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Research Article

Perioperative Nursing Simulation and its Influence on Student Nurses' Career Interest

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Abstract

Perioperative nurses are key personnel in managing safety risk and preventing patient harm. With significant nursing shortages in perioperative nursing, there is a critical need to train and recruit nurses to this complex area. Limited curricular exposure, clinical opportunities, and perioperative instruction in undergraduate nursing programs have led to a decline in nurses seeking perioperative positions and an increased staff turnover. The specific aim of this exploratory quantitative study was to determine if perioperative nursing educational activities, particularly simulation, influence student interest in pursuing perioperative nursing careers. Students were in two different nursing tracks, the traditional (TNC) four-year nursing baccalaureate program or the one-year Accelerated Nursing (ANC) baccalaureate program, on campuses in two states, and at various points in their nursing education. Prior to the perioperative simulation, students completed didactic instruction and an observation of a surgery inside an operating room. Following these learning experiences, the students were assigned to perioperative simulation groups of eight to ten students. Due to COVD-19 challenges, this in-person simulation was converted to a virtual simulation mid-way through the academic term; therefore, approximately one half of students completed the simulation in person while the other half completed the simulation in a virtual format. Survey questionnaire data related to student learning and interest in perioperative nursing were collected immediately following student participation in the simulation. Post-simulation evaluation of data from all students participating in both the in-person and virtual perioperative simulations was conducted. Two hundred and seven students completed the simulation, and 191 students completed both the simulation and evaluation, a response rate of 90%. Thirty-nine percent of students indicated that the simulation and perioperative education increased their interest in pursuing intraoperative nursing.

One hundred percent of students, both in in-person simulations and virtual simulations, agreed or strongly agreed that the simulation met the course objectives and increased their perioperative knowledge. There was no statistically significant difference in interest in pursuing perioperative nursing between the virtual or in-person simulations. Accelerated one-year nursing students were slightly more likely to report that simulation did not increase their interest in working in perioperative nursing, in comparison to traditional four-year students. In both tracks, previously-held interest in perioperative nursing prior to simulation was around 9%. The simulation educational objectives were unanimously met by students on both campuses, in both program tracks, within all age groups, and whether virtual or in-person simulation. Therefore, the perioperative simulation is an effective educational activity to teach students about perioperative nursing and patient care in a unique setting. In both tracks, very few students identified as having an interest in perioperative nursing prior to simulation, and the simulation greatly increased interest in working in perioperative nursing. This study highlights the lack of knowledge and interest that exists in nursing students regarding perioperative nursing career paths. Furthermore, the study showed that the interest level of students in perioperative nursing was increased both by in-person and virtual delivery of the simulation. This is encouraging because it provides support for using virtual simulation to reach students who may not be able to be physically present for in-person simulation. Both in-person and virtual simulation show promise for increasing knowledge of and interest in perioperative nursing in baccalaureate nursing students. Future research is needed to explore the effects of perioperative education on clinical judgement ability and applications for perioperative nursing positions. As nursing programs continue to struggle with clinical placement opportunities and the challenges of meeting COVID-19 limitations on in-person activities, robust in-person or virtual simulation experiences may positively influence students toward a future in perioperative nursing.

Keywords: Accelerated nursing; Intraoperative simulation; Perioperative knowledge; Perioperative nursing; Virtual simulation

Introduction

Perioperative nurses are key personnel in managing safety risk and preventing patient harm [1-3]. With significant nursing shortages in perioperative nursing, there is a critical need to train and recruit nurses to this complex area [4]. Limited curricular exposure, clinical opportunities, and perioperative instruction in undergraduate nursing curricula has led to a decline in nurses seeking perioperative positions and an increased staff turnover [1,2,4,5]. Innovative and sustainable strategies are necessary to reduce the shortage in perioperative nursing. In this quantitative exploratory study, simulated perioperative nursing scenarios utilizing the Tanner Model of Clinical Judgement [6], are used to engage students in clinical judgement scenarios common to the perioperative environment. This study examines the influence of perioperative nursing educational activities, including simulation, on student interest in pursuing perioperative nursing after graduation.

Review of Literature

The challenges and complexities of perioperative nursing require the use of critical thinking and clinical decision making, otherwise referred to as clinical judgement [7]. Clinical judgement is an essential skill for nursing practice [8]. Perioperative nursing is an area in which clinical decision is especially critical due to the variability of patient condition from preoperative to postoperative periods [9,10]. Perioperative nurses must be able to quickly reprioritize their actions according to the patient's condition in order to protect surgical patients from harm [11]. Perioperative nursing education, therefore, needs to assist the learner to exercise clinical judgement and make decisions in what is often a rapidly changing clinical situation.

Well-managed operating rooms contribute to the reduction of postoperative complications and improvement of patient satisfaction and generate a vast amount of revenue for the hospital [1,2]. Inversely, poorly managed operating rooms contribute to increased adverse postoperative conditions and patient mortality [3]. Increased postoperative complications are associated with higher costs of care not only for the patients, but for the hospitals and third-party payers as well [3,12]. These complications may lead to longer hospital stays and discharge to residential care facilities, and/or increase 30-day mortality rates [13,14]. Due to complex medical needs, patients with advanced age experience higher rates of postoperative complications than younger patients [14]. Rates of surgery for patients who are 75 years old or more are projected to increase faster than the general population. The surgical environment is high-risk in regard to patient safety, and perioperative nurses are key personnel in managing risk and prevention of harm [10].

Also contributing to patient safety is an increasing nursing shortage in perioperative nursing [4,15]. In the 2019 annual AORN salary survey, vacant perioperative nurse positions were reported at 9% rising from a previous 3%, and 37% of respondents indicating that retirement was one reason for the nursing shortage at their facility [4]. The inability to adequately staff perioperative units contributes to financial and safety consequences [16]. Thus, there is a critical need for new perioperative nurses. Various factors contribute to this shortage including the historical trend of perioperative managers turning away new graduate nurses, and new graduates not seeking perioperative positions [1,2,4,5]. Decreased perioperative content and experience in undergraduate nursing curricula also contribute to the lack of nurses entering the perioperative field [15]. This limited exposure to and knowledge of perioperative content may ultimately predispose new perioperative nurses with unrealistic expectations for the perioperative setting that can lead to disappointment and staff turnover [2,5].

Undergraduate nursing programs are also facing a decrease in the availability of in-person clinical sites and/or restrictions on student participation in nursing skills [17]. Furthermore, there are challenges in exposing nursing students to perioperative, and, especially, intraoperative sites, where risk of infection is a concern. Simulation-based learning has increasingly been shown to be an educational strategy where students are able to demonstrate learning. The effectiveness of in-person and virtual simulation-based learning has been increasingly researched in areas such as safety, communication, achievement of learning objectives [18,19]. Perioperative care centers understand that strategies to reduce risk is paramount to providing quality care. In clinical practice, simulation activities have shown to positively impact self-efficacy, anxiety, and clinical outcomes [20,21]. Therefore, perioperative simulation is an emerging area in which students can support their learning in a safe and effective manner.

The literature supports a clear demand for improving the recruitment and retention of nurses, with high levels of critical thinking, to perioperative nursing. Innovative and sustainable strategies are essential to reduce this shortage and meet the demands of a growing nursing field. According to the American Sentinel University, one such innovation is the use of perioperative simulation in undergraduate nursing education. Little research has been done to examine how peri-operative experiences can be utilized to teach clinical judgement and reasoning [22] while influencing student interest in pursuing perioperative nursing careers. In this study, a nursing simulation has been designed to provide a unique way to introduce and/or reinforce clinical learning necessary for the perioperative environment. The Tanner Model of Clinical Judgement [6] is used as a framework to develop a perioperative nursing scenario where students care for a client and interact with the surgical team from admission to postoperative

care. This research study hypothesized that perioperative nursing educational activities and simulation will positively influence student interest in pursuing perioperative nursing after graduation.

Methods

The cohort included students in two different nursing tracks, on campuses in two states, and at various points in their nursing education. Students who participated in perioperative simulation represented students in both the traditional (TNC) four-year nursing baccalaureate program in Omaha, and the one year Accelerated Nursing (ANC) baccalaureate program found on both the Omaha and Phoenix campuses. These students were either in their junior year of nursing (Second Acute Care Rotation) or their senior year in nursing (Third Acute Care Rotation). Total student participation in the simulation was 207 students from January 2020 to May 2020.

Prior to the perioperative simulation, students completed didactic instruction and an observation of surgery in an operating room. Following these learning experiences, the students were assigned to perioperative simulation groups of eight to ten students. Due to COVD-19 challenges, this in-person simulation was converted to a virtual simulation mid-way through the academic term, and therefore approximately one half of students completed the simulation in person while the other half completed the simulation in a virtual format. One hundred and thirteen traditional four-year students and 94 one-year accelerated students participated in either an in-person or virtual simulations. The participants included 161 on the Omaha campus and 46 on our Phoenix campus. Survey questionnaire data related to student learning and interest in perioperative nursing were collected immediately following student participation in the simulation.

Student respondents were asked to rate their interest in perioperative nursing in the post simulation survey. The survey gave students the option of selecting increased interest in perioperative nursing as a result of simulation, no interest in perioperative nursing, previous interest in perioperative nursing, or neutral. Respondents were also given an additional set of questions that asked if respondents felt the simulation met learning objectives, and if respondents felt their perioperative knowledge was increased as a result of participating in the simulation. Simulation evaluation data were collected on a 4-point scale Likert scale from 1=Strongly Disagree to 4=Strongly Agree.

Results were collected via Canvas software and stored in a password protected account. Data on career interest is reported in frequencies and percentages, with t-tests comparing student responses by track, gender, and method of simulation delivery (virtual vs in-person). Study approval was sought and this study was found to be exempt by the Institutional Review Board of the participating university.

Description of Simulation

Nursing students in this study participated in perioperative observation, didactic content, and simulation. Prior to the perioperative simulation, students completed a four to six-hour in-person observation of surgery in an operating room. Students also received a three-hour lecture on perioperative nursing and common postoperative complications. Following these learning experiences, the students were assigned to perioperative simulation groups of eight to ten students. The four-hour simulation was prefaced with faculty-developed online modules that introduced the student to the simulation patient, the medical chart, education on informed consent, a review of common preoperative diagnostic studies, instructions on how to complete the pre-operative checklist, expectations inside the surgical suite, and education on the postoperative process. After completion of these modules, students were brought to the simulation area, and prebriefing began. During the prebriefing phase, students self-selected into a preoperative nurse role circulating nurse role, or postoperative nurse role. Students were instructed to explore the simulated environment and the equipment that corresponds with these roles. They were encouraged to ask questions and return to the online modules for support.

During the preoperative phase of the simulation, two to three students worked together to admit the patient by completing preoperative orders, a review of systems, review of all diagnostic data, administration of any ordered medications, and review for existing advanced directives. The intraoperative phase started with students verifying the completion of a preoperative checklist and completion of a patient handoff report prior to transfer of the patient to the Operating Room (OR). Intraoperative students opened necessary surgical equipment, ensured the patient was in the correct position for surgery, performed a surgical count, and led the time out. Once completed, these students gave a handoff report to the postoperative phase students. In the final, postoperative phase of the simulation, students conducted necessary assessments, administered appropriate medications, completed postoperative orders and addressed any complications that occurred leading up to the discharge of the patient.

The students who were not actively participating in each phase were required to observe and evaluate their peers. At the end of each phase, the faculty led the students in a debriefing utilizing the Tanner Clinical Judgement Model [6]. The simulation concluded with a final debriefing where students and faculty came together to reflect on performance overall, and how each phase of the perioperative environment relates with other acute care areas of nursing. Following debriefing, students immediately completed the simulation evaluation questionnaire.

When the simulation was converted to a virtual format, students were expected to complete the same online pre-simulation

module detailing the patient history and expectations in the surgical area. Furthermore, they watched a series of video clips that represented the scenarios that were a part of the in-person simulation experience. Students were provided with a viewing guide that required them to answer critical thinking questions, explore the patient chart, identify priority concerns pertaining to the patient, family, and nurse responses, and answer brief quiz questions in an asynchronous model. The group concluded by coming together in a synchronous online meeting room to discuss their responses and questions about the simulation. The virtual simulation was followed by a short online quiz based on the learning objectives, and the same set of demographic questions and evaluation of the experience that identified their level of interest in perioperative nursing. Though the virtual simulation was presented differently than the in- person simulation, both delivery methods were focused on the same content and learning objectives (Figure 1).

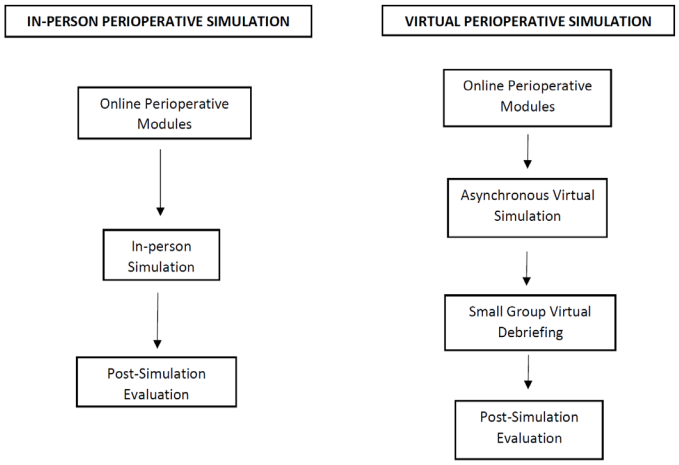

Figure 1: Simulation Scheme.

Results

In this study, 207 nursing students participated in the perioperative simulation. One hundred and ninety-one students responded to the post-simulation and evaluation questionnaires. Of those, 111 students were in the traditional (TNC) four-year BSN tract on the Omaha campus. The makeup of the TNC students included four male students (4%) and 107 female students (96%). Fifty students (45%) were ages 18-20, 60 (54.1%) were 21-25, and one student was between the ages of 31-35. The remaining 80 nursing students were in the accelerated (ANC) one-year BSN track. Of the 80 students in the ANC track, 32 (40%) completed their program on the Phoenix campus and 48 (60%) completed on the Omaha campus. Nine students (11%) were male and 71 (89%) were female. Fifty- eight students (72.5%) were ages 21-25, 16 (20%) were 26-30, three (3.8%) were between the ages of 31-35 and three (3.7%) were aged 31 or older Ninety-nine students participated in in-person simulations while 92 students converted to virtual simulation in response to the COVID-19 restrictions. One hundred and ninety-one students of the 207 participants responded to the evaluation. Evaluation response rates averaged 92% overall (Figures 2 and 3).

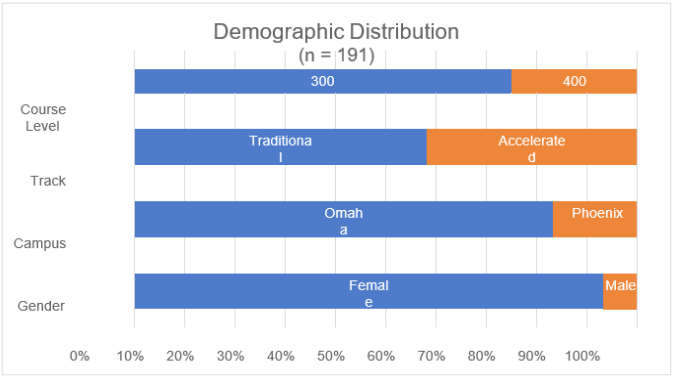

Figure 2: Demographic Information.

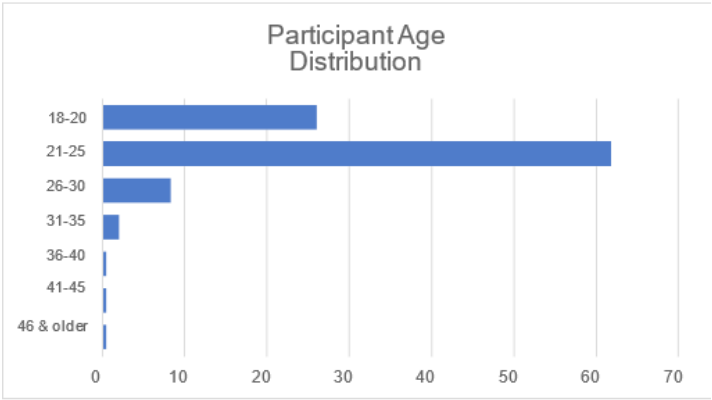

Figure 3: Participant Age Distribution.

The students unanimously agreed that the perioperative simulation met course objectives. From the survey results, 157 (82%) of students strongly agreed and 34 (18%) agreed that the simulation met course objectives. There were no significant differences between the responses of the TNC nursing students and ANC nursing students on either campus or between in-person or virtual simulation experiences (p>0.05) (Table 1).

		Number of Participants	Strongly Agree	Agree
Campus	Omaha	159	83.60%	16.40%
	Phoenix	32	75.00%	25.00%
Track	Trad	111	85.60%	14.40%
	ANC	80	77.50%	22.50%
Learning Mode	Virtual	93	82.80%	17.20%
	Face to Face	98	81.60%	18.40%

Table 1: Met Objectives.

Additionally, the students also unanimously agreed that the simulation increased their knowledge of perioperative nursing. One hundred and fifty-one students (79%) responded that they strongly agreed and 40 students (21%) responded that they agreed that the simulation increased their knowledge of perioperative nursing. There were no significant differences between the responses of the in-person or virtual simulation experiences ($p > 0.05$) (Table 2).

		Number of Participants	Strongly Agree	Agree
Campus	Omaha	159	81.10%	18.90%
	Phoenix	32	68.80%	31.30%
Track	Trad	111	82.90%	17.10%
	ANC	80	73.80%	26.30%
Learning Mode	Virtual	93	78.50%	21.50%
	Face to Face	98	79.60%	20.40%

Table 2: Increased Knowledge.

Fifty-one TNC students (46%) and 25 ANC students (31%) reported an increased interest in perioperative nursing as a result of participating in the simulation. This finding is marginally significant, $p = .038$. Seven of 111 TNC students (6%) and 17 of 80 ANC students (21%) reported no increased interest in perioperative nursing as a result of participation in the simulation, which is mildly significant at $p = .002$. Forty-five of 111 (41%) TNC students and 29 of 80 (36%) ANC students were unsure of their interest in perioperative nursing as a result of participating in the simulation. Eight of 111 (7%) TNC students and nine of 80 (11%) of ANC students selected the response "N/A" that indicated that they were already interested in perioperative nursing prior to simulation participation (Table 3).

		Number of Participants	Agree	Unsure	Disagree	N/A
Campus	Omaha	159	40.90%	39.00%	11.90%	8.20%
	Phoenix	32	61.10%	5.60%	11.10%	22.20%
Track	Trad	111	45.9%*	40.50%	6.3%**	7.20%
	ANC	80	31.3%*	36.30%	21.3%**	11.30%
Learning Mode	Virtual	93	37.60%	39.80%	14.00%	8.60%
	Face to Face	98	41.80%	37.80%	11.20%	9.20%
			*p = 0.038		**p = 0.002	

Table 3: Increased Interest.

Discussion

The aim of the study was to determine if perioperative nursing educational activities, including simulation, increased the nursing students' interest in pursuing a career in perioperative nursing. The simulation objectives were unanimously reported as met by students on both campuses, in both program tracks, within all age groups, and regardless of delivery method. Therefore, the perioperative simulation was found to be an effective educational activity to teach students about perioperative nursing and patient care in a unique setting. The specific simulation scenario was created to encourage the students' ability to apply didactic learning into realistic patient/nurse interactions without risk to an actual patient. Simulation in nursing has been shown by previous research to increase student

self-confidence and satisfaction, which then results in decreases to their anxiety and positive influence on their self-efficacy in patient care [23]. The students unanimously agreed that these learning objectives were achieved, and furthermore, they unanimously agreed that their learning was increased as a result of participating in the simulation. The students collectively agreed that the activity had a positive effect on their learning. This positive impact on student learning has the potential for a protective effect against the negative impacts of anxiety future student experiences [23].

The study found that students reported an increase in interest in pursuing perioperative nursing after participating in the simulation. Traditional nursing students reported slightly higher interest levels than the accelerated students, however both tracks showed similar rates of interest over disinterest in perioperative nursing. This finding may be the effect of traditional students representing younger age groups who commonly have less experience in health care or other professions. Accelerated students come into the program with a previous bachelor's degree and other life experiences that may have influenced their focus in nursing specialty or career path; whereas, traditional students may be more open to exploring a variety of career paths in nursing. However, both tracks had very few students who identified as already having an interest in perioperative nursing prior to simulation, which highlights the lack of knowledge and interest that exists in nursing students regarding perioperative nursing career paths. This supports the previous research by Ball, et al. [2] concluding that current trends in nursing curriculum lack opportunities in perioperative nursing.

Perioperative nursing simulation provides the opportunity to not only educate students on critical thinking scenarios, but also on the role of the nurse in perioperative nursing care. The interest level of students in perioperative nursing did not differ between in-person delivery and virtual delivery of the simulation. This correlates with the literature and is encouraging because it provides support for using virtual simulation to reach students who may not be able to be physically present for in-person simulation, such as students in different geographical areas, differing time zones, or those who may need to be in isolation [19]. Also, in-person simulation requires the use of intraoperative simulation equipment and supplies or the ability to use an actual operating room to complete the scenario. This increased traffic in a surgical department may be limiting for some programs.

Limitations

The study had limitations. It was conducted at a single university as part of a quality improvement process. Future studies should seek to include groups of students from additional academic institutions to see if the results can be replicated. While the study focused on students from a single university, it was able to show geographic diversity between the campuses. Limitations for virtual simulation included the lack of opportunity to complete psychomotor skills or demonstrate competency in other hands-on nursing interventions. Further limiting the study is the lack of a direct measure in student learning. This study utilized a self-report survey from the students' post-simulation, including reporting their interest in perioperative nursing. Measurement of increased clinical judgement and skill performance was especially limited in the virtual platform.

Future Research

This exploratory quantitative study provides a good starting point for discussion and future research of perioperative nursing education. For those students who indicated an interest in perioperative nursing as a result of simulation activities, studies should include tracking students who matriculate into either a perioperative preceptorship their senior year or those who seek employment in perioperative nursing. Research could also include the impact on the hiring practices of surgical departments as related to new graduate nurses with increased perioperative educational activities embedded into their nursing program of study.

Another study of interest would be the effect of perioperative simulation on critical thinking and performance in simulation. The development of these skills may positively influence patient safety outcomes as a result of the improved clinical judgement in new graduate nurses [10].

Future research could also include qualitative thematic analysis of post-simulation evaluations of student experiences in simulation. Qualitative analysis provides a more in-depth look at student learning and perception into the development of critical thinking. Focus groups are a technique that may provide insight into student experiences and the driving factors that influence career choice after graduation.

Conclusion

Perioperative nurses are key personnel in managing risk and improving patient safety [10]. Improved patient outcomes will be dependent on the successful training and recruitment of new graduate nurses to this growing field. This study investigated students' perceptions of learning and new interest in perioperative nursing as a result of simulation. The study found that all students perceived an increase in perioperative nursing knowledge regardless of campus, program track, age group, or whether presented as an in-person or virtual simulation. Future research is needed to explore the relationship of clinical judgement ability as a result of perioperative education, and how hiring practices may be influenced by new graduate nurses with increased perioperative knowledge. As nursing programs continue to struggle with clinical placement opportunities and the challenges of meeting COVID-19 limitations on in-person activities, robust in-person or virtual simulation experiences may positively influence students toward

a future in perioperative nursing.

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