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Evaluating a Low-Cost Disaster Preparedness Simulation for Prelicensure Nursing Students

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Abstract

Objective: This innovation in simulation evaluated the effectiveness of a time sensible, low-cost simulation on prelicensure nursing students' knowledge and confidence in responding to public health emergencies.

Method: One hundred eighty-two nursing students, in groups of 5, participated in a 75-min emergency preparedness disaster simulation. A mixed methods design was used to evaluate students' knowledge and confidence in disaster preparedness, and satisfaction with the simulation.

Results: Students reported an increase in knowledge and confidence following the disaster simulation and satisfaction with the experience.

Conclusions: Prelicensure nursing programs can replicate this low cost, time sensible disaster simulation to effectively educate students in emergency preparedness.

In 2020, the United States (U.S.) was besieged with natural disasters and public health emergencies. Wildfires, floods, hurricanes, pervasive violence, mass shootings, and a pandemic that as of October 2021 has infected close to 45 million Americans and claimed over 730,000 lives has overwhelmed the health-care system.[1] Financial costs are projected in the trillions.[2] Nursing, the nation's largest health-care profession[3] have the responsibility to respond to disaster and public health emergency and help those in need. The Quad Council Coalition of Public Health Nursing Organizations (2018) identified emergency preparedness as 1 of the core competencies for Registered Nurses.[4] With a diversity of teaching-learning strategies to educate nursing students on emergency preparedness, the challenge is to create a simple, low-cost, and practical approach to improve students' knowledge and confidence in emergency preparedness. The purpose of this innovation in simulation was to evaluate a time sensible, low-cost emergency preparedness disaster simulation on prelicensure nursing students' knowledge and confidence. In addition, student satisfaction with the simulation was assessed.

Methods

Setting and Sample

The setting was a prelicensure, baccalaureate nursing program at a private university in the southeastern United States. The simulation was conducted with 182 baccalaureate nursing students in the *Population Health: Community and Public Health Nursing* course offered in the second semester of junior year. A week before the simulation, students received didactic content in class related to public health preparedness, principles of disaster triage, and the nursing role in disaster response. On the day of the disaster simulation, students were divided into groups of 5 for prebriefing and the simulation. Nine debriefing sessions were completed.

Ethical Considerations

The educational evaluation was reviewed by the University's Institutional Review Board (IRB) and deemed exempt. Participation in completing the evaluation questionnaires was voluntary. The quantitative survey included an item to confirm consent; additionally, students confirmed consent to be recorded during the qualitative debriefing.

Description of the Simulation

The disaster scenario was adapted from a 2011 simulation conducted at the same school of nursing in the southeastern United States.[5] with minor modifications. The 75-min simulation consisted of 3 parts: (1) 15-min prebrief, (2) 15-min disaster simulation, and (3) 45-min debrief.

In the presimulation briefing, students reviewed the simulation objectives, scenario overview, and role expectations. Students were also expected to perform disaster triage, activate the emergency response framework and apply disaster communication principles. Psychological safeguards were put in place to allow students to step out of the simulation in case of triggering scenarios. In the disaster simulation, students were provided with patient information, as well as a disaster "jump kit" which included flashlights, disaster triage tags, simulated facility census, c-collar, backboard (if possible), blanket, and wound dressings to stabilize the patients and patient information by means of hardcopy or verbal reports. A lab suite was set up as the disaster scene, with 2 clinical instructors acting as injured patients and a third working as a reporter. Smoke machine, blue chucks, electric wires, lab furniture, and strobe lights were used as props for the disaster scene. For a full description of the scenario, readers are referred to the article published by Kaplan and colleagues.[5]

The simulation progressed over 15 min: lights flickered (1 min), lights shut off and leg injured patient wailed for help (2 min), worried wailing, crying and panicking, instructor playing press appeared and started interviewing staff and patients and meddled with rescue process (4 min), no one stayed with worried well, patient wondered off, injured patient kept wailing and asked about deceased friend (8 min). As simulation progressed, students were offered cues and observed for demonstration of expected interventions.

The debriefing was facilitated by a faculty member with prior experience in debriefing who also participated in the scenario and recorded by another faculty. Students were encouraged to ask clarification questions, express their reactions, and then were guided in reflective learning, using a semi-structured guide.

Design

The project was implemented in the spring of 2019. A mixed methods evaluation design was used. A required post-simulation debrief (qualitative) was completed and students reflected on their learning and satisfaction with the simulation followed by a voluntary post-simulation 13-item survey (quantitative) to evaluate students' knowledge of emergency preparedness and confidence with responding to a disaster and an open-ended question for ideas to improve the simulation. The students had 4 weeks to complete the survey.

Data Collection

Students engaged in a 45-min postsimulation debrief session in groups of 8 to 15 students. Faculty members began the debrief by inviting students to write their responses to 2 prompts, "one word that summarizes your role in the disaster simulation" and "three words that describe your experience in the disaster simulation" on flip charts. Next, faculty facilitated a student discussion guided by 9 semi-structured questions (Appendix 1). A faculty member took notes of the debrief and the sessions were recorded and later transcribed.

Students were asked to complete a postsimulation survey consisting of 13 Likert-scale items (Appendix 2) with responses ranging from strongly disagree (1) to strongly agree (5), measuring the students' knowledge (4 questions), confidence (5 questions), and opinions on the format of the simulation (3 questions). Additionally, 1 open-ended question was included to give the students the opportunity to write in ideas for improving the simulation. The survey took approximately 15 min to complete and was available for 4 weeks following the simulation.

Data Analysis

Quantitative data from the survey was downloaded from Qualtrics survey software and analyzed using SPSS, version 26.0. The data were cleaned using SPSS record and field operations nodes to ensure there were no out of range or implausible data included in the analysis. Incomplete data were excluded from analysis. Descriptive statistics were calculated for the post-simulation survey. Qualitative data were collected; notes and audio recordings of the debrief were assessed by creating inductive codes. All detailed notes were coded using Microsoft Word. Once all the qualitative data were coded, overall themes were developed using congruence and memoing.

Results

Postsimulation Survey

There were 121 student respondents. Of these, 17 were excluded due to not completing the entire survey leaving 104 respondents for an 86% response rate. Thirty-two respondents answered the open-ended survey question. Overall, students (72%) rated the emergency preparedness disaster simulation as valuable and would recommend the simulation to their fellow students. Regarding measures of confidence, only 26% of nursing students believed that their level of self-confidence was adequate before the simulation, and 22% reported being confident to efficiently maneuver through a disaster scenario before participating in the simulation. Overall, the self-confidence mean scores increased from 2.78 presimulation to 4.14 postsimulation on a 0-5 scale (**Figure 1**). Over half of the students (62%) agreed that they could remain calm when facing an emergency situation and when confronted with a disaster scenario, they would be able to work efficiently in a team to handle an emergency. Over 70% of students agreed that they could apply what they learned in their future work. Regarding knowledge, 42% of nursing students did not believe that their knowledge of disaster preparedness was adequate before the simulation, while 75% agreed they had a better understanding how to handle unforeseen situations after participating in the simulation (**Figure 2**). Students (30%) believed that it was challenging for them to understand and execute their perspective roles during the disaster simulation; however, 74% agreed that their level of knowledge was enhanced after the simulation.

Open-ended responses provided positive feedback to the simulation along with suggestions for future improvement such as longer and more frequent simulations, using standardized patients rather than faculty to play the role of disaster victims, and a do-over.

Postsimulation Debrief

Some examples of the 3 words students shared to describe their experience in the disaster simulation were "educational," "informative," "benefit," "valuable," "challenging," "overwhelming," "exciting," "thought-provoking," and "engaging." An iterative and inductive approach was used for thematic analysis. Three common themes emerged from the 9 semi-structured debrief prompts: (1) recognition of benefit and value, (2) lack of time, and (3) lack of information/role confusion. Overall, students indicated satisfaction

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with the disaster simulation by noting that their experience was beneficial and valuable to their training as a nurse.

Limitations

The evaluation survey and the semi-structured debrief questions used in this simulation have not been previously validated in this population. The low number of students responding to the open-ended portion of the evaluation survey may impact generalizability of the results.

Discussion

This low-cost teaching-learning strategy increased students' knowledge and confidence by introducing students to the fundamentals of disaster response and emergency preparedness in a simulated environment. This simulation allowed students the flexibility to ask questions and address challenges and missed opportunities to help increase their knowledge and confidence in emergency preparedness. Thus, 3 recommendations for future emergency preparedness disaster simulation sessions. First, standardizing the pre-emergency preparedness scenario training to maintain uniformity across nursing student cohorts, possibly by using video presentations rather than instructors. This is consistent with health-care simulation standards of best practice for prebriefing preparation and briefing.[6] In this way, all students could be assured of the same pre-simulation preparation. The video could also include real-life disaster documentation to emphasize the real-life critical importance of the students' role in possible future disaster events. Actual disaster footage could help to instill in students that this simulation is not merely an academic exercise, but an incident they may very possibly encounter in their careers. Another option would be to have students participate in a web-based computerized simulation[7,8] before the hands-on scenario.

The second is enhancing the delivery of disaster simulation to include input from professional emergency personnel and the schools within the university. Researchers studying the effectiveness of interprofessional collaboration in disaster simulations identified the importance of ongoing communication for improved disaster preparedness.[9] Previous emergency preparedness disaster simulation research incorporated schools of nursing with schools of radiology,[8] University Volunteer Ambulance Corps,[10] and seasoned first responders.[11]

The third is to incorporate Social Determinants of Health (SDoH) and Diversity, Equity, and Inclusion (DEI) learning outcomes in future disaster simulations for nursing programs. The American Association of Colleges of Nursing identified SDoH and DEI, along with disaster preparedness as nursing competencies in the newly revised Nursing Essentials, a set of core competencies for professional nursing education.[12]

Conclusions

Educating nursing students about emergency preparedness is a complex responsibility as educators must foresee the vast array of possible disasters they may encounter. Students need to be prepared for direct care activities, and ready to lead during a disaster. By using a simple, low-cost, and time sensible emergency preparedness disaster simulation, nursing faculty can best provide the balance between the use of available material and personnel resources and an adequate level of realism.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/dmp.2022.280

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