of the Chinese military around 3000 BC. These games were similar to the game of chess that became popular in the 17<sup>th</sup> century. The use of simulation was greatly enhanced during the 20<sup>th</sup> century largely because of technological advances and was used during recent military operations. While the technology is expensive, it has proven to be cost effective when balanced with destruction of equipment, money spent to rectify mistakes, and loss of life.

Aviation was the first industry to use simulation. It has progressed through the stages of aviation training models, to troop warfare, to the virtual reality of today. In the 1920's, Edwin Link built the first flight simulator. In 1934 the U.S. Army bought it because of costly losses due to poor visibility. In 1955 the Federal Aviation Administration began to require time spent training in simulators for recertification. NASA began using computer

simulation in the next decade which allowed them the ability to make effective repairs on Apollo 13 and Skylab 2. At this time, they also began using full flight simulation. In the 1980's, the military began using this technology in their naval and submarine training programs. Fueled by the gaming industry, the development of higher level graphics as a result of software advances in the 1990's, stimulated the effective use of helicopter flight simulation. If not for simulation training the use of lunar modules in space exploration might not have been the success that it was.

Other industries have found simulation training to be an effective way to maintain safety. Nuclear power plants have used simulation since the 1970's to train their workers for day to day operations and to improve response during a malfunction. These industries have determined that simulation provides great learning capabilities and allows workers to maintain a higher level of skilled performance at their jobs. Medicine has also used simulation to attain and maintain skill in practitioners with positive results since the 1960's. Some of the specialties that have recently added simulation to their training include anesthesia, vascular and abdominal surgery, cardio perfusion, and scope facilitated procedures as in GI, orthopedics, gynecology as well as dentistry.

The medical field has steadily been implementing simulation over the last 50 years. Nursing is a newcomer to simulation use for teaching students and keeping practitioners current on knowledge and skills. In Sweden, a toy manufacturer by the name of Laerdal worked with anesthesiologists to design

a task trainer that we know today as Resusci-Anne. The face was taken from a death mask of a French drowning victim. SimOne, developed at University of Southern California by Abrahamson and Denson in the 1960's allowed for sophisticated simulation experiences. It responded to interventions of 4 IV drugs and 2 gasses affecting heartbeat, breathing, pulses, blood pressure, and pupils. SimOne was too expensive for widespread use in most colleges. Two decades later, two institutions advanced the technology for use in anesthesia. Good and Gravenstein at University of Florida and Gaba at Stanford, with the latter introducing team-based clinical training modeled after the crew management experiences used in aviation. In medicine Medsim and METI were high fidelity task trainers that promoted team-based training.

### *Incidence and Prevalence*

With the shortage of healthcare providers and the pending implementation of the Affordable Care Act, a serious lack of access is foreseeable, especially in areas that are already underserved. At the next level, where will universities find the faculty and clinical sites to train these practitioners? Both of these deficiencies can be eased by the better use of current resources and the technologies that are available and affordable today. One of the answers seems to be a better use of simulation for educating nurses at all levels.

## *Healthcare Costs*

In 2000, The Institute of Medicine (IOM) published the report “To Err is Human”. They noted that over 98,000 people die each year from mistakes made in hospitals. The report recommended institutional changes to remove or minimize the possibility of individual errors. In 2008, medical errors cost the United States \$19.5 billion. One study estimates that the economic impact is much higher, perhaps nearly \$1 trillion annually . This study from 2008 found that 200,000 Americans die because of problems acquired during their care which had direct costs of \$87 billion and another \$1.4 billion in lost productivity and disability claims.

Through simulation infrequent events that lead to death can be rehearsed and prepared for. Students can be evaluated for competence in a safe setting.

This training has the potential to provide safer patient care.

## *Supporting Evidence for the Advanced Practice Registered Nurse*

Some of the benefits of simulation are reduced risk to patients and students. Specific tasks could be created rather than waiting for them to occur in a clinical setting. Through repetition, the skill can be mastered without inconveniencing patients. This also allows the knowledge to be retained better. Such knowledge can be smoothly transitioned from the learning lab to the bedside. Educators in the medical field saw many potential uses for simulation. Students could learn and rehearse skills at all levels. Practitioners could learn or refresh their skills for better competency at the bedside. This training could be done for individuals or teams to enhance

performance. Simulation allows rehearsal for serious events, such as life threatening events, complex events and rare events. It keeps personnel prepared to contend with a variety of crisis situations.

There are multiple reasons why this type of training can be effective for the participant. When the scenario immerses the learner in the experience, they can learn real time critical thinking abilities that can be transferred to similar situations in practice. It allows repetition that can be advanced to increasingly difficult skills and thought processes in a wide range of clinical settings. When properly integrated into the curriculum, a facilitator can provide feedback, incorporating individual learning styles and needs through the use of a limitless possibility of clinical scenarios to achieve a desired set of outcomes. All of this is ideally performed in a safe and supportive classroom that allows errors without negative impact on live patients. Simulation allows a better clinical experience than the current system which is being negatively impacted by decreased length of patient stay related to the cost of health care and hospital closures reducing clinical placement sites for nursing students. Simulation maximizes the effectiveness of clinical instructors during this shortage of nursing faculty both at the undergraduate and graduate levels of nursing.

Critical thinking in health care providers using multiple data sources can be enhanced in the lab. In a virtual environment that has no patient safety risks the learner can have experiences that are shown to reduce medication errors and increase patient safety. Training in a simulation lab

allows the student to integrate the overload of information that they are expected to learn in undergraduate training. It allows the streamlining of postgraduate programs to facilitate availability of doctoral prepared instructors. Also enhanced is the instruction of practitioners in this time of specialization for availability in clinical practice. Competence in previously learned knowledge and skills can be validated.

Limited research has been done with regards to the efficacy of simulation in education at all levels. Most of the proof is provided by translating results from other industries that have a longer history of successful improvement in trainee performance. Preliminary studies were done to determine how much simulation should be used in place of clinical experiences. Healthcare Simulation South Carolina recommended further research that includes outcome measurement of success on standardized tests, improved clinical performance and patient safety. There was also evaluation of how simulation was being implemented. These outcome measurements were specifically addressed in the study released last year by the National Council of State Boards of Nursing (NCSBN). The release of the National Council of State Boards of Nursing (NCSBN) study regarding the potential to use simulation to replace 50% of clinical hours is groundbreaking research.

Confidence was significantly increased in Acute Care Nurse Practitioner students' pre- and post- simulation training . There were 38 students in the

Rosenzweig report using NP's with an increase of 1.2 points using a 1-7 point Likert scale with 1 being poor confidence and 7 being excellent confidence.

Confidence was statistically increased ( $p < 0.01$ ) in graduate midwife students (N=14) with the use of simulation compared to a control group with no simulation. Using the same National League of Nurses (NLN) tool that was used in this project, both groups of graduate students in the Andrighetti study increased in their confidence but the intervention group had a larger change as demonstrated by the p value using Wilcoxon Signed-Ranks Test. With 54% of the variance accounted for, this is strong evidence of relationship between simulation and confidence.

Confidence was statistically increased in advance practice nurses for cardiovascular assessment (N=36). The Jeffries study was a convenience sample of first year APN's from 4 institutions with just under a 1 point increase on a 1-5 Likert scale with 1 being strongly disagree and 5 being strongly agree in both of these tools.

Studies like this will help to fill in the gaps for nursing education as more research using the NCSBN method is conducted on efficacy through simulation.

Implications at the institutional level within academe will be better educated graduates with the skills and confidence to provide safe, effective care to patients. For the medical providers and corporations it will improve teamwork, especially between physicians and nurses as recommended by the IOM. On the local and regional level, care will be provided by a better trained

staff, resulting in improved patient outcomes. This will translate nationally to reduction of disability, lost income and productivity in private households of more than \$17 billion per year annually. Hospitals could realize savings of more than \$29 billion per year, which would be extremely important as the Affordable Care Act goes into effect. A streamlined education process through the use of simulation can reduce the nursing shortage by accelerating the graduation of better prepared practitioners. Internationally, the sharing of knowledge and new procedures will be facilitated. During this time, information for practice is growing exponentially and could prevent promising developments from being lost amidst the vast amount of research to be evaluated.

#### *Introduction of the PICOt Foundation*

It has been determined by studies in many fields other than nursing, that the use of simulation improves skill sets, although there are some undergraduate studies showing the benefits of this technology in the nursing classroom. The literature has few listings for graduate studies and there are many gaps in the research as it relates to nursing. The NCSBN study on prelicensure nursing education has laid a solid foundation for further research in the use of simulation. The AACN task force recommended using the methodology in the prelicensure research to guide implementation of study for APRN simulation education.

## Literature Review

### *PICOt Question*

For BSN to DNP students in physical assessment class, would the use of simulation compared to traditional teaching methods result in greater confidence in clinical practice, as measured before simulation instruction, after simulation instruction and at the end of the class after seeing patients in clinic over 12 weeks?

### *Scope of the Evidence*

Qualitative studies help to define issues for further research especially randomized control trial (RCT). The studies being analyzed were gathered by searching 7 databases using Boolean logic. The keywords used were simulation, undergraduate, postgraduate, nursing, confidence, and self-efficacy with a comparison of the sources found in each data base. For example, in CINAHL, simulation alone had 14,169 results. By adding confidence, that number was reduced to 953. Fifty four were listed when undergraduate was added and six using postgraduate with nursing. Using the abstracts to identify research that most closely reflected the question posed, 15 were chosen to be read for more detail. Four results were found using self-efficacy in the search. These six were felt to be representative of the other studies in their results.

In 2010, Pike and O'Donnell performed a qualitative study to evaluate if confidence levels in students were enhanced by simulation (Pike & O'Donnell, 2010). Using a focus group method they initially had a convenience sample of

22. Of these 14 volunteered for the study and nine actually participated. The author stated that the optimum size for the style of interview was 5-12 subjects. In a recorded session that lasted 48 minutes, questions were asked of the group from themes that had emerged using a pre-simulation questionnaire. The session was transcribed and it was noted that all subjects participated in the debriefing discussion. No actual numbers were given but two themes were noted.

The participants felt that the simulation was too focused on skill performance and not on other non-technical activities like critical thinking and communication. They specifically mentioned lack of confidence in communicating via telephone to a physician. The other area was the psychological fidelity of the scenario, which is being able to immerse in the simulation. They mentioned feeling “silly talking to the dummy” (Pike & O'Donnell, 2010). One student reported in clinical that in a real client situation she froze and forgot the knowledge she had gained during the simulation.

The authors also noted other weaknesses in the study. One was the lack of standardization in the way the simulation was conducted causing inability to identify cause for variations. Because the students volunteered, the motivation by the students could be cause for bias. Finally, they note that the students were not brought in to review and validate the conclusions drawn by the research. Positive notes include free flow of conversation in debriefing

that allowed comfort with students to be honest. Finally, these results reflect reports from other studies.

A descriptive correlational study evaluated the self-reported confidence levels in senior BSN students as it related to their experience with high-fidelity simulation (HFS) (Cardoza & Hood, 2012). They compared two cohorts of senior BSN students in maternal child/pediatric by taking measurements at the beginning and end of the course. Self-efficacy was measured using General Self-Efficacy Scale (GSE), which has been validated by use in 23 nations, pre- and post- simulation at the beginning and end of the course for a total of 4 measurements. Simulation was performed in the lab of the institution after 3 semesters of nursing knowledge but no prior experience with simulation learning. Two groups with of 31 and 21 students for a total of 52 participants composed of four men and 48 women ages 21-35 were involved in the project. The researchers attempted to standardize the scenario as much as possible through the consistent use of personnel and resources.

Their results determined that there was an overall increase in student confidence levels. Levels dropped after the first simulation on test two. Then with test three and four, given before and after simulation following 7 weeks of instruction, the results were higher with each evaluation. Test three had higher results than the previous reports. There were several areas of weakness that the authors recommended be considered and corrected in subsequent research. The sample was a small, not randomized convenience

sample that did not factor in the student's GPA. They also note that other influences may have been involved and the measurement was not sufficient to show causality. Finally, they noted that the student's confidence did not necessarily match their level of competence. Both groups showed significant differences (F2.5.36, P G .001).

Another study evaluated research that examined the effect of using (HFS) in basic life support (BLS) on the confidence of, acquisition and retention of knowledge in 4th year nursing students (Akhu-Zaheya, Gharaibeh, & Aostaz, 2013). It was done in a university simulation lab in Jordan using a quasi-experimental design. Convenience samples of the nursing students enrolled in the program were randomly assigned to 2 groups. Subjects did not know the purpose of the study but the researchers did. 121 started the study. 110 completed it with no explanation for drops. The only demographics listed varied with 74 women and 36 men, age range 19-23, GPA 56-91. The instrument to measure confidence was modified from a reliable tool providing validity (Arnold, Johnson, Tucker, Malec, & Henrickson, 2009). The American Heart Association (AHA) teaching materials, format and evaluation tools have been validated and are reliable. There was a one month follow-up assessment reported.

Both groups had the AHA teaching. Additionally, the experimental group (52) received simulation experience. They used pre-and post-testing a month after interventions. T-testing showed no difference between the groups based on the demographics (t value 0.035). There was increased acquisition and

retention of knowledge for both groups with no significant difference (t value 1.6). There was significant increase in self-efficacy in experimental group compared to control group after 1 month (t value 3.91,  $p=.001$ ). Weaknesses of the study include size and specific group used in testing. The students used self-reporting which can present a bias based on their ability to evaluate themselves. Confidence did not equate to competence. There was limited psychological fidelity due to construction in the lab. Simulation was not recorded to be used in debriefing. One of the strengths of the study is the specific objectives defined by the researchers, use of validated materials and very specific independent variables. This study has stronger validity than many of the available studies in this area as illustrated in the strengths and weaknesses.

A systematic review, done by Yuan et al in 2011, examined research on HFS from 2000-2011 and its relationship to student confidence and competence (Yuan, Williams, & Fang, 2011) They looked at 24 studies, all quantitative, that contained only 1 RCT and 3 non-RCTs as there was limited availability of this type of study. The rest were descriptive and quasi-experimental design. The other criteria for inclusion were that the research was done with HFS and evaluated the effect on confidence and competence. They included a list of databases searched and the key words to gather the material.

The findings concluded that all of the studies provided mixed results from the individual studies, as some reported a significant increase and some reported a decrease. This was attributed to a lack of heterogeneity of the studies.

They did report a CI of 95% from the reports they reviewed. The discrepancy was related to both positive and negative results. One of the weaknesses noted was small sample size. Another noted the lack of similarity in the measurement tools and their validity. That the student levels were self-reported was considered to allow bias. Finally, there was no determination of the student's knowledge base prior to the intervention (Yuan, Williams, & Fang, 2011). Based on these criteria for examining a systematic review (Melnik & Fineout-Overholt, 2011), this systematic review is a credible source to evaluate literature available up to 2011 as it relates to HFS effects on confidence and competence. The authors of the study note that most of the studies report a positive result and that the use of simulation as a tool in education warranted further study. They suggested that qualitative studies demonstrated positive results but high quality quantitative studies should be performed to gain an accurate measure of effectiveness. Recommendations included the use of specific objectives, larger sample size and standardized, validated tools in future research. Finally, there is a need to demonstrate the ability of the student to transfer the classroom knowledge into the clinical setting (Yuan, Williams, & Fang, 2011).

An analysis done two years later by AHRQ reviewed meta-analyses and systematic reviews to determine whether simulation makes patient care safer (Agency for Healthcare Research and Quality, 2013). Searching multiple databases using the keywords "simulat\*" and "safety", they reviewed 174 of the results. In the final analysis they used 40 from the literature search, 27

secondary from the search, 25 from practitioners in the field that were judged to be seminal works and 8 that were used to explain function. This study included computer simulation, simulation labs, and clinical settings. Only four of 12 reported studies inserting central venous catheters were randomized controlled trials. The data that supports the success and reliability is positive and comparison is possible because of the methodology of this information. The review does not include data as it did not evaluate the numbers to determine the study strength. Outside of these included in the table there is no other data in the report. The assessment was primarily focused on study design and not on the evidence reported.

These studies are not similar enough to be considered replicated, but the results consistently show benefits obtained that are reflected in improved knowledge, confidence, and skill in performing patient care. These studies were conducted in diverse care settings and specialties which offer evidence that the results will likely transfer to nursing education. This teaching has been shown to be effective with students as well as maintaining skill performance in practitioners. No potential harm in direct patient care is foreseen.

### Synthesis of Literature

All of the articles used HFS and confidence of students as the main components of the study. There were several ideas that were common in the results. The main problem is the lack of evidence. They all concluded that there needs to be more RCT studies (Pike & O'Donnell, 2010) (Agency for

Healthcare Research and Quality, 2013) (Akhu-Zaheya, Gharaibeh, & Aostaz, 2013) (Cardoza & Hood, 2012) (Yuan, Williams, & Fang, 2011). The only way to gather evidence that can be measured accurately is for future studies to be quantitative allowing exact numbers. These trials need to have larger sample sizes that will allow the results to be generalized in nursing education. The greatest need is in graduate courses as there are few reports available for this population. Most of the RCT's have been done in other industries, translating results to nursing. It is important that the nursing profession develop its own knowledge regarding the effect of simulation. Research is needed in other areas aside from confidence. They include competence, acquisition and retention of knowledge, teamwork, and communication skills to name a few. Another area to be addressed is standardization of the simulation to allow comparison and reproducibility (Pike & O'Donnell, 2010). Some of the variables that need to be controlled are previous knowledge by the student and grade point average (GPA) (Cardoza & Hood, 2012) (Yuan, Williams, & Fang, 2011). Using the same tool would allow the results to be compared for consistency (Yuan, Williams, & Fang, 2011) (Cardoza & Hood, 2012). There need to be clear objectives for the scenario so that study can accurately evaluate if the results were achieved (Akhu-Zaheya, Gharaibeh, & Aostaz, 2013).

One way to improve standardizing is for the training and techniques of the facilitator to be as similar as possible (Agency for Healthcare Research and Quality, 2013) (Akhu-Zaheya, Gharaibeh, & Aostaz, 2013). Creating

psychological fidelity in the simulation should be a dependent variable (Akhu-Zaheya, Gharaibeh, & Aostaz, 2013). This would aid comparison of outcomes and help show causality.

All of the research agreed that there needs to be more studies done, with better control of variables. This would require the use of a standardized, validated tool to measure across studies.

The facilitator needs to have proper training and adequate facilities and equipment to minimize variation in the simulation scenario and student experience. The Cardoza and Hood study (2012) made note that confidence does not equate to competence. This makes the simulation facilitator's job more critical to evaluate for competence during the scenario. Students should be observed by the instructor, actions clarified in the debriefing, and remediation initiated when needed.

All of these recommendations were echoed in and 2014 study released by the National Council of State Boards of Nursing (NCSBN). This large randomized, controlled study included ten prelicensure schools and followed the students over two years throughout their program. The simulations were the same with debriefing techniques identically throughout the study. They found no difference in NCLEX pass rates or ability as reported by their preceptors during the first six months of practice. One of their conclusions was that high quality simulation could substitute for up to 50% of clinical experience with no difference in the graduate's ability to practice safely.

## *Conceptual Theoretical Framework*

Psychologist Albert Bandura proposed and expanded Social Learning Theory in the 1970's demonstrating how people learn not only by doing, but also by observing.

Out of this work, he developed Self-Efficacy Theory in 1977. The basis of this theory is that the use of psychology can affect a person's behavior. This was tested by treating phobias. Initially nursing used this theory as a framework for health promotion in specific diseases. It was then expanded to include smoking cessation, weight loss, and other behaviors that improve patient health. It has moved into the realm of research in clinical interventions.

Bandura's theory is based on four processes that form a person's perception of himself. First, is that the person's actions produce an effect that they can feel. The second is through the experience of others like themselves. Third is that judgments expressed by others shape self-opinion. Last is the transfer of previous knowledge into a new situation . External stimuli develop and initiate learning. Cognitive development is not brought about by the action itself, but is a consequence of the action. People choose to act or not depending on the outcome they anticipate. Self-efficacy is based on a person's perception of their ability to perform the action. In self-efficacy theory confidence in the ability to perform a task directly affects the outcome . If a person believes he or she will be successful it motivates one to action and will help them succeed in the endeavor.

The Self-Efficacy theory has been used successfully in education. Studies of nursing students and success in math, science, and clinical skills have been measured in undergraduate and graduate levels . There have been many tools developed to measure this quality because the confidence measured needs to relate to the task being learned. The measurement is usually made using a Likert scale. Other factors can affect behavior and need to be considered, such as anxiety . The use of simulation in nursing could allow students to gain the confidence they need in the lab so that when they approach their patients in clinical their care could be improved because of previous success in the classroom.

Simulation allows the student the opportunity to care for a patient in a laboratory situation. If they are successful their knowledge is reinforced. If there is a negative outcome, they can evaluate in debriefing to help them adjust their knowledge in future situations. The student can learn what to do or not to do by observing their peers during the scenario. It is particularly important that the debriefing be conducted well to help the participant maintain a positive sense of self and their ability to transfer this newly acquired knowledge to similar situations in the future when caring for live patients.

## Methodology

### *Overview*

The research was conducted with students from the Marybelle and S. Paul Musco School of Nursing and Health Professions, at Brandman University. It is a division of the Chapman University System. Permission was obtained from Brandman University Institutional Review Board through an expedited review process, as there was no involvement of patients in the study.

### *Purpose*

The purpose of this study was to measure the effect of simulation on graduate and advanced practice students. It specifically focuses on their confidence levels measured before and after the simulation experience and then after their clinical experience. The goal was to add to the evidence that is available to evaluate the effect of simulation in graduate nursing student education.

### *Population*

The population being studied is BSN to DNP students in their final year of a three year program. They will be taking didactic courses as well as their clinical hours with a preceptor. All students are required to be on campus for four days (Immersion) for face to face instruction as well as simulated patient experiences. There will be standardized patients, task trainers, and scenarios with a manikin patient.

## Sample

The sample was volunteers from three different program tracks including mental health, adult acute nurse practitioner and adult gero-primary care adult nurse practitioner classes in a BSN-DNP program. There is a pediatric acute care nurse practitioner program as well; however, there were not any students enrolled in the program at the time of this project. The total potential number of participants is 50. The students are in the final year of a three year program. For recruitment the principal investigator explained the study in person during a class session and obtained consent from students. Faculty were blinded to the identity of students who participated in the study. Repeated measurements using two valid and reliable instruments will be obtained by online survey at three different points. The first two measurements will occur during the four day immersion all students participate in. 1) At the beginning of their on campus immersion participants will complete pre-simulation 2) immediate post-simulation (sometime during the 4 day immersion), and 3) 7 weeks later, at the end of the term they will complete the 3rd measurement.

## *Instrumentation*

There have been a few confidence tools have been used over the last twenty years by nursing. This study obtained measurements using two survey tools, open-ended questions, and orientation time. Confidence would be demonstrated by positive responses using qualitative questions in an exit

survey. The survey is a combination of The General Self-Efficacy Scale (GSE) will measure student confidence in an 8 question Likert scale format and The National League of Nurses (NLN) has a tool called the Self-Confidence in Learning using Simulation Scale that they used in a pilot study of 403 participants . This same instrument has been used in other NLN studies helping to standardize the results

#### *Data Collection*

Informed consent was obtained on the first morning students were on campus for their degree courses. Then survey links and random identification numbers were distributed with no connection for the researcher between the number and the participant. They were instructed to use the number each time they logged into a survey to link the responses.

Data collection was conducted through an online survey. Survey Gizmo is a secure, online professional survey management company. They are HIPAA compliant with redundant firewalls, 99% up time and password protection. After obtaining an account with Survey Gizmo the survey was entered into the site. The participants logged on to computers in the lab to complete the first test. Throughout the week, as the participants completed their simulation experiences, they were reminded to fill out the second survey. Reminders were sent out to course instructors during week seven to post to blackboard and remind the participants about the final survey.

## *Data Analysis*

Data was downloaded from the Survey Monkey account at the conclusion of data collection for the purposes of this clinical scholarly project. Data from the pre-test and post-test were linked up by IP addresses. Some individuals failed to completely answer all questions on both surveys completely. Their responses were eliminated as erroneous data. One individual answered the post-survey twice, the second post survey was eliminated as erroneous data. After eliminating the incomplete and erroneous data there were 25 complete responses reported.

The data was put transferred into an excel spreadsheet and compiled and compared. The statistical test utilized for the analysis of data for this project was the Wilcoxon Signed Rank Test. The Wilcoxon Signed-Rank Test is a nonparametric counterpart of the paired *t*-test, outcomes are measured on an ordinal scale. This test is applied when testing the same sample twice, or within- subjects design model. The Wilcoxon Signed-Rank tests the null hypothesis against the alternative hypothesis. If both samples are identical then the null hypothesis is sustained, if the two samples are opposite then the alternative hypothesis is proven (Polit, 2010).

The first survey had 25 responses, the second had fourteen and the third had eight. Only six students submitted three surveys. A Wilcoxon Signed Ranks test was conducted to evaluate whether advanced practice nursing students showed greater confidence after instruction using simulation. The analysis compared same groups with measurements using an ordinal scale. Wilcoxon

Signed-Ranks Test indicated that increased confidence was not statistically significant following simulation.  $Z = -.948$ ,  $p < 0.343$ .

### *Limitations*

A serious limitation to this study is the small number of responses throughout the data collection. The sample was a small, not randomized convenience sample that did not factor in the student's GPA. It is also possible that other influences may have been involved such as design and implementation of the simulations and instructor competence in debriefing techniques. Finally worth noting is that the student's confidence did not necessarily match their level of competence.

### *Results*

The data was entered utilizing the Wilcoxon Signed-Rank test to analyze the data. The null hypothesis could not be rejected because  $p < 0.343$ . There is insufficient evidence to support the hypothesis that the intervention caused a difference in reported confidence. The  $n$  of six did not allow the responses to accurately reflect results for the whole group.

## Results

### *Evidence and Summary*

Simulation provides opportunity by helping students achieve mastery over an experience, not just a skill. They can then transfer this information to

different situations helping them to be successful again. A person will also build efficacy watching others and learning from the other person's efforts. When used properly, simulation provides instructors an opportunity to mentor the student in transferring theory to practice using critical thinking and assessing what actions are best suited to which situation. Finally, they learn that their stress level and mood is not an indicator of failure and a need to stop, but can use it to motivate themselves to persevere. In the debriefing that follows, the student is guided by the instructor to assimilate the opportunity and draw on it again in the appropriate circumstances.

With self-efficacy, the student will be open to more options in their career, will employ more dedication to achieving their goals, and avail themselves of opportunities to be better prepared to meet the challenges ahead.

Because the results of this study showed no statistically significant increase in confidence following simulation there could be two options. One would be to repeat the study with the possibility of getting better participation. This could be achieved partnering with other schools to increase the numbers.

Another option is to gather data longitudinally over several cohorts using the same validated scenarios conducted per the NCSBN study methods. This would allow for a larger pool of perspective participants.

To get better compliance on survey completion, relevant questions could be added to the end of course surveys for a better response rate. It might be helpful to use only two surveys, before and after. This also might increase the

number of completed submissions. This is if the small n is the reason for results being statistically insignificant.

Another option would be for the school to re-evaluate how simulation is being done in the program. By making changes to align their program with the recommendations of the NCSBN National Simulation Study outcomes could be improved. This would be a marketable feature that could increase enrollment in the DNP program.

The current health care system is being negatively impacted by the number of providers available to handle the current patient load, both in and outpatient. One important goal should be the preparation of competent, practice ready providers. Nurse practitioners that are allowed to provide care to the full limits of their scope can positively impact this shortage. The shortage of instructors and clinical sites are can be remedied by the use of simulation for education. DNP education programs must evolve to provide the instruction that will prepare advanced practice nurses for patient care. By improving the quality of simulation experiences, educators can positively impact the provider shortage.

The improvement will require specific elements be used in the simulation process. First is clearly stated objectives. The objectives will be evaluated at the end to determine if the simulation was successful. The scenarios need to be tested and validated providing an evidence based experience. The most important feature is the debriefing process. This means that the facilitator

needs to be educated in debrief pedagogy and have been mentored until they achieve competence.

## Discussion

### *Implications for optimized care*

As this project is directed at how simulation will improve the learning for the students in the Brandman DNP program, it is important to evaluate the university's goals and how it will enhance achieving them. The vision statement looks to the evolution of adult learning. The purpose is to help these students become successful in their chosen fields. By using innovation in their value statement, they purport that they value new and innovative strategies that they will promote to ensure that what is taught is relevant and engages the student in the learning process . To this end, the project was unable to demonstrate a connection between simulation and student results. By optimizing the programs use of simulation there would be an increase in the quality of the education received by the students. This would support the importance of evidence based practice to promote effective simulation use in the program.

In the WASC accreditation report, it was recommended that the university do self-studies in preparation for their next evaluation. One of the areas they focus on is the development of services that support students to be successful in achieving their goals. The report specifically recommends creative initiatives in response to the student needs for development in their chosen

profession . By providing educational experiences that produce practice ready professionals, the university will meet this objective. Successful results could be cited to validate the use of simulation in the program.

### *Implications for Advanced Practice Registered Nursing*

Standardized methods of using simulation would have multiple layers of implications. At the institutional level within academe will be better educated graduates with the skills and confidence to provide safe, effective care to patients. For the medical providers and corporations it will improve teamwork, especially between physicians and nurses as recommended by the IOM. On the local and regional level, care will be provided by a better trained staff, resulting in improved patient outcomes. This will translate nationally to reduction of disability, lost income and productivity in private households of more than \$17 billion per year annually. Hospitals could realize savings of more than \$29 billion per year, which would be extremely important as the Affordable Care Act goes into effect . A streamlined education process through the use of simulation can reduce the nursing shortage by accelerating the graduation of better prepared practitioners. Internationally, the sharing of knowledge and new procedures will be facilitated. During this time, information for practice is growing exponentially and could prevent promising developments from being lost amidst the vast amount of research to be evaluated.

### *Themes*

Nursing education is developing a body of knowledge that supports the use of well executed simulation in the preparation of nurses prelicensure and for APRNs. It will be important for simulation program evaluation to be conducted using validated tools and methods in the future. This is reflected in some of the comments students made at the end of their surveys.

### *Survey comments*

#1

Some of the questions about the actual simulation threw me off because I did not do the simulation yet.

The simulation labs really assist with clinical experiences.

#2

The simulation exercise was supposed to have two students at a time with the other students to wait in an adjoining room, but all of the students remained in the room during my partner and my simulation exercise, and this was difficult as the entire group were making comments, so the exercise was not as effective as it might have been.

Increased simulation practices increases confidence.

#3

Each simulation lab increased my knowledge and confidence for the clinical experience and future clinical practice.

The simulation definitely helps with building confidence during real clinical encounters. Ultimately the responsibility of learning how to be a good NP falls on the student because an adult learner, they should know how to use resources and get the necessary help to be successful.

I feel like the clinical simulations, although very stressful, are helpful and significant for our education.

### *Limitations*

The small sample size (n=6) that completed all of the surveys was not enough to be statistically significant. The lack of standardization in the way the simulation was conducted caused an inability to identify cause for significant results. Another area to look at is if the instructor is trained in conducting effective simulation.

### *DNP Essentials*

As to the Doctor of Nursing Practice (DNP) Essentials, scientific underpinnings for practice focus on preparing advanced practice nurses for their role as provider using evidence based practice. Using systems for the second essential would include evaluating the process of preparation so that practitioners will be safer for practice. This project was designed to use research methodology to evaluate simulation effectiveness on APN preparation as per the third Essential. Technology is addressed in the fourth Essential. Simulation uses technology as a tool to facilitate learning and increase patient

safety. As a health care advocate, the APN will use simulation to its full potential by increasing the amount of simulation used in nursing education as determined by the study recently published by the National Council of State Boards of Nursing (NCSBN) while following the best practice as used in the research. Per the sixth Essential, interprofessional collaboration is improvement of patient care and outcomes. One of the ways to facilitate better communication is the use of simulation involving multiple disciplines. The participants learn from each other the roles and limitations, working to build bridges. Patient and family education can be practiced during scenarios, helping to improve the individual health and prevention of recurrences per the seventh Essential. And in the last, the APN student gets the opportunity to practice cultural sensitive, therapeutic communication to foster excellent practice strategies.

### *Recommendations*

Further study could be done in several areas. One would be to determine a better data collection method. Perhaps only two surveys instead of three would have provided more responses. Another option could be to partner with other institutions to have a larger pool of potential participants. It might be helpful to conduct the study over several cohorts if the simulations are conducted consistently well. Evaluation of how simulation is conducted using the standards set up in the NCSBN study could enhance the simulation experience.

## *Sustainability*

According to the template to implement a lasting change, there are three requirements: culture, leadership, and system. A change culture does seem to be evident at Brandman. The staff works well together and supports each other in their professional roles. They are open to change or they would not be teaching in a new program. They have the training to be effective instructors and mentors, as well as motivation, adaptability, and confidence in their ability. Leadership is currently evolving with a new dean. Each of the instructors has leadership qualities in their field and will be able to stay on target and help their students.

There are systems in place to study and evaluate the program. One of them that are most evident to the students is the survey each is asked to complete with each class. From observation it is evident that the concerns and suggestions made are taken seriously and adjustments are made to incorporate them. This gives the students empowerment in their educational process and comfort knowing that the organization is as concerned for their achievement as the student is.

The Journal of the American Medical Association (JAMA) listed several barriers to change. These included a lack of awareness of the need, the current methods seem like they will be less work, staffing and space, and self-efficacy in current ways of performing. Change also needs organizational support. Simulation requires evidence-based practice with validated scenarios and the budget for equipment, supplies, and staffing. After the

implementation process, there needs to be periodic evaluations to determine if the new method is working. Surveys will answer those questions. Another way to motivate faculty to use it and continue the implementation is to make it part of the evaluation process.

There is also the benefit of being associated with an institution that produces competent and safe practitioners. Improved student results will translate in to the ability to recruit more students which keeps the university open and provides job security for the instructors.

### *Dissemination*

As the results are statistically insignificant, there is little value in making these results available to other institutions. The prudent course would be to evaluate the current simulation program and make changes that will improve outcomes. From another viewpoint it might be good to make these available as a descriptive study to guide further research so that future studies can be designed to avoid some of these shortcomings. This information could also be used as a pilot study to aid the design of future research projects in this area.

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## **Appendix A**

### General Self Efficacy Scale Questions and Scoring

- 1 I can always manage to solve difficult problems if I try hard enough.
- 2 If someone opposes me, I can find the means and ways to get what I want.
- 3 It is easy for me to stick to my aims and accomplish my goals.
- 4 I am confident that I could deal efficiently with unexpected events.
- 5 Thanks to my resourcefulness, I know how to handle unforeseen situations.
- 6 I can solve most problems if I invest the necessary effort.
- 7 I can remain calm when facing difficulties because I can rely on my coping abilities.
- 8 When I am confronted with a problem, I can usually find several solutions.
- 9 If I am in trouble, I can usually think of a solution.
- 10 I can usually handle whatever comes my way.

1 = not at all true   2 = hardly true   3 = moderately true   4 = exactly true

## **Appendix B**

### NLN Self-confidence in Learning Tool

1 = STRONGLY DISAGREE with the statement

2 = DISAGREE with the statement

3 = UNDECIDED - you neither agree or disagree with the statement

4 = AGREE with the statement

5 = STRONGLY AGREE with the statement

6. I am confident that I am mastering the content of the simulation activity that my instructors presented to me.

7. I am confident that this simulation covered critical content necessary for the mastery of medical surgical curriculum.

8. I am confident that I am developing the skills and obtaining the required knowledge from this simulation to perform necessary tasks in a clinical setting

9. My instructors used helpful resources to teach the simulation.

10. It is my responsibility as the student to learn what I need to know from this simulation activity.

11. I know how to get help when I do not understand the concepts covered in the simulation.

12. I know how to use simulation activities to learn critical aspects of these skills.

13. It is the instructor's responsibility to tell me what I need to learn of the simulation activity content during class time.