

Assessing Curricular Simulation Through Revision

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Abstract:

Background: The objective of this study was to evaluate the effectiveness of simulation in an undergraduate BSN nursing program following a quality improvement (QI) initiative.

Methods: Using a mixed-method design, students at all levels of the nursing program completed the Simulation Effectiveness Tool - Modified (SET-M) after each simulation experience during each semester over two calendar years at a small Midwestern university. The tool included 19 items that use a 3-point Likert-scale, two demographic questions, and one qualitative question. Quantitative and qualitative analyses were performed.

Results: The students' perception of simulation effectiveness is rated high across the curriculum. The results of this survey indicate the improvements made in simulation in the program were successful. Debriefing is an area of strength, while pre-briefing is an area that shows additional improvements can be made.

Conclusion: Simulation is a valuable tool within nursing curriculum, but a lack of structure can lead to student and faculty dissatisfaction. Well-defined policies coupled with staff education help to ensure the effectiveness

Key Word: Nursing Education, Simulation, Quality Improvement, SET-M, Pre-briefing

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I. Introduction

Simulation has been validated as an effective learning strategy for nursing students and has the support of the National Council for State Boards of Nursing (NCSBN) for clinical hours^[1]. Simulation facilitation requires careful planning for effectiveness and is included in the standards of best practice from the International Nursing Association for Clinical Simulation and Learning (INACSL). The Jeffries Simulation Framework encourages the use of high-fidelity simulators, simulations that promote problem-solving, student support by faculty, and debriefing after simulations^[2].

Simulation provides the opportunity for all students to experience high risk, low volume scenarios to augment clinical activity. Simulation at all levels of the nursing program provides students the opportunity to become familiar with the simulation process, equipment, and expectations. As students repeatedly engage in simulation activities throughout the nursing program, their competency and confidence are expected to increase. Debriefing serves as the teachable time for student learning. A post-simulation review allows faculty to assess student learning and prompt student thinking with follow up questions.

At a Midwestern University nursing department, the Bachelor of Science of Nursing (BSN) program simulation operation practices were inconsistent and based on faculty preference. Few faculty had received simulation training or had been exposed to simulation activities. Those who were conducting simulation were unaware of best practices of simulation. Due to inconsistent delivery of simulation and dissatisfaction of nursing students, faculty restructured the simulation process within the BSN program curriculum. For these reasons, in 2018 the nursing department identified simulation as a priority with the implementation of the summer simulation committee. The purpose of the simulation committee was to develop standardized simulation operation processes regarding components, scheduling, and evaluation. As a quality improvement (QI) initiative, faculty researched best practices for simulation use in undergraduate nursing programs. Using the National League of Nursing/Jeffries Simulation Framework and the INACSL Best Practices of Simulation^[3], the committee created a simulation handbook for nursing faculty. The handbook serves as a resource for simulation development and implementation. It emphasizes simulation best practices of using objectives, pre-briefing, debriefing, and evaluation. Clear simulation participation expectations are provided for faculty and students. A simulation checklist was developed for faculty to provide guidance with simulation startup. Examples of simulation templates, debriefing models, and on-line resources are included in the handbook. Faculty utilizing simulation are referred to the handbook for best practice guidelines. The simulation laboratory coordinator uses the handbook as a resource for simulation operations. Department administration uses the handbook as the standard for simulation within the curriculum.

As simulation is becoming standard practice in nursing curricula to augment clinical hours, simulation operations require consistency and evidence-based teaching practices. With implementation of simulation operation guidelines, as provided within the handbook, faculty are encouraged to incorporate or increase more simulation activities into their clinical courses. As simulation is now standard practice in nursing curricula to augment clinical hours^[4], simulation operations require consistency and evidence-based teaching practices. With the implementation of simulation operation guidelines, faculty are encouraged to incorporate or increase more high-fidelity simulation activities into their clinical courses. Establishment of high-quality simulation experiences requires faculty training, shared resources, best practices, and evaluation of simulation experiences in nursing curricula^[5].

Because faculty deemed simulation an important learning strategy, student perception of the effectiveness of the simulation activity is essential for quality improvement. At the time of the simulation process revision, student evaluation of simulation effectiveness was not assessed. Although faculty may perceive simulation as effective, it is pertinent to assess the students' perception of the simulation. Evaluating the students' perceptions of the effectiveness of learning in the simulation environment provides educators an opportunity to improve the design and implementation of their simulation activities to further enhance outcomes^[6].

After the simulation process revision, faculty incorporated the evaluation of simulation effectiveness after each simulation activity. Utilizing the SET-M, students self-reported their perceptions of the simulation activity. The SET-M assesses the students' perceptions of pre-briefing, the scenario, and debriefing. Pre-briefing includes activities to prepare the students for the simulation including orientation to the simulation laboratory, reading review, or equipment preparation. Debriefing includes the time directly after the simulation experience to structurally review the activities of the simulation including expansion of the clinical content. The SET-M was utilized for every practicum in each cohort for four semesters. Simulation effectiveness across the curriculum was assessed cross-sectionally and longitudinally. Student simulation effectiveness was the focus of this study. It was predicted that: 1. Students will perceive the structured pre-briefing and debriefing portions of the simulation design well facilitated. 2. Overall perceived effectiveness of simulation within the BSN program is high.

The study was completed at a small Midwestern university BSN nursing program. In this program, the first four semesters focus on general education and pre-requisite classes, and the final four semesters are dedicated to the nursing program. The first two semesters of the nursing courses focus on medical-surgical patients. The third semester centers on obstetrics and pediatrics. During the final semester, students study critical care, community, and leadership. Simulation occurs in all four semesters of the nursing courses and includes a variety of experiences that align with the overall objectives of the semester. Scenarios presented in the simulations mirror the progressive expectations of the program. Thirty students are admitted in both the spring and fall semesters which equates to a total of 100 to 120 students in the program at one time with attrition. The vast majority of students are females who are 20-25 years old.

II. Methods

The objective of this study was to evaluate the effectiveness of simulation in an undergraduate BSN nursing program following a quality improvement initiative. The mixed-methods study design included a longitudinal, cross-sectional analysis of student feedback regarding the effectiveness of simulation. Data was collected from nursing students in each semester of a four-semester program in a small Midwestern university for two years. Students completed the SET-M after simulation in each of six different courses.

Study Design: Mixed methods, longitudinal, cross-sectional

Study Location: Small Midwestern University

Study Duration: Fall 2018 to Spring 2020.

Sample size: 481 surveys

Procedure methodology

The SET-M was designed to better understand the students' perceptions of simulation⁶. The scale has 19 three-point Likert scale items that are subdivided into pre-briefing, scenario, and debriefing. Pre-briefing contains two items, the scenario section-which focuses on learning and confidence – contains twelve items, and debriefing contains five items. Reliability and validity of the tool have been established. Cronbach's alpha scores range from .833 in pre-briefing to .913 in confidence, with an overall Cronbach's alpha score of .936.

In addition to the 19 items on the SET-M, researchers for this study added demographic information to identify the cohort and placement in the program, as well as one qualitative question. The qualitative question was "What else would you like to say about today's simulated clinical experience?" Permission to utilize the SET-M with modification for this study was obtained from the creators.

Students were verbally invited to participate following each simulation. This was done within one week of the simulation in a didactic class via a paper survey. Faculty who conducted the simulation were not present during survey dissemination or collection to prevent coercion. Participation was voluntary and consent was implied by completing the questionnaire. Inclusion criteria included being a nursing student completing simulation and willingness to complete the survey. Once the surveys were complete, participants placed them in a locked receptacle. The researchers did not receive the completed surveys directly from any students to ensure anonymity. IRB approval was granted through the University Institutional Research Board.

Statistical analysis

A total of 481 surveys were collected over four semesters. Surveys were conducted after each simulation experience noting that some students were surveyed multiple times throughout the program, and even within any given semesters. A total of 132 surveys were completed in the Fall 2018 semester, 142 in the Spring 2019 semester, 154 in the Fall 2019 semester, and 53 in the Spring 2020 semester. Simulation, and subsequent data collection, was interrupted in the Spring 2020 semester due to a national health crisis stopping all clinical activity including simulation.

ANOVA tests of data were performed through SPSS. Longitudinal data of students of the same cohort through four semesters showed an overall trend of improvement but was not statistically different. Similarly, cross-sectional data, cohorts within the same semester, showed no statistically significant differences.

III. Results

The overall simulation effectiveness ranged from 50.544 in the Fall 2018 semester to 52.338 in the Spring 2020 semester. There was an initial dip in overall means in the Spring 2019 semester with an average of 49.690. An examination of individual constructs of the tool revealed pre-briefing scores for each class across all semesters ranging from 4.55 to 5.56 out of a maximum score of 6. The average mean for pre-briefing was 5.150 in Fall 2018 and improved to an average score of 5.463 in Spring 2020. Scores in the scenario section for each class across all semesters ranging from 28.78 to 33.44 out of a maximum score of 36. The average of the mean scores in Fall 2018 was 31.223. This improved to 32.348 in Spring 2020. Finally, in the area of debriefing scores for each class across all semesters ranging from 12.8 to 14.70 out of a maximum score of 15. The mean debriefing scores in Fall 2018 was 13.946; this improved to 14.527 by Spring 2020. See Table 1.

Summary of Qualitative Data

First Semester: Fall 2018

In Fall 2018, a variety of comments regarding all constructs were received. These included positive feedback on the scenarios such as “It was the best learning experience of the semester and I hope we can do more” and “This really took what we learn in the classroom and applied it to real life.”

There were also comments that specifically mentioned pre-briefing and debriefing. Pre-briefing was an area identified that needed improvement. This was an area with low quantitative scores as well as constructive criticism within the qualitative comments. Examples of comments include “I think more preparation on the scenario would be more beneficial” and “I was not adequately prepared for the scenario--no previous education was provided on the disease process that I was supposed to identify.”

Debriefing was again an area of strength. Qualitative comments from several students were supportive of debriefing. One student stated, “I would like to add that I felt like I gained more knowledge by participating in observing roles as well as practicing and debriefing.” Another said, “I thought simulation was awesome. I liked that we watched other scenarios as well. Discussion contributed to learning, as well as performing scenarios.”

Second Semester: Spring 2019

In Spring 2019, students across the curriculum commented on the need for additional stimulation. This is evidenced by comments such as “Need smaller groups and more times to do sim” and “One hour is too short to perform a simulation with 8 students.” Another student stated “I enjoy the simulations, they help with seeing scenarios you don’t commonly, see. They help develop critical thinking. I’d like to see more of them.” Still another student stated, “I would like more simulation. We don’t get put in situations like that in real clinical. Simulation teaches me things I won’t forget because I learn from my mistakes.” Several students also commented on the implementation of simulation--specifically the number of students in each simulation experience--with statements such as, “I felt as though there was not much to do and that there were too many students for one simulation” supporting the idea that the simulation renovation affected the students’ simulation experience. Another comment was, “Overall sim in did not help me. Mainly due to lack of

time and the amount of people who have to be in the simulation. It made it hard to focus and be able to participate. I scored it low because I didn't get anything out of it and didn't have adequate participation.”

First Semester: Fall 2019

Multiple comments focused on how well debriefing was done. Examples of comments received include “Debriefing was the most helpful part of sim.” Several other comments were about how well simulation helped prepare them for clinical practice. One student remarked, “I really enjoyed simulation and felt way more confident afterward in regard to my skills, communication with the patient, as well as critical thinking.” Another student stated “Loved all the scenarios! All were so helpful and increased my confidence. One of the best sim days of the nursing program.” Yet another stated, “I really enjoyed my simulation experience as it was an opportunity to synthesize my knowledge, skills, and communication techniques, and assessments and react to a realistic patient scenario.”

First Semester: Spring 2020

The scores for pre-briefing, the scenario, and debriefing were all the highest this semester over all previous semesters. Student comments again requested additional simulation opportunities. Examples include, “I wish we would have more sim” and “I felt like my knowledge was put together in a safe environment without being able to cause harm to a patient.” Another comment was “I think that by doing simulation I was able to tie everything we have learned so far together and things finally clicked.”

Table 1. Mean Results of pre-briefing, scenario and debriefing

Semester	Course	Pre-briefing Mean Max Score: 6	Scenario Mean Max Score: 36	Debriefing Mean Max Score: 15	Overall mean Max Score: 57
Fall 2018	Course A	5.536	30.571	14.214	50.321
	Course B	5.619	34.952	14.905	55.476
	Course C	5.435	32.217	13.870	51.522
	Course D	4.765	27.353	12.588	44.706
	Course E	4.546	30.864	13.864	50.619
	Course F	5.000	31.381	14.238	50.619
	Average	5.150	31.223	13.946	50.544
Spring 2019	Course A	5.520	32.320	14.160	52.000
	Course B	5.375	32.125	14.833	52.333
	Course C	4.800	32.200	13.920	50.920
	Course D	3.826	26.652	11.435	41.913
	Course E	4.909	31.864	13.682	50.455
	Course F	4.565	31.565	14.391	50.522
	Average	4.833	31.121	13.737	49.690
Fall 2019	Course A	5.480	31.400	14.200	51.080
	Course B	5.727	33.455	14.364	53.546
	Course C	5.320	31.240	14.520	51.080
	Course D	5.080	31.720	14.200	51.000
	Course E	5.382	32.677	14.677	52.735
	Course F	4.609	32.130	13.609	50.348
	Average	5.266	32.104	14.261	51.631

Spring 2020	Course A	5.500	31.154	14.192	50.846
	Course B	NA	NA	NA	NA
	Course C	5.333	32.111	14.389	51.833
	Course D	NA	NA	NA	NA
	Course E	5.556	33.778	15.000	54.333
	Course F	NA	NA	NA	NA
	Average	5.463	32.348	14.527	52.338

IV. Discussion

Even though the data did not present significant statistical differences among the groups, the results highlighted quality improvement. Debriefing scored consistently high. The authors feel this is most likely due to the emphasis placed on debriefing throughout simulation discussions and education.

The scenario section also scored high. The authors believe this is a direct result of the quality improvement process. The simulation handbook guides faculty on the development of quality scenarios. This handbook was created in the summer of 2018. Also, at this time, department administration emphasized simulation training for faculty. Multiple faculty members participated in simulation education through conferences and webinars.

Conversely, pre-briefing scored consistently below the other areas. Less emphasis had been placed on pre-briefing. Pre-briefing is an important aspect of simulation as it prepares the student for the activity. In light of the survey results, this information will be shared with faculty to remind those who do facilitate simulation of the importance of adequate pre-briefing.

The second semester showed a dip in scores. Though the authors cannot conclude what caused the lower scores, it is believed to be multifactorial. A major contributing factor was likely that the simulation lab was being renovated which required some flexibility and creativity to run simulations. The simulation education conferences mainly took place in the summer of 2018 and summer 2019 which could contribute to the rises in future semesters. There were larger class sizes that may have played a role also.

The Fall of 2019 showed an increase in scores, and this trend continued over the Spring of 2020 as well. While many potential variables contributed to this change, it is worthy to note that multiple faculty members participated in simulation conferences in the summer of 2019. In addition, the simulation lab remodel was complete, allowing a return to full simulation capacity. Regarding the impact of the new simulation center, one student stated, “The new simulation rooms are awesome, and I appreciate all the work the nursing department did to provide this opportunity and environment for us.”

Spring 2020 was a challenge for all nursing professionals including educators and students. Only three out of the six clinical courses completed simulation before school went online with the pandemic restrictions.

V. Conclusion

Simulation is a valuable tool within nursing curriculum, but a lack of structure can lead to student and faculty dissatisfaction. Well-defined policies and goals can help to increase the effectiveness of simulation. Additionally, evaluation is necessary to determine if the standards and goals are being achieved. Following a simulation overhaul, a BSN program utilized the SET-M to evaluate the effectiveness of simulation from the student perspective. Areas of strength and improvement were identified and will be shared with faculty to maintain and increase the quality of simulation throughout the program.

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