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Literature Review- Simulation Education: Improving Patient Safety and Healthcare Professionals Critical Thinking Skills and Confidence Levels When Providing Care

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Abstract

Purpose: The complexity of the current healthcare environment poses challenges to new graduate and seasoned nurses. Lack of critical thinking skills, clinical competence, theory integration and self-confidence can put a patient at risk for harm. The purpose of this literature review is to identify the nurses' perception of simulation as well as the effect that simulation utilization has on nurse performance improvement, improved patient and safety outcomes and interprofessional care.

Methods: Articles ranging in publication date were gathered from 2008 through 2018 from CINAHL, PubMed and MedLine databases. Relevant topics yielded 143 abstracts of which 43 were selected for further evaluation. Twenty articles were selected and evaluated for this literature review.

Findings: Simulation training boosts clinical skills, knowledge acquisition and critical thinking skills. The use of team based training creates opportunities to work together building team work skills. Both new graduate nurses (transitioning nurses) and seasoned nurses found that simulation training contributed most to their learning while providing them a safe environment where mistakes could be made, discussed and learned from. Simulation utilization has also shown to improve nurse performance especially in critical care situations. Interprofessional simulation offers healthcare institutions a way to build professional support, communication skills and team building practices. This type of training helps bridges the gap between healthcare disciplines allowing for the breakdown of professional silos.

Conclusions: The results of the literature review indicate many positive benefits that come from incorporating simulation training in the healthcare environment. Healthcare facilities that utilized simulation training had several commonalities occurring, including nurse performance improvement, improved patient care and safety outcomes and improved team work skills.

Keywords: Critical Thinking; Interprofessional Education; Patient Outcome; Patient Simulation; Simulation Team Training

Introduction

The complexity of the current healthcare environment poses challenges to new graduate and seasoned nurses. Lack of critical thinking skills, clinical competence, theory integration and self-confidence can put a patient at risk for harm. Simulation allows participants to develop or enhance knowledge, skills, and attitudes or analyze and respond to realistic situations in a simulated environment [1]. There are three classifications of simulation ranging from low fidelity (case studies, static mannequins) to high fidelity (standardized patient, complex computerized mannequin). Each of these forms of simulation have been shown to increase critical thinking skills and clinical competence in healthcare environment. The purpose of this literature review is to identify the nurses' perception of simulation as well as the effect that

simulation utilization has on nurse performance improvement, improved patient and safety outcomes and the benefits that come from incorporating simulation training with interprofessional care.

Methods

MeSH terms were identified using the National Library of Medicine Medical Subject Heading (MeSH) browser. Keywords that were utilized to locate research articles included: patient simulation, interprofessional education, critical thinking, simulation team training, and patient outcome. These keywords were utilized to locate articles in the CINHAL database. Additional keywords including: nursing continuing education, program development, simulation based training, competency measurement, debriefing, and patient centered care were used in both the CINHAL, PubMed and Medline databases to narrow the search for simulation related articles. Combinations of the MeSH term helped narrow the search for appropriate articles. Articles ranging in publication date were gathered from 2008 through 2017. Relevant topics yielded multiple abstracts which were selected for further evaluation.

Inclusion criteria for article selection was as follows: (1) peer reviewed (2) available in English format, (3) some form of simulation had to be incorporated into the study, (4) tools used to evaluate the study were reliable and valid, (5) simulation training had to involve at least one discipline in the healthcare team (nurses, doctors, medical students, respiratory therapy) and (5) study findings had to be generalizable. Exclusion criteria was as follows: (1) non-peer reviewed, (2) not available in English format, (3) inability to access article from research library, (4) no form of simulation was utilized for research, (5) research did not include members of the healthcare team, and (5) studies conducted were too small to be generalizable. Abstracts that included meta-analysis and systematic reviews were reviewed and selected or rejected using both the inclusion and exclusion criteria. Articles that met the inclusion criteria were then retrieved, read and graded based on the Melnyk Level of Evidence (LOE) Scale. Table 1 provides a breakdown and percentage of how many articles meet each level of evidence.

Melnyk Level of Evidence (LOE)	Number of Articles per LOE (N=20)	% of LOE (N=20)
Level 1 - Systematic review & meta-analysis of randomized controlled trials; clinical guidelines based on systematic reviews or meta-analyses	3	15%
Level 2 - One or more randomized controlled trials	1	5%
Level 3 - Controlled trial (no randomization)	2	12.50%
Level 4 - Case-control or cohort study	6	37.50%
Level 5 - Systematic review of descriptive & qualitative studies	5	31.25%
Level 6 - Single descriptive or qualitative study	2	12.50%
Level 7 - Expert opinion	1	6.25%

Table 1: Breakdown and percentage of how many articles meet each level of evidence.

Results

Relevant topics yielded 143 abstracts of which 43 were selected for further evaluation. Twenty articles were selected and evaluated for this literature review. Simulation training boosts clinical skills, knowledge acquisition and critical thinking skills. The use of team based training creates opportunities to work together building team work skills. Both new graduate nurses (transitioning nurses) and seasoned nurses found that simulation training contributed most to their learning while providing them a safe environment where mistakes could be made, discussed and learned from. Simulation utilization has also shown to improve nurse performance especially in critical care situations. Interprofessional simulation offers healthcare institutions a way to build professional support, communication skills and team building practices. This type of training helps bridges the gap between healthcare disciplines allowing for the breakdown of professional silos.

RN's Perception of Simulation

Nurses participating in simulation training had positive perceptions and found many aspects of simulation to be valuable. Wehbe- Janek et al. [2] noted in their research article titled Nurses' perceptions of simulation-based interprofessional training program for rapid response and code blue events that nurses participating in simulation felt they developed an increased awareness and preparedness when it came to caring for an ill patient. They also stated that their comfort level and confidence level increased after simulation participation. Based on the articles evaluated, nurses perceived many benefits of simulation training, including: boosted clinical skills, increased knowledge acquisition and increased critical thinking skills.

Nurses working in critical care environments felt that the use of high fidelity simulation made training more realistic and helped to better prepare the nurse for care of the severely ill patient. These RN's stated that "Simulation training increases awareness of clinical practice and acknowledges the importance of working in a team" [3]. Common themes that emerge from simulation training include: realistic training contributes to safer patient care, reflection and openness during debriefing periods facilitate better

learning, and understanding everyone's individual role promotes better performance as a team. The Ballangrud R, et al. [4] article titled Intensive care unit nurses' evaluation of simulation used for team training found that nurses had a high degree of satisfaction and were enthusiastic when using simulation for training. Having a positive attitude toward simulation training facilitates a more open learning environment where nurses and other members of the healthcare team can benefit.

Simulation Through the Transitioning Phase

Hoffart, Waddell and Young [5] found that there is detachment for new graduate nurses as they transition between nursing school and taking on a new role as a registered nurse. Mentoring programs (nurse residency) and simulation use helped to effectively support the new graduate during their transition phase. A significant decrease in new hire turnover rate from 17% down to 9.2% was noted with the implementation of a nurse residency program that incorporated the frequent use of simulation [6]. New grads participating in this program noted that simulation experiences were beneficial to their learning and they preferred simulation training for advanced training skill acquisition.

Cant and Cooper noted in their research that high and mid fidelity simulation use can build global skill sets to accelerate the novice-to-expert process as the nurse is transitioning into the clinical setting [7]. The incorporation of simulation throughout hospital residency programs proves to be an effective method for learning. Not only are critical thinking skills being established but new graduates are also learning how to better communicate within a team environment [8]. New graduates and seasoned nurses indicate that participating in simulation training allows you to practice in a safe environment where mistakes can be made, reviewed and learned from.

Simulation and RN Performance Improvement

The utilization of frequent simulation training that included feedback, refresher opportunities and debriefing proved to be beneficial for improving nursing performance especially as it relates to providing critical interventions such as cardiopulmonary resuscitation. Seethala, Esposito and Abella [9] showed in their research study that when simulation training was used without follow up refreshers or debriefing after a 3-month period only 30% of nurses properly performed the required critical skill. In the same study, when simulation, debriefing and refresher training was incorporated nurses properly performed the same required critical skill 64% of the time after a 3-month time period. Repeated skill practice through the use of simulation allows the nurse to hone their skill set and provide better patient care. An additional benefit that was noted in the Seethala et. al [9] study was that the patient survival rate after experiencing a life threatening cardiac event doubled after the incorporation of simulation, debriefing and refresher training. Simulation has proven to be a valuable teaching tool that when properly utilized can improve learning for the healthcare professional. Confidence, communication skills and performance skills were shown to increase after simulation training according to a 2013 study conducted by Shear, Greenburg and Tokarczyk [10]. This study also showed a higher success rate with first time procedure completion when the participant had simulation training prior to the patient contact.

Simulation and Increased Patient Safety/Outcomes

Simulation can come in a wide variety of methods (role-play to high fidelity mannequins) but all benefit the nurse's learning in some way. Didactic and simulation training combined was shown to be most effective when it comes to increasing patient safety and positive patient outcomes. The Team STEPPS program was utilized in several research studies as a method of training that when incorporated with simulation training has been proven to increase team awareness and clarify specific roles and responsibilities of each team member, resolve conflicts among the various healthcare disciplines, improve information sharing and eliminate barriers in the healthcare environment. All of these allow for increased patient safety and better patient outcomes.

Shear, Greenberg and Tokarczyk [10] evaluated the effectiveness of the Team STEPPS program and simulation training as it relates to individual healthcare performance and patient safety in their article titled Does training with human patient simulation translate to improved patient safety and outcome? Based on the evaluation, participant's confidence, communication and performance skills increased and an 18% reduction in mortality was noted in the facilities that participated in the training. Additionally, participant surveys revealed that changes were made in their methods of medical practice related to the training course.

In situ simulation training takes place in the actual working environment and involves those that work there. Klipfel et. al [11] evaluated the impact of participation in an *in situ* training emergency scenario and the effect it had on healthcare provider response, confidence levels and patient outcomes. All participants involved in this study strongly agreed that the simulation training was "Useful and realistic and debriefing enhanced their learning". Eighty-three percent of the participants felt that the training prompted a realistic response to the emergent situation and eighty-seven percent felt that their confidence improved in an emergency situation. Every participant felt that they could provide better care to a patient in an emergent situation after completing the *in situ* simulation training experience.

Interprofessional Simulation Benefits

Teamwork and collaboration are key when it comes to providing safe and effective care. Interprofessional education offers healthcare institutions a way to build professional support, communication skills and team building practices. This process

helps improve learning skills, allows for team analysis of practice and performance, improves decision making skills and makes a safer patient environment. Interprofessional education and simulation training help bridge the gap between healthcare disciplines.

In a study conducted by Baker et al. [12] eighty-six percent of medical students and over ninety percent of nursing students stated that interprofessional simulation adds value to their education and provides understanding for team roles, especially in emergent situations. It was also noted in this study that participant's confidence levels and collaboration skills were increased. Engum and Jeffries [13] had similar results when evaluating interprofessional simulation use in a healthcare institution. This study found that participants were better able to differentiate roles and responsibilities and this knowledge allowed for a better focus when providing safe patient care. A study conducted by Shin, Park and Kim [14] noted that simulation based education improved communication skills, collaboration skills and increased the participant's ability to manage complex situations leading to improved patient results.

Practice Implications

Impact of Simulation Training

Research indicates that healthcare providers who utilized simulation training throughout their practice performed better in the clinical setting, had higher self confidence levels and better critical thinking skills. In the article Perceived benefits and challenges of repeated exposure to high fidelity simulation experiences of first degree accelerated bachelor nursing students, students and transitioning nurses who were exposed to simulation training felt that it contributed to the development of critical thinking skills, helped develop clinical competency, built self-confidence and allowed them to integrate the knowledge learned in class into a clinical situation [15]. Several studies indicated that nurses' acquisition and knowledge retention increased with the repeated use of simulation which proved more effective than other training methods. It was also noted that student learning can be optimized by incorporating deliberate practice and reflective practice principles into high fidelity simulation experiences [16].

Most studies showed that active learning and simulation improved critical thinking, clinical performance competency and clinical judgement skills. Simulation provides a risk-free approach to learning in a realistic environment that allow healthcare providers to construct knowledge, explore assumptions, and develop psychomotor skills in a safe setting [17]. Simulation helps fill the gap between the demands of current nursing practice and the nurses' education for that practice [18]. Ultimately patient safety and outcomes improve because the healthcare providers are better trained and equip to provide appropriate care.

Gaps from the Review of Literature

The use of simulation training in the healthcare environment is a fairly new concept. This fact alone limits the amount of research that has been conducted in this area. Many of the literature articles that were reviewed for this project involved the utilization of mid and high fidelity simulation. These mannequins are extremely expensive ranging in price from $30,000 to over $100,000 making it difficult for smaller healthcare organizations to purchase and use this technology in its training. Generalizability of this research comes into question when an organization is not able to afford the equipment necessary for achieving maximum benefit as it relates to simulation training.

Naismith and Cavalcanti discuss in their article Validity of cognitive load measures in simulation-based training: A systematic review that there are inconsistent measurements and tools available to accurately assess a correlation between cognitive load and learning (2015) when simulation training is utilized [19]. Their findings suggest that the use of multiple measuring techniques would increase the validity of cognitive load measurements and could help improve the rigor of simulation opportunities both in the academia and healthcare setting. Ballangrud, Hall-Lord, Persenius and Hedelin [4] noted that most participants in their study were female and males may have a different perspective on simulation training. Even though this gap was not noted in the other research articles that were reviewed, it stands to reason that with over eighty percent of the healthcare workers in the U.S. being female it is likely that all research studies were more heavily participated in by females rather than males.

Male healthcare providers may have a different learning style preference but until further research is conducted on this facet of the healthcare population, it is difficult to determine the benefits of simulation training on this group of individuals. Interprofessional education training is the newest form of simulation training. Although research is proving to have positive effects on bridging the gap between healthcare disciplines and allowing for the breakdown of silos among healthcare professional's further research is warranted.

Future Research Recommendations

Many of the research articles reviewed indicated the need for longer research studies that involved a larger sample size of healthcare participants. The Team STEPPS program was utilized in many of the research studies and provided positive results including better communication skills, improved teamwork skills, and improved patient safety outcomes. Additional programs like ACES and the Simulation Setting Model were also used successfully. It would be beneficial to conduct research evaluating these three methods of training when paired with simulation to

determine if one method proves more effective in meeting the objectives of improved patient safety and care.

According to Ballangrud, Hall-Lord, Persenius and Hedelin [4] most participants in their study were female which is not surprising due to the fact that the healthcare industry is female dominated. Even though the industry has a large concentration of female workers, the male perspective should not be excluded when it comes to researching the effectiveness of simulation training. The male healthcare worker may require different training to achieve the desired outcome of improved patient safety and care but this cannot be determined without further research.

Interprofessional education simulation training is a very new concept of teaching. It is beginning to be commonly seen in college health related programs however it is not utilized often enough in the healthcare setting. Further research on the benefits of incorporating interprofessional education simulation training would be useful so that evidence based research could be presented when seeking by in from the various healthcare disciplines. Although the small amount of research on this particular topic is limited, studies have shown positive results as it relates to improved team work, communication and patient outcomes.

Conclusion

The results of the literature review indicate many positive benefits that come from incorporating simulation training in the healthcare environment. Healthcare facilities that utilized simulation training had several commonalities occurring, including nurse performance improvement, improved patient care and safety outcomes and improved team work skills. Table 2 (listed below) shows several of the common benefits (themes) found throughout the articles evaluated for this project. Increased healthcare provider confidence and improved communication were the most common benefits related to the incorporation of simulation training based on the review of the literature, although all of the benefits (themes) help improve patient outcomes and care. Longer research studies involving a larger sample size of participants were the most commonly seen gap in the literature. Future recommendations provided in this review were suggested to help fill the identified gaps and increase the amount of research available on this topic.

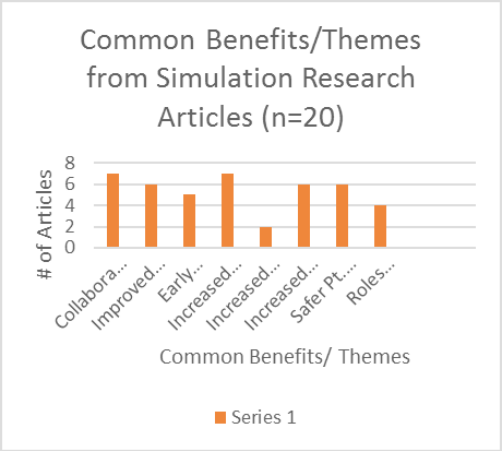

Table 2: Shows several of the common benefits (themes) found throughout the articles evaluated for this project.

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