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Analysis of the Impact of Hours of Simulation on HESI Scores

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Executive Summary

Project Title: Analysis of the impact of hours of simulation on HESI scores.

Statement of problem: Undergraduate nursing programs are challenged to develop high cognitive skills in students and prepare them for practice readiness. Limited clinical placements that offer a narrow exposure to clinical experiences to prepare nursing students adequately to apply their knowledge are a growing concern. Simulation experiences allow students the opportunity to acquire competencies necessary to apply knowledge to practice. Is there a direct relationship between increased hours of simulation to students' readiness for practice?

Purpose: To determine if there is a relationship between hours of simulation received and student performance on HESI exam to better explain the relationship of simulation to student knowledge acquisition and application.

Goals: Provide evidence of impact of simulation on nursing student knowledge. This study will provide information that may guide undergraduate nursing curriculum development specifically surrounding clinical hours.

Objectives: To determine if there is a relationship between the number of hours of simulation received and student performance on a standardized exam.

Plan: Challenges for clinical placements required innovative strategies to meet the clinical requirements within this organization. The use of simulation in place of clinical hours was being done, but cohorts were receiving different numbers of hours. A retrospective look at each of the cohorts was done to determine simulation hours received. Data was collected from each cohort's HESI exam results and compared.

Outcomes and Results: The analysis of data revealed that 6 hours of simulation is a minimum number of hours that will have a positive impact on student learning, and 12 hours showed the greatest impact on students within this study. The data does not appear to reach saturation one cannot prove that only 6 or 12 hours of simulation should be considered as all levels are statistically significant. One cannot prove that additional hours is a waste of time or that student learning has reached a plateau.

Keywords: DNP Project, Undergraduate Nursing, Nursing Clinical hours

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Problem Recognition/Definition

Nursing education is rapidly changing to meet the demands of the paradigm shift within health care. The once acute-focused curriculum must now adapt to incorporate multiple aspects of nursing care to ensure the future nurses are prepared to practice in a community, holistic care profession with a focus on patient centered and multidisciplinary collaborative care (Roehrs 2011). This shift has created challenges to undergraduate schools of nursing to change their curriculum to meet these standards. In addition to curriculum changes the decreasing availability of quality clinical sites has challenged schools of nursing to creatively fill these gaps. The use of simulation experiences is one way schools are attempting to meet the needs of the students (Grant 2010). Simulation experiences allow students the opportunity to acquire competencies necessary to apply knowledge to practice and can produce specific experiences that may not be available within traditional clinical placement (Secomb & McKenna 2012). The purpose of this study is to determine if there is a relationship between hours of simulation received and student performance on Health Education Systems Incorporated (HESI) exam. The HESI exam was developed as a predictor test to determine student readiness to take the NCLEX (HESI, 2013). The HESI standardized test provides information to determine individual remediation needs for students (Nibert & Morrison, 2013). This information can be used by nursing faculty to better prepare students to be successful with the licensure exam.

Simulation is a method of evaluating performance that has been around for many years. The military has used simulation in flight simulators and computer programs to evaluate one's skills or adaptation to specific variables. Many years of use in a variety of organizations has shown that simulation is a proven way to teach, learn and evaluate learning (Rourke, Schmidt, & Garga, 2010). The increase of interest in simulation within the healthcare field has created

benefits, but also its share of challenges. The shift within health care focus and education is creating a push toward increasing the knowledge of the students to be able to transition into a practice setting and be prepared to practice independently, but the challenges faced by schools of nursing for quality clinical placements are increasing. The use of simulation is popular among both rural and urban schools to attempt to fill the gaps created by poor or non-existent clinical site placement (Grant 2010). Simulation, both high and low fidelity, is widely used throughout nursing programs, however the number of hours used in place of clinical varies among states and programs (State of Colorado Department of Regulatory Agencies 2015). Undergraduate nursing programs are challenged to develop high cognitive skills in students and prepare them for practice readiness. Limited clinical placements that offer a narrow exposure to clinical experiences to prepare nursing students adequately to apply their knowledge are a growing concern. Simulation experiences allow students the opportunity to acquire competencies necessary to apply knowledge to practice (Kirkman, 2013).

Problem Statement

The decreased availability of quality clinical sites for rural community nursing students and the increased popularity of use of simulation within nursing curriculum require a more in depth look at the effects of simulation on students and their readiness for national licensure exam. Is there a direct relationship between increased hours of simulation to students' readiness for licensure examination?

P- Undergraduate nursing students in the junior year medical-surgical class

I- Increased hours of simulation experience

C- Previous 3 cohorts

O- Change in the Health Education Systems INC (HESI) student performance

Theoretical Models

Dorthea Orem's self-care deficit theory is described as the relationship between one's initiative for self-care and the identification of deficits. This theory describes three basic levels of self-care requisite which if not met create a deficit (Orem, Taylor & Renpenning, 2001). This deficit can be identified and fulfilled by another until the person can meet the needs independently. It is a continuous process of evaluation, implementation and re-evaluation. Major assumptions of this theory are all people are individuals and needs or deficits can change per circumstances (Orem, Taylor & Renpenning, 2001). Orem described nursing as a form of action-interaction between two or more people ("Dorthea Orem's Self-Care Theory", 2012). This can be applied to nursing education as well if one thinks of the student learner as the patient and the educator as the nurse. This is especially true within simulation where the type of simulations given to students can be a direct response to student deficits in learning experiences. Orem's theory has the end goal to render the patient, or student in this case, capable of meeting their needs ("Dorthea Orem's Self-Care Theory", 2012). This is shown by bringing the person to as near normal function as possible. Within the education realm this would translate to bringing the students to the desired competency necessary (Berbiglia 2011). This theory could help guide this PICO as the identification of the needs of the students by the faculty to create simulations that can help fill these deficits in a controlled environment. The evaluation of students within a simulation environment can also reveal deficits that are recognized by both the student and the faculty which can lead to curriculum changes to focus on those specific needs. The relationship between educator and student can encourage autonomy over learning, but allow for additional support when needs are identified. It is a give and take relationship to be successful and requires active participation of all parties involved

Kolb's Experiential learning theory (ELT) focuses on learning through process and experience as a source of learning (Kolb 2015). The ELT consists of four stages within a cycle of learning that describe the process of knowledge acquisition (Kolb 2015). The first stage of concrete experience is a new experience or reinterpretation of an existing experience (McLeod, 2013). The second stage is observation and reflection (McLeod 2013). This allows the learner to determine inconsistencies between the experience and understanding. The third stage is Abstract Conceptualization in which the reflection from stage two creates new ideas and generalizations or conclusions about the experience (McLeod 2013). This lead into the final stage of Active Experimentation where the learner applies the information to the world around them resulting in new experiences (Kolb 2015). Kolb also described four learning styles encompassing a combination two of the stages. The ELT suggests that experience assigns meaning to knowledge thus increasing the retention (Poore, Cullen, & Schaar, 2014). The stages are a continuous process and at the completion of stage 4, the experimental stage, new experiences are created thus repeating the cycle once again (Lisko, & O'Dell, 2010). This process of knowledge acquisition can be applied to this PICO as a road map to understanding the importance of experience and knowledge acquisition.

Review of Evidence

Available literature is limited in the effects of simulation on student performance on a standardized test such as HESI. There is a wide array of research that focuses on how simulation affects critical thinking and knowledge retention as well as a variety of methods to implement simulation into the curriculum. These findings are valuable to the understanding of how and why simulation can be used within undergraduate nursing programs in conjunction with or in place of traditional clinical placements (Chung 2012). Initial searches were narrow using key

terms such as “nursing education and simulation”, “simulation evaluation”, “simulation in undergraduate education” and “HESI in undergraduate nursing education”. These were searched within the main search engines of Cinahl, EBSCO host, and ERIC. More searches were conducted using a broader approach to attempt to gather additional information about simulation application in education as well as the uses of HESI exams. Once a wide range of research was obtained the information was narrowed down to focus on specific applications of simulation and knowledge retention within undergraduate nursing. This included confidence and competence of students and faculty surround simulation.

Knowledge acquisition and the ability to transfer knowledge from the classroom to practice is a priority within education. A study by Kirkman (2013) focused on the ability of students to transfer theory knowledge into application using high fidelity simulation. This was a time series design study that focused on the transition of knowledge from classroom into high fidelity simulation experience and transition of knowledge into a traditional clinical setting. The sample size of 42 undergraduate nursing students was observed within a traditional clinical setting on three different occasions (Kirkman, 2013). Each observation took place in the traditional clinical setting while the student performed a respiratory assessment of a patient. The three observations included observation of students prior to lecture or simulation specific to respiratory assessment. The second observation was one week following a classroom lecture about respiratory assessment and patient management. The third observation was one week following a high-fidelity simulation scenario related to asthma. The students were observed in their clinical performance and a standard rating scale was used by the observers. The results of this study revealed a significant improvement in observation scores post high fidelity simulation indicating a higher application of knowledge post simulation experience when compared to

students receiving traditional lecture or no exposure to the material (Kirkman, 2013). Although limited by a small convenience sample size as well as short time frame the results give strength to the use of high fidelity simulation as a method to transition from classroom to practice.

The ability to apply knowledge into practice is necessary for nursing students to successfully transition from school into practice. A study by Pauly-O'Neil and Prion (2013) focused on the use of simulation to improve medication administration skills of nursing students. This was an evaluative study to determine the overall influence of mixed education approach on knowledge, skills, and self-confidence of undergraduate students and medication administration. This study was a convenience sample of 32 BSN students who were evaluated through pre-and posttests following 50 hours of traditional clinical experience and 40 hours of simulation (Pauly-O'Neil & Prion, 2013). The simulation scenarios were aimed at filling the deficits that the traditional clinical experiences lacked. This included skills such as IV starts and specific medication administration the students were unable to perform or not exposed to within the traditional clinical experience. The results of the pre-and post tests revealed a rise in self-reporting self-confidence and knowledge as well as the ability to perform safe medication administration. This mix of methods of simulation with traditional clinical experience revealed a more comprehensive learning experience and preparation for safe practice of the students (Pauly-O'Neil & Prion, 2013). This study was limited by a small sample size as well as lack of separation of the performance skills between simulation and clinical experience. It does however give power to the push for incorporating additional education methods to further enhance students' knowledge and experience. This is important for this project to understand student acquisition and retention of skill sets.

Another study by Schlairet & Pollcok (2010) was conducted to explore the relationship of knowledge acquisition of students with clinical versus simulation experience. This was an intervention study of 74 undergraduate students (Schlairet & Pollock, 2010). Each group participated in a two-week clinical and simulation experience. One group did traditional clinical followed by simulation and the other completed simulation prior to traditional clinical experience. The results revealed the group that did simulation then traditional clinical had a greater increase in test scores post simulation when compared to the traditional clinical-simulation group. Both groups did reveal significant improvement overall in tests scores (Schlairet & Pollock, 2010). Simulation is shown to have as big of an impact on student knowledge gain as traditional clinical experience. Limitations within this study were noted as small sample size as well as curriculum changes. Despite these limitations the results strongly indicate that the use of simulation in conjunction with traditional clinical experience can positively affect students' knowledge acquisition and performance.

Student outcomes from simulation is important, but one must also focus on the faculty and curriculum to implement successful simulations. An informal review by Phillips (2011) was completed to explore the views of high fidelity simulation and nursing faculty. This qualitative study used questionnaires with open ended questions to gain responses. The focus of the questions was on the use of high fidelity simulation, the confidence of the faculty to use it and the benefits if any to nursing education. The results revealed that 90% of the faculty were using high fidelity simulation in their teaching, but only 40% felt confident in using it with 35% feeling insufficiently prepared to use simulation (Phillips, 2011). While 80% of the participants felt there was a significant benefit to simulation in nursing education the lack of education about the use of simulation and a solid format decreased their confidence in using it (Phillips, 2011).

This informal review has multiple limitations, but the indicating that faculty see the benefit, but feel ill-prepared to use simulation opens the door for additional research to create solid education models for faculty to implement simulations. This is important to understand how faculty preparedness can affect student learning with simulation.

Market Risk Analysis

Population

The population of undergraduate nursing students enrolled in a BSN program was chosen as the target for this study. It is a small convenience sample of fours cohort that attended Adams State University. It is a predetermined sample. Each cohort received a different percentage of simulation to clinical hours ranging from 5%-25% of simulation hours used in place of clinical hours for the second year medical-surgical course. The cohorts ranged in size from 16-31 students, a total of 87 students.

Understanding how the amount of simulation used within a clinical rotation affects student retention of knowledge is imperative to continue to grow an effective program. This population was chosen because of the quality improvement nature of the study and because it would provide data with little to no impact on student learning or curriculum changes. The results will be valuable to this university but may not be applicable to the general population. However, the value of the data will create a springboard for additional research.

Strengths, Weaknesses, Opportunities and Threats

The hosting university is a rural school in the mid-west. It offers both a BSN undergraduate nursing program as well as an online RN to BSN program. Our RN to BSN program is 10 years old and our undergraduate BSN program is starting year 7. Located in a small community surrounded by several other small communities which are comprised of a

diverse cultural population the student population is comprised of many first-generation students. There is not a direct competitor with an undergraduate BSN, but there is a junior college, in the same area that offers an ADN program and with the possible changes in legislation could potentially be allowed to offer the same BSN degree.

strengths.

Primary strength is the state of the art simulation lab available. The simulation lab was created through several community and state grants that allowed for high quality equipment and facility to be built. The lab is one of the only simulation labs in the state to have a dedicated IT tech employed.

weaknesses.

The primary weakness is the increased turnover of staff. Currently the university has availability for one additional faculty members, but has a significant lack of qualified applicants. Nursing faculty are paid well below state and national average and the rural location does not have a variety of higher level nurses to choose from. This can impact the amount of simulations that the program can offer to the students. The turnover rate can also affect the simulation consistency from one group to the next.

opportunity.

This university has the unique opportunity to use the simulation department to benefit the community. This can be done through offering continued education to local hospital and clinical staff members through the use of simulation as well as the ability to coordinate community wide simulations to incorporate all community resources toward disaster preparedness. Simulation also provides students the opportunity to be exposed to a wider variety of patient care scenarios. This can complement the students' experiences that they receive in the traditional clinical setting.

threats.

The primary threat for this university would be the possibility of significant decreased enrollment forcing the program to close. A second threat is the continued low NCLEX pass rates. These threats were chosen because if enrollment due to multiple circumstances were to drop below a fiscally responsible level or if the NCLEX pass rates do not maintain the minimum standard set by state board of nursing, the program would cease to exist and multiple opportunities for local students would be lost (Figure 1).

Decreases in quality clinical placements within the undergraduate nursing education has created a need for more innovative teaching methods. Simulation is one such method that can be customized to the needs of the students. In rural communities, access to specific experiences within clinical sites is limited and a student may never have the chance to perform a skill on a patient throughout his or her nursing school career. Simulation can create those experiences for the students and allow for a better-rounded, competent nurse upon graduation

Some restraining forces are due to lack of supporting evidence and knowledge. Faculty can have challenges with changes and straying from full clinical experiences by incorporating increased hours of simulation can be not supported. There may be a concern by faculty students and hospitals about the value of simulation as an education tool and the fear of lack of exposure to real life experiences may inhibit student learning.

Stakeholders

Multiple stakeholders were identified surrounding this quality improvement project. The first identified is the Nursing program. The decrease availability in quality clinical sites and increases in fees has created challenges for the nursing program to ensure students gain quality and meaningful clinical experiences. Simulation is a possible solution to help alleviate some of

these concerns. Students are also a major stakeholder as they will benefit from curriculum changes that may occur as a result of this study. On a larger scale the University is a stakeholder as the nursing program is a vital part of the institution and providing quality education is a priority. The local community hospital, potential patients and nurses working with the community are also stakeholders. Students of the university are also stakeholders as simulation would be a part of their undergraduate curriculum. The use of simulation is becoming more widely used for continuing education and monitoring skill proficiency of working nurses. This research may help create policies for working nurses. The idea of using simulation as clinical hours is challenging for some working nurses to accept. This study could provide evidence based information to give these nurses and providers the confidence in the education of the students and open the doors for additional opportunities.

Costs Benefit Analysis

Resources required to complete this project was low. The largest resource was time to compile and analyze the data from the completed HESI exams. Access to the HESI results did not require additional cost to this author. The total costs associated to complete the project be consisted mainly of office supplies such as paper, computer software rental for data analysis and time. These minute costs were worth it as the potential benefit for the program could be huge. The results of this project have the potential to shape the curriculum for the program to give more flexibility to adjust to the challenges of clinical placements using simulation. While the population of this project is limited the data could create a spring board for additional research which could potentially affect undergraduate nursing curricula and create more comprehensive guidelines to the use of simulation.

The cost for a department to increase hours of simulation will vary greatly from one department to the next. This school has a running sim lab currently with a foundational inventory. The startup costs for a simulation lab on average are around $500,000. Several fixed costs exist such as the salaries of the staff. Minimum of three staff positions which include the simulation director, coordinator and sim tech can have an average salary range of $138,000 annually. Use of the lab and equipment will increase utility costs and maintenance, which could range roughly $3000 annually. Another fixed cost will be the manikin warranties: $17,000. These are purchased up front, and will remain the same until the warranty expires (5 years) or equipment is upgraded. Depreciation of equipment is another fixed cost. The value of the lab equipment is roughly $450,000 with a 10-year product life. This would be equivalent to $45,000 per year in depreciation costs (Figure 2).

Variable costs are costs that may change over time depending on what is required. The simulation center will have several variable costs associated with it. The first will be supplies. Estimated cost for yearly supplies is $10,000 yearly. This however could fluctuate up or down depending on the utilization and the type of supplies that were used. Another variable cost will be the continuing education or recertification costs. The amount will vary according to the need of the staff.

Long term costs from this project could be additional staff and faculty hired within the simulation department. This would also include specific training for the staff on the development and execution of quality simulations that effectively meet the student requirements for clinical experience. Although this will appear to be additional expenses for a program the decrease in expenditures for additional clinical instructors and facility fees could potentially balance the costs.

Project Objectives

The objective for this research is to determine if there is a correlation between the number of hours received in simulation and student performance on the standardized HESI exam. The HESI exam is a nationally recognized NCLEX readiness indicator examination that is used by nursing programs nationwide (HESI, 2013). This exam is used by nursing programs to follow the progress of students throughout the program to identify areas of concern. This data will be organization sensitive as it will provide an understanding of the students' performance and knowledge level as well as provide guidelines for curriculum development to ensure the students are receiving quality education that will successfully prepare them to enter the profession of nursing. In addition, it will provide information to use the data to create best practice for this university. Long term goals are to see an improvement in NCLEX scores and possibly policies surrounding simulation in undergraduate nursing programs. This form of quality improvement could potentially be a foundation for other nursing schools to model.

Mission and Vision statements

This university has created a mission that encompasses education needs of diverse populations to educate and inspire students toward their dreams and ambitions. This mission is carried over into the nursing department's mission which strives to provide students an environment of learning that is evidenced based and uphold the professional nursing standards, patient safety and culturally competent care within a rural community (Adams State University, 2014). The simulation department uses the University and the nursing department missions as a guide to its mission:

> Simulation center: Dedicated to improve the transfer of knowledge from theory to practice providing an opportunity to enhance clinical skills and experience hands on

patient care techniques. This process provides immediate instructor feedback to improve understanding of concepts all within a safe, mistake friendly environment

The incorporation of cultural diversity and patient outcomes from both the university and the nursing department into the mission for the simulation department creates a learning environment that will prepare nursing students to enter practice into their community and understand the unique needs of that community.

The vision for the university is to be the University of Choice for underserved populations and all who want a quality education and inclusivity. The nursing department envisions all students passing NCLEX exam on the first try upon graduating and creates highly successful graduates with the aspiration to be the premier nursing program in rural Colorado (Adams State University, 2014). These visions have some similarities in the focus on the diverse population and needs of the community and incorporation of some of those aspects helped to create the vision for the simulation department:

SIMULATION: Bridging student knowledge from theory to practice within a safe environment

The vision for the simulation lab is to ultimately link theory and practice to enhance successful transfer of knowledge from classroom to clinical setting. There is not a specific cultural diversity element within this vision and one could look at adding learning cultural diversity within this vision. However, understanding the diverse student population that comes into the department and the needs of the community in which many of these students come from are considered within this vision. Simulation has been shown to improve understanding of concepts that were learning within the didactic portion of the class (Secomb, McKenna & Smith 2012). The ability for students to learn the foundational knowledge in the classroom and apply

that knowledge within the simulation lab where it is safe to make mistakes without the negative consequences allows the students to test the boundaries of the information. The application of the knowledge and then reviewing this once again within the debriefing of the simulation gives multiple access points to the information for improved student retention (2012). The broad understanding of bridging the gap from classroom theory to application practice knowledge is the goal of simulation.

Evaluation Plan

Methodology

The shift in nursing education toward a community based focus instead of an acute care focus is creating a change in curriculum (Roehrs 2011). Traditional clinical sites are still acute care focused and the limited availability of alternative sites creates additional challenges. Nursing programs strive to understand the effectiveness of their curriculum as well as student readiness for state board testing. Many programs have adopted the use of nationally recognized standardized testing platforms to quantify both (State of Colorado Department of Regulatory Agencies 2015). The results of the med-surg HESI specialty test was used as the primary outcome measure within this study. This test is a computerized test that includes questions that are weighted differently from easy to hard (HESI, 2013). HESI tests the students' performance in a variety of nursing applications within the med-surg curriculum.

Each student has the same question bank of difficulty. The test provided a conversion score to account for the question difficulty (HESI, 2013). This allowed a more consistent comparison of the four cohort scores. Every student in each cohort took two versions of the HESI within the same semester. The mean average of each version was compared. This was

done to better reflect the overall knowledge. The cohorts were given two versions as a percentage of their overall course grade which was approximately 10% (100 points) on the first version and the second worth 15 %(150 points). The points were assigned on the following scale: >900 HESI = 100%, 899-750 = 75%, 749-500 = 50%, <499 = 25%. This allowed students to get a minimum of 25% of the points just for participating in the test. If students did well on the first test and were satisfied with their overall grade for the course they might have put less effort into the second test. This could have skewed the results. Due to this potential for decreased effort the choice was made to take the average result of the two versions to gain a better overall result of the student performance.

The sample size for this study consisted of all the students from four separate cohorts, looking specifically at their junior year med-surg class. The cohort sizes varied from 16-31(Adams State University, 2014). Each cohort received a different number of hours of simulation experience. Due to the retrospective design the use of all the cohort students adds to the value of the data, however, it also limits the sample size as it is already pre-determined.

A logic model was created to determine resources, constraints as well as long and short term goals (Appendix B). The determined impact of this project could allow for significant curriculum changes with overall improved student outcomes. The timeline was approximately 18 months from start to finish. As this was a retroactive study, the data from the three previous cohorts was already completed and the fourth cohort was completed within a semester (Appendix C). Prior to collection of the data an IRB proposal was requested through both Regis University and Adams State University. As this was determined to be a quality improvement project the research fell within the exempt category and both organizations granted approval (Appendix D).

This was a retrospective, correlative study aimed at determining the relationship of hours of simulation and performance on a standardized examination. Utilization of the data to attempt to find a correlation of the variables involved. The independent variable was the number of hours of simulation experienced by undergraduate BSN nursing student and the dependent variable was mean scores achieved on the Health Education System Inc. (HESI) specialty medical-surgical exam. The focus was on four separate cohorts who received simulation hours in place of clinical experience from 5%-25% of total hours required within the medical-surgical clinical rotation. Cohort one received 5%(6 hrs), cohort two 10%(12 hr), cohort 3 received 20%(24 hrs), and cohort 4 received 25 %(30 hrs) (Adams State University 2014). To process this data an Analysis of variance (ANOVA) was used. This technique was used to analyze the differences among the 4 groups receiving different hours of simulation (Polit 2010). It was used to determine if the hours of simulation had an impact on student performance. This tool allows the comparison of multiple students within each cohort to create a visual representation of the data per cohort. The comparison of this data gave a better understanding of the relationship of the variables

The results of the med-surg HESI specialty test was used as the primary outcome measure within this study. This test is a computerized test that includes questions that are weighted differently from easy to hard (HESI, 2013). It is written similar to the National Council Licensure Examination (NCLEX)-style and tests the students' performance in a variety of nursing applications within the med-surg curriculum.

In addition to the overall score the test breaks down the student performance according to the nursing process sections (assessment, analysis, planning, implementation, evaluation). The scores for these areas was compared to further determine if the simulation impacted each section.

The average score of version 1 & 2 per student for each section has been compared. The data collected is interval data as it will determine the degree of difference between the scores. It can be classified and ordered, and has specified differences between each interval. This data can be rank ordered, it is exhaustive and has equally spaced intervals.

Due to the type of data an ANOVA was used. The Levene's test of homogeneity of variances was measured to determine if the variances between groups was consistent. A robust test of equality of means was also run. Once the significance was determined the Post Hoc Bonferroni test was run. This allowed for a comprehensive comparison analysis for each group to one another to be conducted. This same process was followed for all the sections (Overall HESIscore, Assessment, Analysis, Planning, Implementation and Evaluation). The Overall score was looked at first, then each of the subsequent sub-sections.

Project Findings and Results

The independent variable was the hours of simulation received by each cohort. This was broken into the four groups of 6 hr, 12 hr, 24 hr and 30 hr. The dependent variable was the score of the HESI exam. The effect size was calculated as partial Eta Squared through SPSS. $F = 3.812$, $p = 0.013$. The Partial Eta Squared = 0.121(Table 2). This is considered a large effect size which would indicate that the effect of simulation hours on HESI scores is strong.

The data was gathered from the HESI test bank. The students were de-identified and the raw data for the version 1 and version 2 of each group was collected. This data included each students' individual overall score as well as the scores under each of the nursing process categories. The groups were labeled by the number of hours of simulation received and which version of the test. The two version scores were averaged to give an overall performance for each student in each of the six categories. The data was compiled in an Excel spreadsheet and

then transferred into SPSS. The data was labeled in SPSS with simulation hours containing the four independent groups (6 hr, 12 hr, 24 hrs, 30 hrs) and each dependent variable labeled separately. An ANOVA was run for each of the dependent variables to compare the simulation hour groups, six in total. Each included descriptives, a Levene test of homogeneity and a comparison between groups. If this comparison was found to be significant then a post hoc test was run.

The ANOVA for overall HESI scores revealed descriptive statistics of mean scores for each dependent variable. The Hesiscore overall out of 87 students had a mean of 729.86, range 411.5-1085, and a standard deviation of 159.09(Table 1). The overall assessment for the group had a mean of 742.79, range 327.5-1126, and a standard deviation of 185.76. The analysis mean was 703.36, range 236.5-1190 and standard deviation of 208.13. Planning mean for the 87 was 712.51, range 202.5-1150.5 and standard deviation of 226.01. Implementation mean was 742.26, range 265-1196 and standard deviation of 176.14. Finally, the evaluation mean was 705.28, range of 108.5-1428.5 and a standard deviation of 281.75(Table 1).

The ANOVA for the HESIscore showed a between groups significance in mean scores ($F=3.812$, $p=0.13$). This lead to a Post hoc Bonferroni test to be run. The results of this test revealed a significant relationship between the 6hr group and the 12hr group ($p=0.041$, CI: -30.48 - -3.76). It also revealed a significant relationship between the 6 hr and 24 hr groups ($p=0.48$, CI: 3285.81 - -0.796). The rest of the comparisons were not statistically significant. The scores were higher for the 12 hr and 24 hr groups when compared to the 6 hr group. This would indicate that simulation had an impact on the scores between 6 and 12 hr. There was not a saturation of scores so it can be concluded that simulation has its greatest impact on student knowledge at the 12 hr level for this sample.

This was repeated for the additional variables. Assessment is the only variable that had some significant findings. Scores improved between 6 hr and the 12 hr group ($p= 0.001$, CI: -364.4459- -70.2118), the 6 hr and 24 hr group ($p<0.001$, CI: -388.4969 - -107.7562) and the 6hr and 30 hr group ($p=0.046$ CI: -252.0872 - -1.4919). There was no significance between 12 and 24 hour groups however, which indicates once again that 12 hr of simulation within this study had the greatest impact on student scores (Figure 3).

The results indicate the bare minimum of 6 hrs of simulation will have an impact on the overall HESI score and it will also impact the assessment variable scores within the test. There was a significant change in the overall HESI between the 6 hr and 12 hr group which would indicate that 12 hours of simulation in this sample had the greatest impact on overall HESI scores. The data does not appear to reach saturation one cannot prove that only 6 or 12 hours of simulation should be considered as all levels are statistically significant. One cannot prove that additional hours is a waste of time or that student learning has reached a plateau.

Limitations, Recommendations, Implications for Change

The question about hours of simulation and impact on student learning is one that requires additional research. The results of this study make a good argument that simulation at minimum of 6 hours will have a positive impact on student learning. These results are exciting and can be used as a spring board for further research. Simulation should be utilized within the undergraduate nursing curriculum as it is shown to have a positive impact. A minimum of 6 clinical hours can be achieved without too large of an impact on a nursing program.

Limitations

Although the research reached its objectives there were several limitations identified within this study. First, the sample was a small convenient sample of 87 students. To generalize

the findings the study should have included a larger, random sample size. Second, the simulations varied in content and execution between the cohorts. This lack of consistency between the cohorts could alter the HESI results. Finally, the simulations received by each of the cohorts were a mix of fidelity levels. This lack of consistency in the implementation of the simulation could affect student learning outcomes.

Recommendations

Recommendations going forward are to repeat this study accounting for some of the challenges that were faced. The first recommendation would be to give only one version of the standardized test to measure the results. A second is to ensure that the simulation hours received are given by consistent instructors with the same expectations from cohort to cohort. This study should be repeated with a more consistent cohort size who all have the same processes in simulation. All simulations should be high fidelity and not a mix of simulation fidelity between the groups. A final recommendation is to look at other core courses that have simulation hours to better capture overall student impact of simulation across the curriculum instead of only one course.

Implications for change

The implications for simulation in undergraduate nursing education will continue to evolve as more solid research is completed. Nursing programs are challenged to find quality clinical sites and they lack the ability to ensure that students are exposed to necessary skills and clinical experiences. Simulation can bridge the gap between theory and clinical and allow all students to experience specific skill sets to ensure they are ready to enter practice at the level that is required by facilities. The ability to expose students to every situation is not possible within an undergraduate curriculum. The use of simulation can help create an avenue for students to

have guaranteed exposure to the foundational experiences and patients that will allow them successful entry into practice upon graduation.

Summary

Simulation in nursing education is increasing in popularity nationwide. The guidelines for use and implementation vary between states as well as programs. The need for nursing curriculum to continue to adapt to meet the changing demands in health care is imperative for student success and program survival. Creative alternatives to traditional education must be considered to meet these needs. Simulation experiences offer a viable solution to the challenges faced by nursing programs. It offers the ability for programs to continue to meet the needs of the students within the constraints of community resource availability. The data indicates that utilizing simulation in conjunction with traditional clinical hours does not decrease student learning and does have a positive impact. This information is valuable within the university setting to allow for innovative curriculum changes surrounding clinical experiences, which will improve the quality of education received by the students.

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Appendices

Table 1: Overall mean for total population in primary and subsets

N=87	Mean	SD	Std.Error	95% CI for Means		Min	Max
				Lower Bound	Upper Bound		
Overall HESI	729.86	159.09	17.06	695.95	763.76	711.50	1085.0
Assessment	742.79	185.76	19.92	703.20	782.38	327.50	1126.0
Analysis	703.26	208.13	22.31	658.91	747.62	236.50	1190.0
Planning	712.51	226.01	24.23	664.34	760.68	202.50	1150.5
Implementation	724.26	176.14	18.88	704.72	779.80	265.00	1196.0
Evaluation	705.28	281.75	30.21	645.23	765.33	108.50	1428.5

Table 2:

Tests of Between-Subjects Effects

Dependent Variable: HESIscore

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	263566.749[a]	3	87855.583	3.812	.013
Intercept	44438806.92	1	44438806.92	1928.110	.000
Simulationhours	263566.749	3	87855.583	3.812	.013
Error	1912972.205	83	23047.858		
Total	48520590.75	87			
Corrected Total	2176538.954	86			

a. R Squared = .121 (Adjusted R Squared = .089)

Figure 1

SWOT

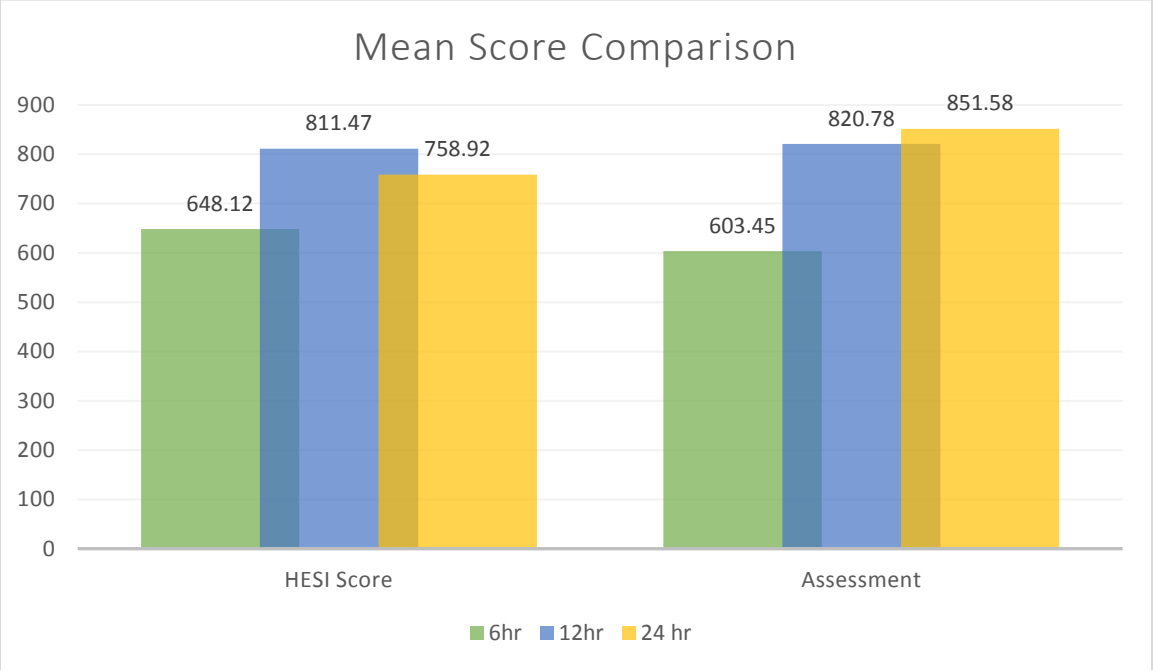
	Strengths	Weaknesses
	State of the art simulation lab, dedicated simulation staff and IT tech	large faculty turnover, low pass rates, limited historical data to make changes from, simulation consistency
	Opportunities	Threats
	community partnership with simulation lab as well as post graduate employment, increased access to continuing nursing education through simulation, variety of simulation scenarios to provide well rounded student experience.	poor pass rates due to lower educational foundation of students, decreased enrollment due to financial challenges

Figure 2

Approximate Cost for Simulation lab

Startup Cost	Fixed Cost (annually)	Variable Costs (annually)	Total
	Salaries $138,000.00	Certification	
	Equipment $3000	Equipment	
	Warranties $17,000		
	Depreciation $45,000		
$500,000.00	$203,000.00	$10,000.00	$713,000.00

Figure 3


Mean Score Comparison
900
800
700
600
500
400
300
200
100
0
648.12
811.47
758.92
603.45
820.78
851.58
HESI Score
Assessment
6hr
12hr
24 hr

Appendix A

Article/Journal **(1-5)**	Effect of Simulation on the Development of Critical Thinking in Associate Degree Nursing Students Nursing Education Perspectives	Equivalence testing of traditional and simulated clinical experiences: undergraduate nursing student' knowledge acquisition Journal of Nursing Education	The effectiveness of simulation activates on the cognitive abilities of undergraduate third year nursing students: a randomized control trial Journal of Clinical Nursing	High Fidelity Simulation Effectiveness in nursing student' transfer of learning International Journal of Nursing Education Scholarship	Using integrated simulation in a nursing program to improve medication administration skills in the pediatric population Nursing Education Perspectives
Author/Year	Goodstone, L., Goodstone, M. S., Cino, K., Kupferman, K., & Dember-Neal, T. (2013).	Maura Schlairet, Jane Pollcok 2010	Jacinta Secomb, Lisa McKenna, Colleen Smith 2012	Tera Kirkman 2009	Susan Pauly-O'Neill, Susan Prion 2013
Database/Keywords	Cinahl/ Simulation evaluation	Cinahl/ Simulation evaluation	Cinahl, simulation in nursing education	Cinahl/ Simulation evaluation	Cinahl/ Simulation evaluation
Research Design	Quasi=experimental study	Intervention study	randomized control trial	Observation/rating comparison	Evaluative study
Level of Evidence	Level III	Level II	Level IV	Level V	Level VI
Study Aim/Purpose	Explore development of critical thinking between high fidelity simulation and low fidelity	Explore the relationship of knowledge acquisition of students with clinical vs simulated experience	Provide evidence on effectiveness of simulation on clinical decision making abilities of undergraduate nursing students	Explore the transfer of learning from simulation to human patients. Theory to application	Determine overall influence of mixed education approach on knowledge, skills, self-confidence of undergraduate nursing students
Population/Sample size Criteria/Power	42 AND students(n=20 High fidelity, n=22 low fidelity)	74 students	58 third year	42 BSN nursing students	32 BSN nursing students
Methods/Study Appraisal Synthesis Methods	Two group quasi experiment design. Weekly simulation labs throughout semester. Standardized test for critical thinking evaluation given.	2x2 crossover design with two interventions. Each student participated in 2 week clinical and simulation experience.	Randomized pre and posttest groups using learning environment preferences inventory. group-parallel randomized	Use of observers/raters of student performance in theory, simulation and clinical experiences.	Pretest, posttest of convenience sample of students. 50 hours of clinical experience and 40 hours of simulation

			controlled design was employed.		
Primary Outcome Measures/Results	increase in critical thinking skills within both simulation groups. Resulting in simulation low or high has impact on improved critical thinking skills	Simulated-traditional group had sharper incline in test scores post simulation than traditional-simulated group. Both showed significant improvement in overall scores	No significant difference in cognitive abilities between groups. However there was significant improvement in non-native English language students	Significant improvement in scores post HFS indicating greater improvement of knowledge post HFS than lecture and continued improvement post clinical indicating improved ability to apply knowledge in clinical setting	Rise in self reporting of self-confidence and knowledge, Improved ability for safe medication administration following simulation experience
Conclusions/Implications	The type of simulation high or low fidelity did not reveal one better than other, but the simulation experience did reveal increase in critical thinking skills of nursing students	Simulation experience is shown to have as big of an impact on student knowledge gain as traditional clinical experiences. Simulation used in conjunction and as a pre-clinical experience can positively improve students' knowledge acquisition	Simulation experience did not reveal significant changes in cognitive ability of two groups compared, but did indicate a significant improvement in non-native English language students. Warranting further research	Simulation experience shown to have impact on students' ability to acquire and apply knowledge into the clinical setting vs lecture only.	Simulation shown to impact students' self-confidence as well as actual skill attainment with allowing for ample practice prior to working with live patients
Strengths/Limitations	Small sample size, no control group used	Small sample size, change in course curriculum	Small sample size, student attitude toward taking LEP, indeterminate value placed by students, short time frame	Small convenience sample, short time frame, limited exposure to simulation, time series design resulting in loss of participants	Small convenience sample with limited follow-up participation. Lack of separation between clinical and simulation data. Comparison between theory vs clinical and simulation.

Article/Journal **(6-10)**	Repeated scenario simulation to improve competency in critical care: A new approach for nursing education.	Nursing Students' Clinical Judgment Regarding Rapid Response: The Influence of a Clinical Simulation	Using low-Fidelity Simulation with Sophomore nursing students in a baccalaureate nursing program	Simulated practice learning in a preregistration programme	Using simulation technology to identify gaps between education and practice among new graduate nurses. *The*

	American Journal of Critical Care	Education Intervention. Nursing Forum	Nursing Education perspectives	British Journal of Nursing	*Journal Of Continuing Education In Nursing*,
Author/Year	Abe, Y; Kawahara, C; Ymashina, A, & Tsuboi, R. (2013)	Lindsey, P. L., & Jenkins, S. (2013).	Sharpnack, P. & Madigan, E. (2012)	Ricketts, B., Merriman, C. & Stayt, L. (2012)	Everett-Thomas, R., Valdes, B., Valdes, G. R., Shekhter, I., Fitzpatrick, M., Rosen, L. F., & ... Birnbach, D. J. (2015)
Database/ Keywords	Cinahl/simulation education methods	EBSCO host simulation in nursing education	EBSCOhost Simulation and undergraduate nursing	EBSCOhost Simulation and undergraduate nursing	EBSCOhost Simulation and undergraduate nursing
Research Design	Present perspective open label study	randomized sample	Program development	evaluation project	Observation study
Level of Evidence	Level VI	Level II	Level VI	Level VI	Level VI
Study Aim/Purpose	Examine the effectiveness of simulation-based education in improving competencies of cardiovascular critical care nurses	Examine the impact of a novel educational intervention on student nurses' clinical judgment regarding the management of patients experiencing rapid clinical deterioration.	program developed for sophomore students integrated the pharmacology, health assessment, and pathophysiology theory courses using low-fidelity simulation and computer-assisted instruction	Discuss the support for use of simulation in undergraduate nursing	Determine knowledge gained from 10 week simulation clinical setting
Population/ Sample size Criteria/Power	24 critical care nurses	79 nursing students in final semester. Control group n=39, intervention groups n=40	32 sophomore nursing students	52 participants including practice partners, mentors, practice educators, academic staff and students from all four branches of nursing	98 new graduate nurses who participated in med-surg nurse residency program
Methods/ Study Appraisal Synthesis Methods	Four groups of 6 with each group broken into two sub groups of 3 members. Each group experienced 4 zones of simulation training. The TAINS score was evaluated for teamwork scale. Rubric scoring was used to determine skill acquisition and competency	All students were given pre-test. Control group received traditional code blue educational instruction and the intervention group received high fidelity simulation instruction. Post tests were given to each	students evaluated the experience using the EPSS, the Student Satisfaction and Self-Confidence in Learning questionnaire, and the SDS as described Above. Gronbach's alpha	A two day evaluation event was created. Participants were divided into groups to discuss the 3 themes identified surround simulation in education. Results were collected from	During the 10 week residency program weekly simulation exercised were employed. For 5 weeks.

			scores established the reliability of the EPSS and SDS scores at .96 and .97, respectively. The Student Satisfaction and Self-Confidence in Learning instrument achieved a Gronbach's alpha of .95.	each group and summarized.	
Primary Outcome Measures/Results	Rubric scores improved in all 4 groups after the second simulation. TAINS showed significant increases in teamwork scales scores.	Independent t-test revealed student receiving simulation intervention scored significantly higher on posttest.	findings are encouraging for promoting active and diverse methods of learning, high and positive expectations for students, self-confidence, and Collaborative team-building opportunities.	Indicated a support of direct care hours through simulation permits students to practice essential clinical skills. These experience led to positive outcomes with traditional clinical placement sites and mentors.	Using analysis of variance results showed significant improvements in applied knowledge or practice between week one and week 5
Conclusions/ Implications	Repeated exposure to simulation scenarios enhanced nurses' technical skills as well as teamwork skills in critical care	Clinical simulation can enhance student knowledge and ability to understand how to handle high stress situations. Simulation improves clinical judgment and student knowledge about rapid response scenarios.	Low fidelity simulation can be used as an evaluation method of student knowledge. Students viewed the method for evaluation as valuable and a way to build confidence	Students gain confidence and learn from their mistakes within simulation. Clear objectives in simulation improve skill acquisition and improved student learning	The use of simulation as part of the residency program may help new graduate nurse groups apply the correct actions to clinical situations through repetition and frequent exposure. Simulation also may be used to gauge the progress of new graduate nurses on applied knowledge of clinical skills, and their performance scores may be used to standardize a hospital-based residency curriculum. Combining simulation and formal teaching strategies for new graduate nurses in a hospital setting shows promise because the educator can include all of the nuances associated with the clinical environment (e.g., noise levels, interruptions by colleagues and patient

					family members, additional patient assignments, and emergencies) to address both physical and cognitive concerns
Strengths/ Limitations	Participants were all nurses from the same institution, small sample size	Convenience sample of senior nursing students from one college, large sample with randomized control.	Small sample size, qualitative, only one school and one class was included.	Descriptive qualitative data with small sample size.	Observed group performances not individual practices, different leadership within each group. Conducted at one hospital

Article/Journal (11-15)	COMPARISON of Communication Outcomes in Traditional VERSUS Simulation Strategies in Nursing and Medical Students. Nursing Education Perspectives,	Supporting the lecturer to deliver high-fidelity simulation. Nursing Standard,	Student evaluation of simulation in undergraduate nursing programs in Australia using quality indicators. Nursing & Health Sciences	Millennial Generation Student Nurses' Perceptions of the Impact of Multiple Technologies on Learning. Nursing Education Perspectives,	Change and administrative barriers: nurse educators' perceptions concerning the use of simulators. *Nursing Education Perspectives*
Author/Year	REISING, D. L., CARR, D. E., SHEA, R. A., & KING, J. M. (2011)	Dowie, I., & Phillips, C. (2011)	Kable, A. K., Arthur, C., Levett-Jones, T., & Reid-Searl, K. (2013).	Montenery, S. M., Walker, M., Sorensen, E., Thompson, R., Kirklin, D., White, R., & Ross, C. (2013).	Abell, C., & Keaster, R. (2012).
Database/Keywords	Cinahl Benefits of simulation to nursing education	EBSCOhost Teaching simulation in nursing school	EBSCOhost Simulation in nursing education	EBSCOhost Technology in nursing education	EBSCOhost Technology in nursing education
Research Design	prospective, descriptive survey design	An informal review	mixed-method study	descriptive, longitudinal, anonymous survey design	descriptive correlational research study
Level of Evidence	Level VI	Level VI	Level IV	Level VI	Level VI
Study Aim/Purpose	compare the outcomes in affective and communication domains using a traditional (roundtable) model versus simulation in	Explore views of high fidelity simulation among lecturers teaching as nursing faculty.	test the application of these evidence-based quality indicator statements as an effective guide for simulation design,	determine how millennial nursing students perceive the effects of instructional technology on their attentiveness,	to examine the adoption of simulators in the nursing classroom and the relationship between adoption and nurse educators' perceptions of established change strategies as followed

	nursing and medical students.		implementation, and evaluation in undergraduate nursing programs.	knowledge, critical thinking, and satisfaction.	by program administrators
Population/Sample size Criteria/Power	41 senior bachelor of science in nursing students and 19 second-year medical students	20 nursing faculty	Participants included staff and students in undergraduate nursing programs during the first and second years of the programs. 85 students	convenience sample of 108 sophomore, junior, and senior baccalaureate nursing students	303 nurse educators
Methods/Study Appraisal Synthesis Methods	Convenience sampling was used to recruit participants for this study. Students were divided into teams involving two medical students and three to four nursing students and then randomly assigned to either the traditional roundtable or the simulation intervention. The traditional roundtable (no fidelity) consisted of a facilitator providing the scenario as an unfolding case, similar to the algorithm in the simulation scenario. Nursing and medical students sat together at a table where they could discuss and decide upon their interventions at critical points as the scenario progressed. The high-fidelity	Questionnaires were used that required responses to open-ended questions related to lecturers' use of high-fidelity simulation in their current teaching, confidence in its use as a method of learning, whether they felt adequately prepared to use it and if they felt that high-fidelity simulation was beneficial.	Students participated in six facilitated simulation experiences at two separate campuses. Students completed the student-evaluation instrument following each session.	all current sophomore, junior, and senior nursing students (N = 60) were invited to participate in the study on the last day of classes during the winter quarter and again during the spring quarter. The principal investigator distributed a survey form and return envelope to each potential participant, gave directions, and then exited the classroom. Return of a completed survey constituted informed consent. Descriptive analysis of data was performed with the Statistical Package for the Social Sciences	Study participant package was sent to over 1100 nursing faculty in Kentucky. Completed questionnaires received 303. Spearman's rank order coefficient was used to examine the correlation.

	simulation consisted of a manikin in a patient bed with monitoring equipment available; all students stood by the side of the manikin as the scenario evolved.			(SPSS) software, version 19.0.	
Study tool/instrument validity/reliability	The model used to build the simulation experience was the Jeffries simulation model students were provided with a survey to complete on a variety of indicators including: sense of role on the clinical team, changing viewpoints on role on clinical team, stress of the experience, managing group interaction, nervousness, and respectful communication. Minimal or no debriefing was provided so that student perceptions regarding the interventions would not be confounded by facilitator interaction.	Five open-ended questions were asked, as follows, and participants were asked to base their responses on high-fidelity simulation experiences: ‣ Do you currently use simulation in your teaching? ‣ Do you feel confident in using this method? ‣ Do you think simulation is a beneficial method of learning? ‣ Do you feel prepared in the use of simulation, in particular the use of advanced systems such as the METI (Medical Educational Technologies Incorporation) human patient simulator – a computer-driven manikin? ‣ Do you think a simulation module for lecturers would help increase your confidence in using high-fidelity simulation?	of the student-evaluation instrument. This tool consisted of 17 Likert-type questions designed to test the extent to which students perceived the simulation activity to meet the requirements of quality in teaching and learning in simulation activities.	The investigators designed a nine-item, ranked-response survey instrument to measure student preferences for instructional technology; no established instruments that measured multiple concurrent technologies were found. A 10th item invited a narrative response. The survey items were derived from the review of literature.	Nursing Practice Questionnaire (NPQ). and a Change Process Survey (CPS) NPQ measured level of use of simulators by educators. CPS examined educator's perceptions of how program administrators followed established change strategies with the introduction of simulators.

Primary Outcome Measures/Results	The simulation strategy resulted in statistically higher levels of stress as identified by participants. In addition, nearly all participants reported having a better sense of the clinical role, and with 55 percent of participants stating that the experience changed their view of the role of the clinical team. This initial study indicates that interprofessional communication may be enhanced using simulation.	90% were using HFS in teaching, while only 40% of these felt adequately prepared or confident to do simulations. 80% felt HFS module would improve their confidence in using simulation as a teaching method	All participants agreed or strongly agreed that simulation was a valuable learning tool. Over half the students felt prepared for the simulation scenario and 95% of the participants felt the scenarios offered real life experience.	Participants positively rated the audience response, virtual learning, and simulation instructional technologies on their class participation, learning, attention, and satisfaction. They strongly preferred computerized testing.	Significant correlation between faculty adoption and use of simulation to the perception of establish changes strategies being followed by administrators.
Conclusions/Implications	both nursing and medical students overwhelmingly noted that the encounter was helpful in the context of learning interprofessional communication skills, better sense of roles and how they viewed medical teams	The need to raise awareness about HFS in nursing curriculum and providing adequate training for staff to better prepare them for its use.	student evaluation of simulation sessions provided valuable insights into the quality of the simulation experiences provided, including aspects of preparation, support, fidelity, and debriefing.	Active involvement increases responsiveness and challenges students to come to class prepared. students prefer the use of technology in the classroom.	Nursing educators must change their way of thinking and teaching to incorporate the use of simulation. This requires administration for programs to also change their thinking.
Strengths/Limitations	one-time encounter of this study, small sample size, no objective data was used	Small sample, informal review with no scope for further exploration of views	Small samples, limited to two sites over 3 month period.	Small sample size, investigators were current faculty members. Convenience sample not generalizable	Nurse educators from single state. CPS is a new instrument
Article/Journal **(16-20)**	High-Fidelity simulation in nursing education: a change in clinical practice.	Fusion of Psychiatric and Medical High Fidelity Patient Simulation Scenarios: Effect on Nursing	Can simulated practice learning improve clinical competence?	The contribution of high-fidelity simulation to nursing students' confidence and competence: A	Effects of participation vs. observation of a simulation experience on testing outcomes: Implications for logistical planning for a school of nursing.

	Nursing Education Perspectives,	Student Knowledge, Retention of Knowledge, and Perception. Issues In Mental Health Nursing,	British Journal of nursing	systematic review. International Nursing Review,	International Journal Of Nursing Education Scholarship (IJNES),
Author/Year	Richardson, K., & Claman, F. (2014).	Kameg, K. M., Englert, N. C., Howard, V. M., & Perozzi, K. J. (2013).	Handley, R. & Dodge, N. (2013)	Yuan, H. B., Williams, B. A., & Fang, J. B. (2012).	Kaplan, B. G., Abraham, C., & Gary, R. (2012).
Database/Keywords	CINAHL Simulation and clinical practice in nursing education	EBSCOhost HESI and simulation	CINAHL Simulation and nursing education	CINAHL Simulation and nursing education	CINAHL Simulation and nursing education
Research Design	Evidence based review	**quasi-experimental design**	Scoping research	Systematic Review	RCT
Level of Evidence	Level V	Level III	Level VI	Level I	Level III
Study Aim/Purpose	To determine benefits for use of simulation in nursing education	**to assess if HFPS improved student knowledge and retention of knowledge**	To determine if simulation facilitators have a preference on fidelity of simulation and do they value simulation use.	describe available evidence about the effects of HFS on students' confidence and competence within nursing educational programmes.	Determine the difference between observation and participation in simulation scenarios on student learning.
Population/Sample size Criteria/Power		**37 senior level nursing students**	4 Health care education institutions.	18 English and six Chinese studies addressed confidence and competence as outcomes of HFS and were retrieved in this review (	92 junior students in an upper division baccalaureate nursing program.
Methods/Study Appraisal Synthesis Methods	Review of literature surrounding simulation use in undergraduate	Non random assignment. Researchers developed high fidelity psych simulations	assessment before field visits and further investigation By reviewing UK university websites that	Inclusion criteria for studies was created to include: population of nursing	Two groups of students were randomly created one group would participate within the simulation scenario while the other was an observation group of

	nursing education	based upon mental health concerns these were based on the recent standards for best practice. All students participated in all three developed simulations.	offered an undergraduate nursing practice award, clear divisions could be made between the clinical education and simulation sectors from the wider nursing programmes. If websites were easily accessible, a clear title for the simulation initiative was clarified and recruitment photographs or team introductions were shown, the university was selected for field visits. Following screening, the clinical education team identified four universities for field visits.	students or new graduates participating in simulation; studies addressing evaluation of HFS on confidence and competence Two independent reviews assess eligibility for each study.	the simulation. Both groups participated in debriefing and
Study tool/instrument validity/reliability		Partnered with Elsevier and developed three 30 questions HESI customized exams. Questions addressed nursing care related to the medical management as well as the psychiatric care involved in each of the simulation scenarios.	Survey tool Ten open questions were formed around key themes highlighted by the NMC audit principles (NMC, 2007a) covering investment, partnership, simulated learning process, quality and competency	Confidence and competence were measured by self-report instruments, focus group interviews or individual interview.	Post experience survey The study was conducted in two parts: as a computer administered survey on the course blackboard website and as part of a scheduled examination approximately 3 weeks after the simulation.
Primary Outcome Measures/Results	simulated experiences are an appropriate and much needed venue	Means HESI scores decreased after simulations, but variance	**found overwhelming support for simulated learning**	The result of the meta-analysis supported a mixed	Both groups participate in the debriefing process. Findings revealed no significant

	to augment traditional nursing education methods and should be strongly considered as an option in educational preparation Nurse educators have the opportunity to introduce the use of relevant technology into a clinically focused curriculum while still preserving the human component of nursing.	analysis showed this was not significant.	**from students and facilitators. However, it was highlighted that no clear guidance or strategies were universally used to effectively incorporate simulation within curricula, nor to evaluate or audit its effect upon student competency within clinical practice.**	effect. HFS either decreased the standardized mean score of confidence (by 0.45 point) and competence (by 0.95 point) or increased confidence (by 0.43 point) and competence (by 5.00 points;	differences (p=.97) between the simulation and observational groups on scoring of the test items related to this content (n=92). Over 70% reported the simulation experience as enjoyable, well-organized, clarified issues, increased knowledge and prepared them to work in a hospital. These findings indicate that the use of this alternate plan was effective for student learning and could therefore be incorporated into the simulation program design.
Conclusions/Implications	Augmenting clinical rotations with HFS could provide nursing students with the opportunity to garner psychomotor skills critical to the development of the professional nurse. Financial limitations and lack of uniform national guidelines should not be a rationale to exclude HFS from consideration. Institutions lacking HFS resources could create community partnerships in developing	Preliminary evidence that HFPS may improve student knowledge who are identified as “at risk” for not passing NCLEX. Students reported positive feedback about the use of HFPS in their learning.	Innovative teaching approaches are viewed as positive for both students and faculty. **Further evidence to support the implementation of simulation within nurse education is therefore required to ensure effective implementation and transferability of learning into clinical care settings.**	There was insufficient strong evidence to support the efficacy of facilitating students’ confidence and competency through HFSs. This systematic review indicated a mixed contribution of HFSs to confidence and competency with a lack of high-quality random control trials and large sample sizes. Qualitative studies looking at HPS use	support that logistically larger number of students can be accommodated in simulation by allowing half of the students to observe. In addition, this study supports that observing a simulation is a valuable teaching tool, especially when specific criteria are identified to guide students such as the critical action checklist we employed.

	simulation centers.			demonstrate positive results. However, more quantitative studies are needed to demonstrate effectiveness.	
Strengths/Limitations	Review of literature descriptive and qualitative.	Small sample size, variations in control of HFS, post test admin after long simulation day	Only 4 sites visited. Small sample, scoping exercise.	Lack of formal measurement tools available, validity of confidence tools.	post-simulation student evaluation data was collected as a group aggregate rather than separating out student responses based upon "participating" or "observing" the simulation
Article/Journal **(21-25)**	Simulation-based learning in nurse education: Systematic review. Journal Of Advanced Nursing,	Effects of an integrated problem-based learning and simulation course for nursing students. Nursing & Health Sciences	The Effect of Virtual versus Traditional Learning in Achieving Competency-Based Skills. Turkish Online Journal Of Distance Education,	Enhancing Clinical Reasoning Through Simulation Debriefing: A Multisite Study. Nursing Education Perspectives	A cost-utility analysis of medium vs. high-fidelity human patient simulation manikins in nursing education. Journal Of Clinical Nursing,
Author/Year	Cant, R. P., & Cooper, S. J. (2010).	Roh, Young Sook, Sang Suk Kim, and Sung Hee Kim. 2014.	Mosalanejad, L., Shahsavari, S., Sobhanian, S., & Dastpak, M. (2012)	Forneris, S. G., Neal, D. O., Tiffany, J., Kuehn, M. B., Meyer, H. M., Blazovich, L. M., & ... Smerillo, M. (2015).	Lapkin, S., & Levett-Jones, T. (2011).
Database/Keywords	CINAHL Simulation and nursing education	CINAHL Simulation effects in nursing education	ERIC Effects of simulation in nursing	CINAHL Simulation effects in nursing education	EBSCOhost Simulation effects in nursing education
Research Design	Systematic review	One group post-test only design was employed	quasi-experimental study	A quasi-experimental, pretest-posttest, repeated measure research design	quasi-experimental study
Level of Evidence	Level 1	Level IV	Level III	Level III	Level III

Study Aim/Purpose	Review quantitative evidence to compare high fidelity simulation to other educational strategies in nursing education	purpose of this study was to identify the effects of an integrated course with problem-based learning and simulation by evaluating college-based stress, student perceptions on their competence and small group learning, and comparing stress and student perceptions	determine the effectiveness of virtual systems on competency-based skills of first-year nursing students.	replicate Dreifuerst's 2012 findings of enhanced clinical reasoning scores using a structured debriefing	analysis sought to determine whether the extra costs associated with high-fidelity manikins can justify the differences, if any, in the outcomes of clinical reasoning, knowledge acquisition and student satisfaction
Population/Sample size Criteria/Power	varied	185 second year nursing students	43 freshman 43 sophomore nursing students	153 nursing students 78 were intervention group 75 control group	268 2nd year 84 third year Nursing students
Methods/Study Appraisal Synthesis Methods	Study criterion for each article was standardized and 12 studies met the criteria to be included within the review	Questionnaire posttest was given to all students enrolled in specific 7 week block course with integrated simulation. Samples were non random of the 240 enrolled only 185 questionnaires were used.	Paired t-test and independent sample t-test was used for statistical analysis. Two groups of nursing students were taught the same skills one with traditional methods (face to face) the other through virtual methods.	study was conducted at four baccalaureate colleges of nursing in the Midwest A convenience sample of 200 nursing students at the beginning of their second year of course work (seniors) was the purposive, target population. To obtain a medium effect size of .50 and 80 percent power, 200 participants were estimated to be necessary	cost-utility analysis using multiattribute utility function was then conducted to combine costs and three outcomes of clinical reasoning, knowledge acquisition and student satisfaction from a quasi-experimental study to arrive at an overall cost utility.
Study tool/instrument validity/reliability	Comparison of assessment of knowledge, skills, objectives, learner satisfaction, and ability to	College-based stress level was measured using the 39-item College-based Stress Scale for Korean Nursing Students	Data were analyzed by SPSS statistical software version 11.5 using	health sciences reasoning test (hsrt) a 33-question, validated, multiple-choice test	an adaptation of the ingredients method or the resource cost model was used to estimate the cost involved in the interventions.

	perform clinical judgments were done throughout each of the 12 studies. Jeffries model for simulation was used.	The College-based Stress Scale consists of four subdomains: academic, environmental, intrapersonal, and interpersonal. Each item was scored on a five-point Likert-type scale, from 1 to 5, and higher scores indicated a higher stress level.	descriptive statistics, student and paired t-test to compare the final scores in the two learning groups. Pearson's rho was used to find any correlation between the theoretical and practical scores in each group.	designed to assess critical-thinking skills in health science students (undergraduate and graduate) and professional health science practitioners. DASH-SV was used to answer the second research question related to nursing students' perceptions of the quality of debriefing.	The analysis was a marginal analysis where only areas that differed between the two interventions were included. Costs common to both interventions were excluded from analysis, and only the additional or incremental costs required for the two interventions of interest were included.
Primary Outcome Measures/Results	All 12 studies reported statistical improvements in student knowledge, skill, critical thinking and confidence related to simulation education. Indicating the effectiveness of simulation in education	Nursing students evaluated their stress as moderate with the academic subdomain as the highest stressor. The students reported favorable student perceptions on competence and small group learning with no significant differences in these levels by course grade. A moderate level of overall college-based stress was identified in this study. This result is inconsistent with a previous study showing that students in the problem-based curriculum had fewer academic, clinical and personal worries than students in the previous traditional	No statistical significant correlation was found between theoretical and practical scores in the virtual teaching, but a statistical significance was found in the traditional teaching group. A significant difference in theoretical scores of the two groups was found showing students taught by interactive methods were higher than those taught through traditional means.	Nursing students who had the DML debriefing scored significantly higher in their clinical reasoning than nursing students who had usual and customary debriefing there is a significant change in scores from pre- to posttest that is not recognized in the control group.	The results indicate that the cost–utility ratio for medium-fidelity is $1Æ21 and $6Æ28 for the high-fidelity HPSMs. This implies that the medium fidelity alternative provided a given amount of utility at the lowest cost.

		In addition, previous research supported that an integrated PBL and simulation course improved performance			
Conclusions/Implications	All the studies showed simulation to be an effective education methods, but many studies did not have a control group for comparison. Simulation was shown to have a significant effect on knowledge vs just lecture methods of teaching	In conclusion, nursing students reported a moderate level of stress, favorable perceptions of an integrated course, and no significant differences in stress and student perceptions level by course grade after experiencing an integrated course This evidence may demonstrate the advantages of an integrated course of PBL with simulation in student learning, and it might serve as baseline evidence for nurse educators considering changing traditional pedagogy to an integrated curriculum that incorporates simulation	Virtual methods of teaching improve students knowledge, and should be used in conjunction with traditional methods of teaching to offer well rounded education.	Debriefing for Meaningful Learning had a positive impact on the development of clinical reasoning skills in undergraduate nursing students when compared to usual and customary debriefing. Faculty were able to role model a pattern of thinking and dialogue. The debriefing emphasized how similar stories in different contexts require similar thinking and reasoning — a primary learning principle in assisting students to begin to transfer their learning	The results of this study indicate that effective simulation sessions do not always require high-fidelity manikins and that, depending on the learning objectives and actual scenario, similar outcomes can be achieved with medium fidelity manikins. These are important findings and should be factored into decision-making by those planning or utilizing simulated learning environments.
Strengths/Limitations	Small sample sizes, variety of clinical experiences between studies, varying exposure to simulation hours.	Preliminary evaluation reports of course, post test design offered no improvement comparison	Small sample size	Small sample size, not adequately assess nature of clinical reasoning used by nursing students	Small sample size, data drawn from subgroups thus not representative of larger group, short term measurements
Article/Journal **(26-30)**	Increasing Faculty Capacity: Findings from	Evaluation of the clinical hour requirement and attainment of	NCSBN study on clinical simulation's	Standardized Predictive Testing: Practices,	"An Integrative Review of the Use and Outcomes of HESI Testing in

	an Evaluation of Simulation Clinical Teaching. Nursing Education Perspectives,	core clinical competencies by nurse practitioner students. Journal Of The American Academy Of Nurse Practitioners,	effectiveness. (2014). Journal of nursing regulations	Policies, and Outcomes. Administrative Issues Journal: Education, Practice, And Research,	Baccalaureate Nursing Programs." Nursing Education Perspectives
Author/Year	Ricahrdson, H., Goldsamt, L. A., Simmons, J., Gilmartin, M., & Jeffries, P. R. (2014).	Hallas, D., Biesecker, B., Brennan, M., Newland, J. A., & Haber, J. (2012).		Barton, L., Willson, P., Langford, R., & Schreiner, B. (2014).	Sosa, Mary-Elizabeth, and Kristen A. Sethares. 2015.
Database/Keywords	EBSCOhost Simulation vs clinical hours in nursing education	EBSCOhost Simulation vs clinical hours in nursing education	EBSCOhost Simulation vs clinical hours in nursing education	ERIC Nursing education and HESI	EBSCOhost Nursing education and HESI
Research Design	comparative evaluation design	retrospective, nonexperimental, correlational study design involving one university that has 12 NP programs and 500 graduate students.	Longitudinal, Randomized, Controlled Study	ex post facto nonexperimental design	Integrative review method
Level of Evidence	Level VI	Level IV	Level I	Level IV	Level VI
Study Aim/Purpose	compare how the use of different "doses" of simulation in undergraduate clinical teaching affect faculty capacity	analyze the national practice of fulfilling 500 clinical hours as a requirement for graduation from nurse practitioner (NP) programs at the master's level and to compare this standard to a comprehensive approach of evaluating attainment of clinical competencies.	provide BONs with evidence on nursing knowledge, clinical competency, and the transferability of learning from the simulation laboratory to the clinical setting	*describe current policy practice related to the use of the HESI™ Exit Exam in schools of nursing and to determine which policies result in higher HESI Exit Scores*	Evaluate utilization of HESI exam in nursing education
Population/Sample size Criteria/Power	75 faculty members	16 PNP and 30 ACNP	666 undergraduate nursing students	99 schools, 5,438 individual student	17 research citations

	104 students From two separate schools of nursing	students who had graduated from one university.		NCLEX outcomes and HESI Exit Exam Scores were obtained 3,084 students from Associate Degree (AD) programs and 2,354 from Baccalaureate Degree (BD) programs	
Methods/Study Appraisal Synthesis Methods	students and faculty members completed surveys assessing their experiences with clinical simulation and other teaching modalities. Each group was asked to rate the degree to which they thought the three teaching modalities — classroom activities, clinical simulation, and clinical work in traditional settings (e.g., hospitals) — would help them develop as nurses.	All data recorded in NPST™ over a period of two clinical semesters by PNP and ACNP students, who had graduated from the university, were deidentified and analyzed. NPST™ offers a complete electronic tracking system for all student encounters, and permits faculty to monitor each student's progress throughout the program.	Began in Fall 2011 and ran through May 2013. Three groups control (no more than 10% simulation), 25% group (25% clinical hours in simulation) & 50% group(50% clinical hours in simulation). Each school appointed a study team consisting of faculty and staff members. Having consistent study team members ensured that the scenarios and debriefings were conducted according to the study model, which ensured consistency across all study sites in accordance with best practices for simulation. Study team members were required to attend three mandatory training sessions to receive education on the NLN/Jeffries Simulation Framework. Study teams were also taught the Debriefing for Meaningful Learning© method	Three electronic instruments were used to collect the data: the HESI Exit Exam, the Testing Policy and Practices Questionnaire, and the Licensure Outcomes Questionnaire. Elsevier produced the HESI Exit Exam, and Elsevier's HESI Operating System generated the Licensure Outcomes Questionnaire. The researchers designed the Testing Policy and Practices Questionnaire.	Review of research studies surrounding the use of HESI within undergraduate programs, over 300 articles were retrieved and through elimination from strict inclusion criteria 17 were used.

Study tool/instrument validity/reliability	Both students and faculty members completed surveys assessing their experiences with clinical simulation and other teaching modalities. To document changes over time, as different levels of simulation were incorporated into each program, the ratio of faculty clinical days to the number of students taught per day over the course of a full semester was calculated.	Clinical objectives and self-evaluation tools were developed based upon the NONPF Competencies the International Guidelines for Management of Severe Sepsis and Septic Shock and the Guidelines from the Institute for Health Care Improvement	Students remained in their assigned groups throughout the 2 years they were enrolled in the nursing program. Data from course outcomes (clinical competency and course-level ATI scores) and end-of-program outcomes (comprehensive ATI scores, clinical competency, critical thinking, and readiness for practice [End-of-Program Survey]) were collected from all programs and aggregated. These data were compared across the three study groups.	HESI exit exam Licensure Outcomes Questionnaire Testing Policy and Practices questionnaire	HESI is known reliable tool with multiple studies that indicate it's effectiveness of NCLEX success.
Primary Outcome Measures/Results	Adding simulation as an alternative to traditional clinical increased faculty capacity. Faculty were able to oversee more students throughout the year using simulation as part of clinical rotation.	Results indicated that in direct clinical hours the core competencies were being met. In addition. Addition of simulation scenarios and intensive online, interactive learning modules added to competencies and ability to measure effectively.	No significant differences in groups were seen in any phase. All evaluative measures produced the same results: Educational outcomes were equivalent when up to 50% of traditional clinical experience in the undergraduate nursing program was replaced by simulation.	The findings of this study indicate that nursing faculty are designing and implementing many different policies for the use of the HESI Exit Exam. Several of these policy components were related to better HESI Exit Exam Scores as well as NCLEX-RN success.	

Conclusions/Implications	Implications include the using simulation as a part of clinical hour rotation can effectively decrease some challenges faced by schools of nursing to provide adequate clinical placements for students without further taxing current faculty	Data analysis revealed that the 500 clinical hours correlated to populations, skills performed, required levels of decision making, and expected diagnoses. However, assurance that these clinical hour requirements translated to exposure to all core competencies for entry into practice could not be established.	No significant difference among groups regarding end of program knowledge and skill acquisition, NCLEX pass rates were equivalent. Although non significant changes were found it did show that simulation can effectively be used for up to 50 % of clinical hours without changes in student outcomes.	The results of this study demonstrated that developing and implementing policy to support standardized testing in schools of nursing is an integral part of student success. Policy provides a framework of action for students and faculty	Results indicate that the use of HESI as a sole indicator of NCLEX success falls with increased use for the lower students. Students who do not perform well on HESI and do the remediation to improve performance were not shown to have the same success on NCLEX.
Strengths/Limitations	Only looked at certain percentages of hours of simulation, cannot be generalized to different percentages. Reliability of questionnaire answers. Universities where study conducted are research intensive, might not work for state funded schools.	Conducted at one university with a convince sample.	Schools in the study already had existing simulation labs, results from clinical preceptors could be biased due to feeling about traditional clinical.	Randomized sample from single data base. Retrospective, non-experimental no verification of schools policies was done.	Small sample of inclusion articles

Appendix B

Logic Model:

Project Plan: Increased hours on simulation experience in place of clinical hours from 5-25% to determine the effectiveness of simulation in place of clinical experiences.

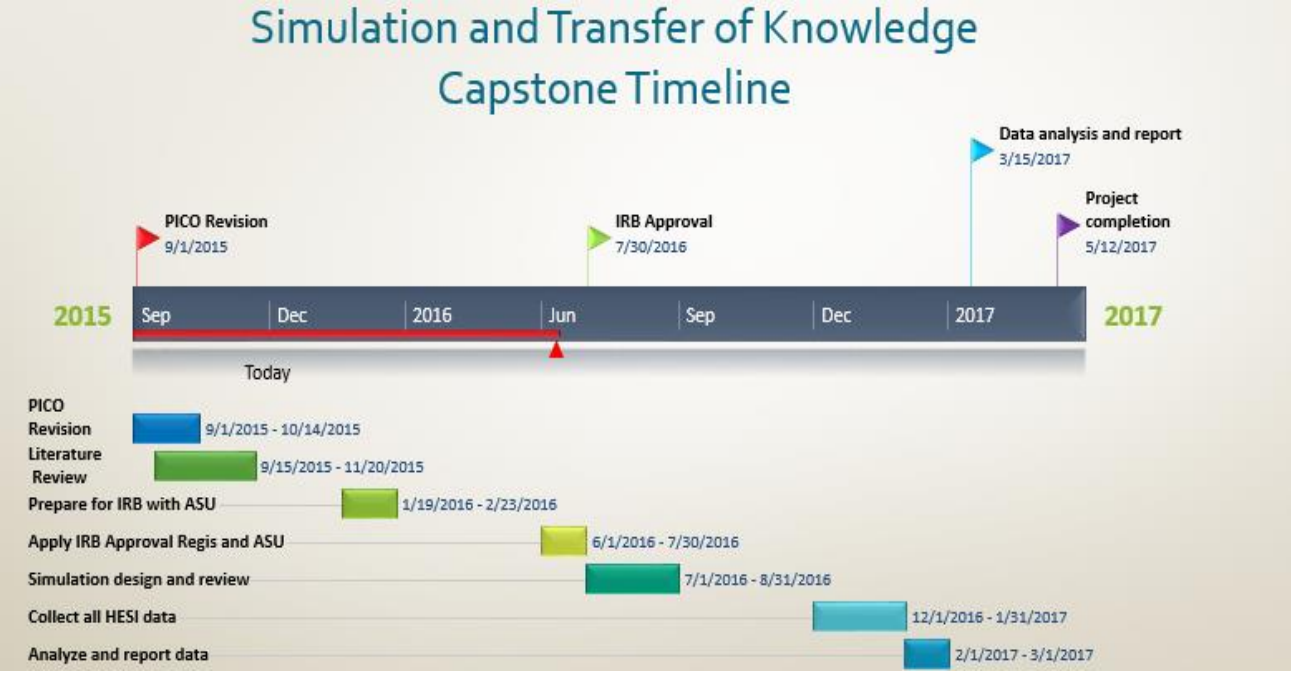
RESOURCES	Constraints	ACTIVITIES	OUTPUTS	SHORT & LONG-TERM OUTCOMES	IMPACT
Access to previous two years of HESI results. Access to student records Access to current simulation schedule Access to current class HESI result. Previous med-surg simulation scenarios Access to simulation video from previous two cohorts. Access to time sheets documenting the hours of simulation completed Access to university clinical curriculum for previous 2 years. Regis IRB approval.	Small sample size Changes in simulation staff and execution Lack of appropriate number of staff that are educated in simulation.	Active participation in creation and execution of simulation at 25% clinical hours. Comprehensive simulation team to execute the increased hours. Review previous simulations scenarios from previous two years. Review curriculum for clinical rotation for past two years. Review current simulation and clinical curriculum. Access student records for review of HESI results. Administer HESI exam to current class.	Execution of simulation hours. Change in student performance on the HESI exam. Generate a pattern from low percent of sim to higher percentage to gage student success.	Visualize change in student performance on standardized HESI exam. Improved understanding of simulation hours related to clinical hours. Creation of new standard for clinical vs simulation hours to achieve optimum student success. Potential for further increases in simulation up to state standards to decrease the continued strain for quality clinical placements.	Creation of quality standardized simulation process, procedures and Policy. Improved NCLEX pass rates. Decreased challenges faced by nursing schools for quality clinical placements. A well-rounded clinical curriculum.

ASU department and University admin approval.					

W.K Kellogg Foundation. (2004). Logic Model Development Guide, p 54

Appendix C

Timeline



Appendix D

D-1 Regis University

REGIS UNIVERSITY

REGIS.EDU

Institutional Review Board

DATE:	August 20, 2016
TO:	Melissa Milner, DNP
FROM:	Regis University Human Subjects IRB
PROJECT TITLE:	[944038-1] Analysis of the impact of hours of simulation on HESI scores
SUBMISSION TYPE:	New Project
ACTION:	DETERMINATION OF EXEMPT STATUS
DECISION DATE:	August 19, 2016
REVIEW CATEGORY:	Exemption category # *(1; 4)*

Thank you for your submission of New Project materials for this project. The Regis University Human Subjects IRB has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations 45.CFR46.101(b).

We will retain a copy of this correspondence within our records.

If you have any questions, please contact the Institutional Review Board at irb@regis.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Regis University Human Subjects IRB's records.

D-2: Adams State University

Melissa,

This looks like a meta-study to me--that is, you are only working with data, not human subjects, and you are using the data in aggregate, IRB does not need to see it.

Thank you

Beth E. Bonnstetter, Ph.D.
bbonnstetter@adams.edu
Associate Professor of Mass Communication
Adams State University

Appendix E

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Melissa Milner (ID: 4656061)
- **Email:** mmilner@regis.edu
- **Institution Affiliation:** Regis University (ID: 745)
- **Institution Unit:** Student

- **Curriculum Group:** Human Research
- **Course Learner Group:** Social Behavioral Research Investigators and Key Personnel
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 15197845
- **Report Date:** 02/03/2015
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT
History and Ethical Principles - SBE	02/03/15
Belmont Report and CITI Course Introduction	02/03/15
The Federal Regulations - SBE	02/03/15
Assessing Risk - SBE	02/03/15
Informed Consent - SBE	02/03/15
Privacy and Confidentiality - SBE	02/03/15
Regis University	02/03/15

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
Email: citisupport@miami.edu
Phone: 305-243-7970
Web: https://www.citiprogram.org

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Melissa Milner (ID: 4656061)
- **Email:** mmilner@regis.edu
- **Institution Affiliation:** Regis University (ID: 745)
- **Institution Unit:** Student

- **Curriculum Group:** CITI Conflicts of Interest
- **Course Learner Group:** Conflicts of Interest
- **Stage:** Stage 1 - Stage 1

- **Report ID:** 15197846
- **Completion Date:** 02/03/2015
- **Expiration Date:** 02/02/2019
- **Minimum Passing:** 80
- **Reported Score*:** 90

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED
CITI Conflict of Interest Course - Introduction	02/03/15
Financial Conflicts of Interest: Overview, Investigator Responsibilities, and COI Rules	02/03/15
Institutional Responsibilities as They Affect Investigators	02/03/15

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
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