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The Effects of High Fidelity Simulation on Nursing Students' Perceptions and Self-Efficacy of Obstetric Skills

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Abstract

Introduction: Simulation fills the gap between theory and practice as a method of student-centered learning and performance assessment. Simulation-based learning is a commonly used teaching tool that provides opportunities for students to learn and apply theoretical principles of nursing care in a safe environment.

Purpose: The purpose of this study was to evaluate the nursing students' perception of obstetric high fidelity simulation and its effects on their knowledge, skills, and critical thinking.

Method: A descriptive, and correlational study design was utilized. Convenience sampling was conducted among junior level baccalaureate nursing students who were enrolled in a maternal child health nursing course at a large public university. The simulation experiences included nine different scenarios that highlighted critical obstetric concepts. Three instruments were used to gather data: (a) a demographic survey, (b) the Simulation Evaluation Form, and (c) the Simulation Design Scale. Student feedback also was assessed through qualitative open-ended questions. There were three simulation sessions. One hundred-twenty students participated in the simulation training as observers with the following response rates for each session: I (80.5 %), II (75.9 %), III (66.6 %). The response rate for the simulation participants was 100 % (36/36) for all sessions. The collected data was analyzed using the Statistical Package for Social Sciences software and the level of significance was set at 0.05.

Results: The majority of the participants were female (79.7 %) and the mean age was 23.6 years. The findings indicated that simulation activities improved students' perception of learning. There was a positivie correlation between the amount of simulation a student had experienced and the perception of simulation. The qualitative analysis of open ended questions revealed five themes: satisfaction, skills/knowledge, confidence/critical thinking, cooperation/communication, and fidelity

Conclusion: The findings of the study indicated that respondents felt positive about high fidelity simulation experience. Further research is needed to identify components of simulation effectiveness with a larger sample size.

Keywords

Simulation, Nursing students, Perception, Obstetric skills

Introduction

Simulation is a student-centered educational method, which typically provides a new learning experience for students in a clinical or lab setting, and has been a growing part of the curricula in nursing education for the last decade [1,2]. Simulations are defined as activities that mimic the real clinical environment by incorporating medical procedures, decision-making, and critical thinking through techniques such as role playing and the use of devices such as interactive videos or mannequins [3,4]. Simulations range from simple to complex, and may include live actors, and low to high fidelity simulators. High-fidelity simulators (HFS) are highly technical, life-like human mannequins that breathe, talk, have heart and lung sounds, and are used to replicate evidence-based clinical scenarios for training purposes [5].

Adults tend to learn best when information can be applied to real-life experiences [6]. Additionally, learner's self-reflection has become a key component that contributes to the development of simulation training. Nursing educators realize that simulation is an innovative teaching and assessment tool that must adapt to the learning styles of the new generation [3,4]. Jeffries (2005) proposed the Nurses Education Simulation Framework (NESF) as a useful guide in which students play an active role [2]. The theoretical model comprised of five major components: teacher factors, student factors, educational practices, simulation design and outcomes.

Nurse educators are often faced with the problem of how to provide clinical learning experiences that promote effective clinical judgment and increase self-efficacy among nursing students [7-9]. Research indicates that simulation has demonstrated benefits in preparing the newly graduated nurses for the clinical practice environment [7,10,11]. However, nursing education literature indicates the need for more research that explores the effectiveness of simulation in nursing education. Despite the increase in the use of educational simulation the evidence about its effectiveness as an educational strategy is inconsistent [8-13]. Therefore, the evaluation of simulation is critical in determining student learning and efficacy of their experience.

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Purpose

The purpose of this study was to evaluate the nursing students' perception of obstetric HFS and its effect on their obstetric knowledge, communication skills, and critical thinking.

Research questions

1. How satisfied are the students with the simulation experience?

2. Does simulation experience influence student's perceived skill/knowledge/critical thinking?

Methodology

Design

A descriptive, and correlational design was used for this study.

Participants

The study included a convenience sample of 120 junior nursing students enrolled in a maternal child health course at a large public university in the southeastern United States. Students participated in three simulation sessions held on different days. Thirty six students participated as both scenario participants and classroom observers while the remaining students observed all simulation sessions.The response rate for the simulation participants was 100 % (36/36) for all sessions, while classroom observer responses for each session were: I (80.5 %), II (75.9 %), III (66.6 %).

Inclusion criteria

To be eligible for the study, students must have been enrolled in the maternal child health course, fluent in English, over the age of 19, and willing to be involved in the study. Junior level nursing students enrolled in a maternal child health course fluent in English, over the age of 19 and willing to be involved in the study. All simulations were a part of course requirements. Students were invited to be involved in the study and were under no obligation to participate.

Exclusion criteria

Nursing students who were under the age 19, and those who did not volunteer to be in the study.

Variables

Dependent variables**;** simulation evaluation form (SEF) score and simulation design scale (SDS) score. Independent variables**;** demographic characteristics of students and students previous work experience with similar patients.

Setting

The study was conducted in the simulation lab and classroom. All clinical case scenarios for simulation were designed to be similar to what could be encountered with a typical patient in a hospital setting.

Ethical considerations

The study was approved by the University Institutional Review Board. Students participating in the study received verbal and written information about the aim of the study, the right to withdraw and the guarantee of confidentiality of the information provided to the researcher.

Application

Investigators were course faculty who designed the clinical case scenarios to enhance student learning of course content and who worked closely with the lab team certified for simulation learning.

Phase-1- facilities: The simulation lab utilized the Noelle-Gaumard high fidelity simulator or a human embedded patient. Faculty, staff or volunteers served as the patient, family members or health care professionals as called for in the case scenarios. Student participants were in the simulation room set up for each scenario. Classroom observers were sitting in a classroom watching the simulation unfold via a skyped web based system, which also recorded the scenario.

Phase-2-Scenario and debriefing design: Scenario scripts were designed by course faculty and staff and the principal investigator and faculty who are content experts. Three different obstetrical simulation session scheduled on three different days were the basis for the study. Simulations were divided into three separate four hour sessions with four different scenarios in each session.

- First session case scenarios pertained to (1) pre-eclampsia, (2) preterm labor/hyperemesis, (3) postpartum hemorrhage, and (4) early labor.

- Second session case scenarios were based on (1) abruptio placenta/cocaine abuse, (2) teen pregnancy/placenta previa, teen pregnancy/NB assessment, (3) delivery/adoption and (4) active labor.

- Third session case scenarios involved patients experiencing (1) shoulder dystocia, (2) newborn hypothermia/hypoglycemia, (3) labor and delivery, and (4) delivery and recovery. Student support was written into the patient case scenario by providing cues for the student to use in problem solving.

Phase-3-actions: Students were randomly assigned to teams of three for each patient case scenario (n=36). Course faculty and researchers reviewed each case with the team and class in the classroom immediately prior to beginning the simulation. Each team had planned roles – one student performed physical assessment, another took history, and one communicated with the health care provider. Faculty and lab staff assumed roles as team leader, embedded simulation participant (ESP) who played a family member or friend, or physician prescribing orders and examining the patient. Case scenarios were well planned and scripted for each role and information to be provided during the simulation. A faculty or lab staff member ran the computer which controlled the mannequin's voice, vital signs and changes based on the treatment and nursing actions. Each clinical case scenario simulation lasted about 50 minutes, including the case and debriefing.

Phase-4-debriefing: Immediately, following the simulation facilitators conducted debriefing as a reflective activity. Debriefing was an essential element of simulation, and used the Plus-Delta model as described by the National League for Nursing (NLN) [3]. Elements in the model include- constructive feedback, correction, clarifying any questions and active listening. Participants and observers took part in the debriefing session which lasted about 30 minutes.The same process was used for all simulations on all three days. Video tapes from debriefing sessions were analyzed for time spent on discussion related to simulation objectives and the application of learning to practice.

Phase-5-evaluation: At the end of the simulation session, the students completed the posttraining questionnaire, which focused on their perceptions of simulation effectiveness. While 120 students were enrolled in the course, participation in the study was voluntary. During the three days of the experience student participation in the sessions were as follows: Session 1 (87 observers and 12 participants), Session II (82 observers and 12 participants), Session III (72 observers and 12 participants). The questionnaires took about 15 minutes to be completed by students.

Instruments

Three instruments were used to gather data: (a) a Demographic Survey (DS), (b) the Simulation Evaluation Form (SEF), and (c) the Simulation Design Scale (SDS). These instruments are described in detail below.

DS: Demographic data including gender, age, role played during simulation activity, history of employment in a health care setting, and previous experience with patients who had symptoms similar to those encountered during each simulation experience were collected after each day of implementation.

Table 1: SEF score averages of simulation sessions for observers

SEF Items***	Sim I (n=87)		Sim II (n=82)		Sim III (n=72)		Statistical test*/p	
	M	SD	M	SD	M	SD		
1	4.06	0.90	4.13	0.82	4.26	0.92	7.208	0.027
2	3.98	0.97	3.99	0.91	4.28	0.81	8.863	0.012
3	3.97	1.00	4.22	0.67	4.37	0.76	8.976	0.011
4	4.01	0.96	3.92	0.96	4.31	0.81	16.535	0.000
5	3.32	1.44	3.31	1.24	4.04	1.09	29.359	0.000
6	4.00	0.92	4.11	0.88	4.29	0.77	6.540	0.013
7	4.03	0.92	3.97	0.88	4.28	0.87	14.787	0.001
8	4.00	0.96	4.00	0.93	4.29	0.77	10.095	0.006
9	3.74	1.15	3.58	1.14	4.18	0.98	20.164	0.000
10	3.95	0.96	4.00	0.93	4.25	0.86	8.279	0.016

*Kruskal-Wallis test,

1. This experience will improve my care of patients.
2. I was adequately oriented to the simulation environment.
3. This simulation was a valuable learning experience.
4. This debriefing was a valuable learning experience.
5. The length of time for this simulation and debriefing was appropriate.
6. The objectives for this simulation were met.
7. I would recommend this simulation to others.
8. Completing the simulation helped me understand classroom information better.
9. I learned as much from observing my peers as I did when I was actively involved in caring for the simulated patient.
10. This experience increased my critical thinking skills.

SEF: This form is a 10-item scale to measure students' perception of the simulation experiences. Responses were rated on a 5-point Likert scale with values ranging from 1 (strongly disagree) to 5 (strongly agree). There were also three open-ended questions related to the things they have learned, things students wished were focused on, and their preference of having a high fidelity mannequins or live actors in the simulations.

SDS: This scale is a 20-item instrument using a 5-point Likert scale which measures five design features: objectives and information (5 items), student support (4 items), problem solving (5 items), guided reflection or feedback (4 items), and fidelity (2 items). This instrument has two parts: one asks about the presence of specific features in the simulation, the other asks about the importance of those features to the learner and responses range from 1 (strongly disagree) to 5 (strongly agree) for both parts. The SDS was developed by NLN who reported content validity verified by ten content experts in simulation development and testing. The instrument's reliability was tested using Cronbach's alpha, which was found to be 0.92 for presence of features, and 0.96 for the importance of features [3].

Data analysis

The data obtained from the research were analyzed with the Statistical Package for the Social Sciences (SPSS version 19.0, IBM Corp, New York) software package for statistics programs. Descriptive statistics were evaluated by percentage, standard deviation, and median. Tests to analyze the relation between the dependent variables and independent variables were Kruskal-Wallis test, one-way analysis of variance (ANOVA) test, and Pearson correlation test. All p values were considered significant if less than 0.05 for all results.

Results

Demographic characteristics

Results of this study indicated that, there were total of 241 student responses from the observer group and 36 student responses from the participant group at the end of the three simulation training sessions. Of the 241 observer responses, the majority were female (79.7 %), and there was an overall mean age of 23.6 years (SD 4.02, range 20-42). Only 28.2% of the observer responses reported previous work experience in a health care setting; however, 48.5% had experience with obstetric patients. Moreover, 52.7 % of 241 observer responses had prior simulation experience related to obstetrics.

Of the 36 students who participated in the simulation, 75 % were female with an overall mean age of 23.1 years (SD 3.59, range 20-29). Only 19.4 % of the participants had previous work experience in a health care setting and 60 % of those had experience with obstetric patients. Moreover, 44.4 % of the 36 participants had prior simulation experience related to obstetrics.

SEF characteristics

Out of 241 observer responses on the SEF form, the minumum total score was 10 and the maximum was 50 with a mean of 40.37 and a SD of 8.18. Table 1 compares observers' simulation scores for three separate sessions. According to Kruskal-Wallis test results, the SEF scores for third simulation are significantly higher ($p < 0.05$). The parametric equivalent of Kruskal-Wallis, ANOVA also exhibited significant difference among three-simulation session for all instrument items. However, only Kruskal-Wallis results are reported due to non-normality of our sample distributions. As a non-parametric method, Kruskal-Wallis does not require normal distribution of the residuals.

SDS characteristics

Means and standard deviations for presence and importance items on the SDS are shown for participants in Table 2.

In Table 2 the objectives construct exhibited the mean score of 22.06 (SD = 3.5) out of 25 possible points, followed by student support (M = 18.86, SD = 1.65, max = 20), problem solving (M = 22.00, SD = 3.12, max = 25), feedback (M = 18.53, SD = 2.24, max = 20), and fidelity (M = 9.56, SD = 0.80, max = 10) (Table 3).

Also in Table 2, participants' SDS scores under presence column indicated that the experience helped them think more positively about simulation. The mean for all questions were above 4 (agree) with some cases being very close to 5 (strongly agree). Moreover, the results under "importance column" indicated that most participants either agreed or strongly agreed that all constructs (i.e., objectives, student support, problem solving, feedback, and fidelity) are important in simulation experience.

Table 2: Presence and Importance of SDS characteristics for participants

SDS items	Presence		Importance		Statistical test*	
Objectives/ Information (M=22.06 SD=3.5)	M	SD	M	SD	r_s	p
There was enough info provided at the beginning of the simulation to provide encouragement	4.47	0.90	4.22	1.07	0.107	0.534
I clearly understood the purpose and objectives of the simulation.	4.50	0.77	4.33	0.75	0.525	0.001
The simulation provided enough info in a clear manner for me to problem-solve the situation.	4.47	0.84	4.42	0.84	0.322	0.005
There was enough information provided to me during the simulation.	4.33	0.98	4.61	0.64	0.401	0.015
The cues were appropriate and geared to promote my understanding.	4.27	0.94	4.47	0.65	0.266	0.116
Student Support (M=18.86, SD=1.65)						
Support was offered in a timely manner.	4.63	0.48	4.58	0.60	0.116	0.502
My need for help was recognized.	4.75	0.60	4.56	0.65	0.148	0.388
I felt supported by the teacher's assistance during the simulation.	4.77	0.48	4.56	0.73	0.261	0.124
I was supported in the learning process.	4.69	0.52	4.56	0.60	0.202	0.237
Problem Solving (M=22.00, SD=3.12)						
Independent problem solving was facilitated.	4.44	0.77	4.56	0.60	0.101	0.557
I was encouraged to explore all possibilities of the simulation.	4.22	0.92	4.58	0.60	0.236	0.166
The simulation was designed for my specific level of knowledge and skills.	4.53	0.73	4.75	0.43	0.055	0.752
The simulation allowed me the opportunity to prioritize nursing assessments and care.	4.56	0.69	4.69	0.52	0.390	0.019
The simulation provided me an opportunity to goal set for my patient.	4.25	0.87	4.53	0.69	0.590	0.000
Feedback/Guided Reflection (M=18.53, SD=2.24)						
Feedback provided was constructive.	4.25	0.87	4.67	0.75	0.356	0.033
Feedback was provided in a timely manner.	4.63	0.63	4.69	0.52	0.377	0.023
The simulation allowed me to analyze my own behavior and actions.	4.69	0.57	4.64	0.79	0.511	0.001
There was an opportunity after the simulation to obtain feedback from the teacher in order	4.58	0.60	4.58	0.80	0.490	0.002
Fidelity (M=9.56, SD=0.80)						
The scenario resembled a real-life situation.	4.77	0.42	4.78	0.42	0.518	0.001
Real-life factors, situations, and variables were built into the simulation scenario.	4.77	0.42	4.78	0.42	0.518	0.001
Total	91.00	9.53	91.56	9.20	0.097	0.000

**Pearson correlation test*

Table 3: Mean and standard deviation presence of SDS sessions for participants

	SDS Sessions							
Presence of SDS	**Sim I (n=12)**		**Sim II (n=12)**		**Sim III (n=12)**		**Statistical**	
	M	**SD**	**M**	**SD**	**M**	**SD**	**Test ***	**p**
Objective-Information	4.41	1.18	4.32	0.92	4.66	0.58	1.43	0.64
Student Support	4.69	0.65	4.68	0.56	4.88	0.36	1.56	0.69
Problem Solving	4.24	1.16	4.36	0.61	4.57	0.53	2.35	0.42
Feedback/Guided	4.29	0.79	4.65	0.64	4.99	0.26	6.43	0.02
Fidelity	4.63	0.50	4.75	0.45	4.86	0.25	5.26	0.04

**Kruskal-Wallis test*

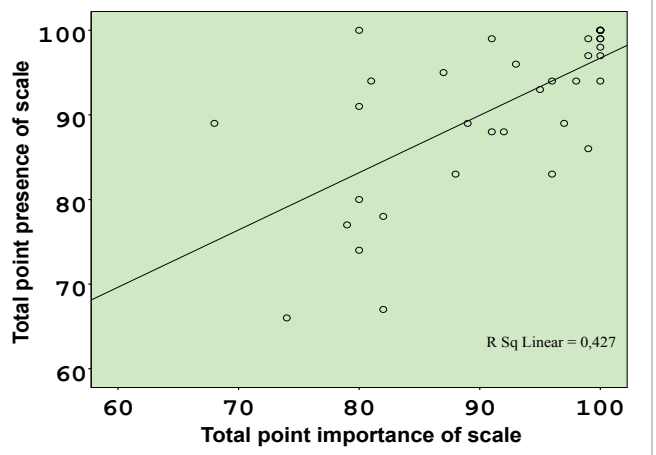

Figure 1: Graphic 1- Corelation of presence and importance of score.

Correlations

The second set of subscales rated perceptions of the importance of simulation elements. Pearson correlation coefficient (**r**) analysis is displayed in Graphic 1 (Figure 1). The results indicate that there is a positive significant correlation between participants' perceived score of the presence items and their perceived importance of the items on the obstetric simulation activities (r = 0.654, p = 0.000).

Table 3 exhibits the comparison of simulation scores for the first, second, and third simulation sessions. The test results indicate that out of scale items only 2 subscales were significant. Namely, participants' simulation scores for items on feedback/guided reflection and fidelity indicated a significant difference ($p < 0.05$) among these sessions. As students progressed in the simulation sessions their responses for feedback/guided reflection and fidelity were more favorable.

Open-ended question characteristics for simulation experience

From the four open-ended questions in the SEF, 6 participants (n = 36) and 178 observer (n = 241) responses were submitted. Two questions asked the students to name two things that they, as observers or participants liked/learned and two things that they wished the simulation had focused on. A qualitative content analysis of observers' responses to these open-ended questions revealed that these responses clustered around five themes: satisfaction, skills/knowledge, confidence/critical thinking, cooperation/ communication, and fidelity (Table 4).

In Table 4 the most frequent responses were related to satisfaction and skill/knowledge. They believed that the simulation was motivating (n = 4) and effective (n = 37). Observers also expressed satisfaction toward the simulation since they enjoyed learning and conveyed that the simulations were fun. They indicated greater self-confidence in caring for patient and knowledge covered in the simulation (n = 136) and in their ability to apply this experience to clinical settings (n = 14).

Table 4: Feedback of observers for simulation

Satisfaction	n	%
1. I enjoyed learning with simulation/ I learned by fun	63	28.2
2. I understand that I made mistake a lot	4	2.2
3. It motivated me to learn more	4	2.2
4. It was effective /good/helpful /interesting	37	20.7
Skills/knowledge		
1. It improved my knowledge	136	76.4
2. I developed my spesicific skills	14	7.8
Confidence/Critical thinking		
1. It improved my professional behavior	5	2.8
2. I am confident I can apply my knowledge	4	2.2
3. I recognized critical aspects of an unanticipated outcome	6	3.3
Cooperation/communication		
1. It demonstrated effective communicaiton with patient/ family members	9	5.0
2. I observed roles among team	5	2.8
Fidelity		
1. It resembled a real life situation	13	7.3

Observers also reported that working with simulation was important. Results showed that observers improved their confidence and critical thinking through better understanding of their professional role (n = 15), team-work, communication with patients and family members (n = 14) and fidelity (n = 13) as a result of the experience.

Only 6 participants out of 36 responded to the open-ended questions. Four participants stated that "simulations were motivating, exciting, and entertaining", "I loved simulation", "simulation helped me to learn", "simulation helped develop my professional skill". Two students responded to the question about things that could be improved, and said "we should have more of a patient background before scenario" and "more time to prepare when receiving report as participant".

The open-ended question regarding students' thoughts/ preferences related to using high fidelity mannequins and/or live actors in simulation activities exhibited the following results for participants and observers. Out of 114 responses, 26.3% prefered high fidelity mannequins, followed by 25.4% prefered live actors, and 49.1% liked both high fidelity mannequins and live actors.

Discussion

The NLN has provided standards for nursing education and endorsed simulation to prepare students for complex clinical and critical thinking skills. The perception of the students for clinical simulation is highly important and is associated with the success of the simulation experience [1,3]. This study was based on outcomes related to skill performance, learner satisfaction, critical thinking and self-confidence [2]. The participants were involved obstetrical scenarios and in varying roles. At the end of each scenario the students evaluated the experience using the simulation design scale which measured the frequency with which the students agreed with the simulation design and the importance of each design element.

A California study carried out with baccalaureate nursing students (N = 104) to examine the significance of HFS on nursing students' performance on examinations by Gates, Parr and Hughen showed positive student's perceptions following HFS [14]. In a randomized controlled trial, Kim and Jang examined the effect of simulation on knowledge of acute care assessment, and clinical performance ability using a pretest–posttest experimental design for nursing students (N = 50). Their results indicated that the experimental group had significantly greater knowledge and clinical performance ability for cardiopulmonary emergency care, compared with the control group [15]. Other studies specifically focusing on student reaction to the simulation model report more positive responses to the simulation experience than to the traditional training approach [6,8,11,16-18]. This study's findings are consistent with those mentioned above that simulation positively effects student's overall learning perception.

Conversely, Schoening, Sittner, & Todd evaluated the effect of simulation on knowledge of preterm labor simulation for nursing students (N = 60) using an experimental and control group. Their results showed no significant differences in knowledge scores [10]. Another study was conducted in Jordan using a quasi-experimental design which examined the effect of simulation on nursing skills of cardiac life support among 121 university nursing students. Findings from the Jordanian study revealed no difference in knowledge acquisition or retention but self-efficacy revealed significant difference [19]. This study had no pre or post test to determine differences in knowledge and did not use control and experimental groups.

Overall, our students found the simulation to be a positive experience. Students also expressed that the realism of a simulation was necessary for the participant to fully engage. Qualitative data from this study revealed that students found the simulation experience to be a valuable learning method. Five themes emerged: 1) satisfaction, 2) skills/knowledge, 3) confidence/critical thinking, 4) cooperation communication, and 5) fidelity.

When querried about high fidelity manequins and live actors, students liked both. Students identified advantages for use of simulators with live actors filling in supporting roles. These include: "allowing the student to learn at their nursing knowledge/ skills level", "presenting critical thinking with complex scenarios", "allowing the student to mistake without harm to the patient", "improving professional behavior", "identifying learning as exciting, fun, motivating and realistic", and "developing roles among team members and effective communication skills with patient/ family members".

Communication skills are core competencies essential for good patient care as part of the training of healthcare professionals. Self-efficacy and confidence is widely used for the outcome of communication skills training. Students in our study also indicated greater self-confidence in caring for patients after the three simulation sessions. According to Social Cognitive Theory, Bandura believes that individuals with high self-efficacy have higher performance because self-efficacy plays a mediating role in relation to motivation, learning, and performance for learner [20]. In the case of nursing education, the approach learned in simulation may then be transferred to the clinical settings where student's practice [21].

Smith and Roehrs (2009) explored in a study the effects of an HFS experience involving physical assessment, medication administration with junior level baccalaureate nursing students (N = 68) at a public university in the western United States [22]. The study showed students' responses clustered around the following themes: skills/knowledge, confidence/critical thinking, cooperation/communication, and fidelity. Schlairet determined that junior-level baccalaureate-nursing students (N = 161) in the southeastern United States identified the value of high expectations, active learning, diverse learning practices, and collaboration in simulations. Students also valued support, feedback/guided reflection, information/objectives, and complexity related to simulation design [23]. Bambini et al. conducted an experimental study with undergraduate nursing students (N = 112) to explore the effectiveness of simulation for postpartum examination in the southeastern United States [24]. Results revealed significant increases in students' satisfaction for simulation ($p < 0.01$) and three themes identified from the qualitative survey are: 1) Communication, 2) Confidence/psychomotor skills and patient interaction, 3) Clinical judgment [24]. In our study, students showed significant difference in the areas of feedback/guided reflection and fidelity to a real clinical setting.

Comments written by the students in the response to the open-ended question on the post simulation questionnaire included: "I feel a lot more confident doing the obstetric skills after doing the simulation!", "Using the simulator today has helped me be more comfortable with this case". Another study which took place among baccalaureate junior nursing students (N = 134) in Ohio by Guhde (2011) using the NESF found three positive outcomes following simulation: critical thinking, learning and learner satisfaction [25].

Positive results were confirmed on critical thinking, self-confidence and cognitive learning for simulated maternal-newborn scenarios among senior students (N = 63) at an eastern United States School of Nursing in a quasi-experimental design study by Lewis and Ciak [26]. Likewise in Cangelosi, & Moss, Bambini et al. and Bremner studies, it was determined that nursing students' self-efficacy scores including nursing skills were significantly higher following simulation experience [12,24,18]. In a randomized controlled trial, Ellis, et al. studied the effectiveness of simulation in the education of midwives (N=132) for eclampsia. Post-training exams revealed a 32% increase in mean score after physical examination and most of the students felt comfortable and self-confident during the simulation ($p < 0.001$) [27]. Regarding self-efficacy and confidence, Daniels et al. used two groups by didactic and simulation method for shoulder dystocia and eclampsia scenarios. It was found out that the group studying with the simulation model had much higher scores ($p < 0.05$) [28]. Tawalbeh and Tubaishat reported that simulation is significantly more effective than traditional training in helping to improve nursing students' knowledge acquisition, knowledge retention, and confidence about advanced cardiac life support [29]. Cohen et al. examined the relationship between low-tech high-fidelity in simulation-based training and pre- and post-training changes in nursing midwives and students' self-efficacy. The training positively affected participants' perceived readiness for the technical, behavioral, and cognitive dimensions of obstetric emergencies [30]. The outcomes in the literature mentioned here are similar with the findings of our study.

In contrast, Alinier et al. performed a study with 77 nursing students in the North America. Students provided positive feedback to the courses using the simulation method. However, the results indicated the group studying with the simulation model had not gained much higher self-confidence scores [31]. Smith and Roehrs and Brannan et al. found that although students were satisfied with HFS teaching method there was no correlation between students' self-confidence and level of performance whether students' received simulation training or not [22,13]. A study by Kaplan & Ura used simulation to assist undergraduate senior nursing student (N = 97) confidence while improveing the students' clinical skills, and safety in caring for multiple cases [32]. The students reported that the simulation exercise was the most realistic of their previous simulations. However, the data also indicated that 26% of students did not believe simulation enhanced their confidence or knowledge and nursing skills, and they reported feelings of inadequacy after the simulation [32]. Walton et al. identified a number of reflections that student nurses experienced during simulation. These thoughts reported by students ranged from feeling like an imposter, making errors and struggling with the learning strategy to feelings of anxiety and discomfort, disorganization and wanting specific instruction [33]. Student responses in the Walton et al. study are different from our study results.

A qualitative study by Pike & O'Donnell examined the impact of clinical simulation on pre-registration nurses (N = 9)' self-efficacy beliefs in the United Kingdom using the NESF. Two themes emerged from the data: "self-efficacy" in relation to communication skills and the need for "authenticity" when performing simulations. According to the study self-efficacy was not enhanced by simulation [34]. Another descriptive study was done to determine the physical assessment self-efficacy of nursing students (N = 73) at a University in Libya. It was determined that students had a high level of self-efficacy in performing physical assessment following the training [35]. In an Interprofessional study of medical, nursing and pharmacy students, results showed significant positive improvements in nursing students' responses on the post-course survey of knowledge, skills, and attitudes. Over 90% of students reported the simulation increased their understanding of professional roles and the importance of Interprofessional communication [36]. These studies report conflicting data and may not have been measuring similar results. Our study used the SEF and SDS to obtain data which may be compared to data from future studies employing the same instruments.

During simulation a computer-driven high fidelity human-patient simulator allows students to perform safely on computerized mannequins that substitute for real patients and can be programmed to exhibit multiple physiologic responses as a unique learning tool [37]. Lasater found that 30% of students in their simulation study felt that the simulator did not have a high level of realism [38]. In our study both high-fidelity simulators and standardized patients were used in the simulation scenarios. The use of the both techniques may be a factor in improving students' satisfaction and confidence as indicated by their responses on the open ended questions on the SEF. Also, the improving technology for high fidelity simulators and the increase in training available for faculty may be factors in the fidelity of simulation to real life situations.

Conclusion and Recommendations for Future Research

This study demonstrated that simulation was effective in students' perception of a simulation being a higher level of learning. Authors found the clinical simulation experience described in this study to be viewed by students as "motivating, exciting and entertaining", assisting "me to learn" and further developing "my professional skill". Further research is needed to identify components of simulation effectiveness with a larger sample size.

Limitations

This study has some limitations including the design, sample, and instrument.

- The convenience and small sample limits the ability to generalize these findings to the greater population of learners.
- The study was based on students due to the simulations being a required part of the obstetric nursing course. Therefore, there was no control group for comparison.
- The impact of this simulation experience on student learning/competency with an objective structured clinical examination was not assessed. Instead, students' perceptions of obstetric skills after simulation were measured using the SDS instrument.
- There was no pre and post test to determine specific knowledge acquisition,. This study relied on student report of their perception of improvements in knowledge and clinical skill.

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