Interdisciplinary Disaster Drill Simulation: Laying the Groundwork for Further Research

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Abstract

AIM The aim of this study was to examine the effect of using serial simulations with progression through the nursing curriculum.

BACKGROUND Simulation provides a way to learn without fear of failure and increase critical thinking and clinical decision-making skills. Learning in an interdisciplinary simulation provides a greater understanding of teamwork and communication skills.

METHOD The NLN/Jeffries Simulation Framework was used in an interactive disaster drill with role-playing patient actors and manikins. In a debriefing session, nursing and radiology students co-presented scenarios.

RESULTS Students displayed critical thinking and clinical decision-making skills. They reported an increase in self-confidence in caring for patients during a disaster, an increase in empathy, and learning by observing others.

CONCLUSION This pilot study revealed that an interdisciplinary disaster drill simulation experience was a positive learning experience for both nursing and radiology students.

A challenge for nurse educators is to identify innovative and appropriate uses for simulation as a teaching strategy. This article describes a unique interdisciplinary approach to using a disaster drill simulation to facilitate the transfer of classroom learning into a clinical context for nursing and radiology students.

We decided to conduct a disaster drill simulation each year for students from all levels of the nursing and radiology programs so that students, as they progress throughout the curriculum, will ultimately experience all different roles in the simulation. For sophomore and junior students, these roles include being patients and caregivers, while senior students perform triage and disaster management. The disaster drills use human simulation (role-playing patient actors) and high- and medium-fidelity manikins and are organized in conjunction with members of the community disaster management agency. These disaster drill simulations will form the basis for continuing research into the learning outcomes of participation in all phases of a disaster drill simulation.

BACKGROUND

In its Essentials of Baccalaureate Education for Professional Nursing Practice, the American Association of Colleges of Nursing (AACN) (2008) outlines the importance of providing quality clinical experiences so that nursing students can develop the knowledge and skills required for nursing practice today. The AACN advocates pairing simulation experiences with direct-care experiences to teach students the role of the registered nurse. Using simulation, students can learn without fear of failure and while also identifying gaps in their knowledge. Simulation allows students to “transfer their skills and knowledge to clinical practice while gaining confidence” (Walton, Chute, & Ball, 2011, p. 309), increase their critical thinking and clinical decision-making skills (Kaddoura, 2010), and prepare for potentially stressful clinical environments. The AACN recognizes that interdisciplinary communication and collaboration skills are required for nurses to provide excellent patient care.

Since collaborative practice is viewed as a necessity for today’s health care providers,
students need to be taught the roles and responsibilities of other health care providers and how to communicate with them. Learning with other health care students in an interdisciplinary simulation provides students with a greater understanding of teamwork and communication skills in complex patient care situations (Bambini, Washburn, & Perkins, 2009; Durham & Alden, 2008).

**LITERATURE REVIEW**

Over the past decade, patient simulations have been used as an effective teaching strategy for a variety of clinical scenarios in undergraduate nursing courses (Lee et al., 2003). Patient simulation provides a teaching modality that is effective in incorporating the affective, psychomotor, and cognitive domains of learning, all critical to the education of nursing students (Jeffries & Norton, 2005). Likewise, simulation has been used as an effective teaching strategy for facilitating decision-making and problem-solving skills in undergraduate nursing courses (Feingold, Calaluce, & Kallen, 2004; Flanagan, Nestel, & Joseph, 2004). Schubert (2012) reported that a simulated event of rapid deterioration of the patient’s clinical condition improved nursing knowledge and critical thinking.

A significant strategy for enriching student knowledge and satisfaction with simulation is role direction (Whitman & Backes, 2014). When the simulation is organized and includes clear directives, role development is enhanced. One teaching strategy for role direction frequently used in nursing is the NLN/Jeffries Simulation Framework (Jeffries, 2012).

Kaplan and Ura (2010) used a simulation-based learning approach that comprised both case study analysis and debriefing sessions, as well as the simulation experience. Their study reported increased self-confidence, particularly with prioritization and delegation skills. Jose and Dufrene (2014) conducted a review of the literature for simulated disaster drills and found there was little uniformity of planned outcomes among simulation studies, although all studies followed a coherent and systematic approach for content delivery, whether utilizing low- or high-fidelity simulators or patient actors.

No studies were found that examined interdisciplinary simulation using students from all levels of a nursing program. In addition, no studies examined the effect of using serial simulations to build on student knowledge as students progress through the nursing school curriculum. This article attempts to bridge that gap in the literature.

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**METHOD**

Following the NLN/Jeffries Simulation Framework, we conducted an interactive disaster drill scenario that simulated the touchdown of a tornado. The tornado simulation resulted in many victims with multiple injuries, including fatalities. Participants included 132 nursing students and 25 radiology students from all program levels; 10 nurse faculty and 4 radiology faculty served as resources throughout the experience. The setting for this disaster drill was the Health Science Wing of the campus. Nursing and radiology classrooms and labs were utilized as a triage center, a nine-bed trauma center, and two general patient wards.

Twenty patient actors entered the simulation exercise through a triage area where vital signs were taken and triage performed. They were dispatched to various areas of the nursing lab that were set up to simulate the emergency department (ED) of a trauma center. Radiology classrooms functioned as the X-ray and CT scan departments, and nursing classrooms were set up as patient wards. Nursing students staffed the ED bays and patient wards, while radiology students staffed the X-ray and CT departments. Nursing faculty served as nurse practitioners and physicians, and radiology faculty directed students in the radiology areas. Patients received appropriate emergency care and were transferred either to the trauma unit, radiology departments, or to the ward for continued care.

**Student Preparation**

Student preparation for simulation was an integral part of the experience. Nursing and radiology course instructors created scenarios based on course objectives and expected outcomes. Students currently enrolled in these courses participated in scenarios designed for these specific courses. Patient simulations included pediatrics, geriatrics, obstetrics, medical/surgical, culture care, critical care, trauma/code, and end-of-life care scenarios. The disaster drill also utilized the community resources of county emergency medical technicians, a nearby hospital, and the county disaster management team.

To prepare for the disaster drill, sophomores and juniors were given the patient scenarios along with reading assignments. They researched the pathophysiology, common clinical manifestations, medications, lab values, and relevant technical skills for each scenario before the simulation. Senior-level students were given information about the stages of a disaster, the protocols for triage, and the roles of individual members of the disaster response team.

**Student Roles**

Nursing fundamentals students and beginning radiology students served as patients, family members, and patient transporters.
These roles were designed to help beginning students relate to and learn about the patient experience. Students were presented in class with case scenarios for individual patients in the disaster drill. They researched and devised plans for how they would portray the patient situation. They were also asked to use their creativity to dress the part. For example, to prepare for participating as a patient presenting with a fractured, pulseless foot as a result of being thrown from a car into a chicken coop, the student was expected to review the topics of fractures, compromised circulation assessment, and pain. One particular student used the scenario information and presented with a discolored, limp foot as well as dirty clothes complete with feathers.

Junior nursing students gave hands-on nursing care, which included wound care, and practiced history taking, physical assessment, and therapeutic communication, while the radiology students performed radiologic procedures. Senior nursing students served as disaster team leaders, triage nurses, and charge nurses. They also coordinated with incident command, directed mobilization of resources, managed communication, and attended to public relations issues associated with the disaster drill simulation.

High- and medium-fidelity manikins were used in the scenarios; a high-fidelity manikin allowed senior students to participate in a cardiac arrest situation and perform a “full code.” Medium-fidelity manikins were used to portray trauma and obstetric patients.

RESULTS AND DISCUSSION

Group Debriefing and Evaluation
According to the Agency for Healthcare Research and Quality (AHRQ, 2011), debriefing is a part of the disaster drill process. All disaster drills should include a debriefing to gather feedback from all participants and observers on the performance during the drill. In addition, well-designed simulation experiences include a time for reflection (Alden & Durham, 2012).

In our disaster simulation, reflection took place during the debriefing process, allowing students to reflect on the simulation and what was learned. Following the disaster drill, all participants (students, faculty, and community members) met together in the auditorium. An open nonjudgmental atmosphere was created for the debriefing. All comments were welcomed. Caregivers, victims, and members of the county disaster management team together presented information on each scenario to the participants and observers.

Nursing and radiology students, guided by their instructors, discussed the scenarios and how they unfolded. Critical thinking was evident during the debriefing session when senior-level nursing students presented each case scenario and discussed lab results and nursing care for patients. Radiology students then discussed the radiology aspect of care and provided pictures of radiographs that showed patient injuries. All reflected on the positive and negative aspects of each scenario performance and received feedback from faculty. Students described the debriefing session as a valuable learning experience.

Questions asked during the debriefing included: Did the triage system work effectively? Were there delays in treatment? What did students learn from participating in the drill? What parts of the drill went well? What could have been done differently to make the drill run better?

**Student Outcomes**

Students participating in the disaster drill had the unique experience of serving in all roles throughout their time in our nursing program. As sophomores, they prepared for role-playing as patients in a clinical and emergency setting. This provided the opportunity to internalize the patient’s perspective while observing the nursing skills and problem-solving skills of upperclassmen. During the junior year, they were tasked with the role of staff nurse and the challenges that arise from working in a mass casualty situation. Senior students were confronted with the ethical issues of triage and incident command.

A unique aspect of this drill was the debriefing session, whereby nursing and radiology students co-presented several case scenarios. We evaluated how students felt about the disaster drill simulation experience by asking them to describe what they considered to be the benefits of the experience. While this is anecdotal data, it was interesting to obtain student perceptions of the disaster drill experience.

Students reported an increase in self-confidence in caring for patients during a disaster as a direct result of this disaster drill. In addition, they stated they had greater empathy for patients involved in the disaster. Finally, students reported they learned by observing others.

All students agreed that the disaster drill simulation was a valuable learning experience and they appreciated being able to work with another health care discipline. Nursing students reported that it was exciting and beneficial to see what happened when patients were sent for X-rays and to see the radiograph pictures with the explanation of what injuries looked like on an X-ray. Radiology students reported that observing the care patients received before and after their radiographic studies was beneficial. Faculty observed that students displayed prioritization of care, clinical decision-making skills, and critical-thinking skills.

**CONCLUSION**

This pilot study revealed that an interdisciplinary disaster drill simulation experience was a positive learning experience for both nursing and radiology students. Incorporating students from all levels of both programs in the simulation provided students from both programs an opportunity to understand a discipline outside their particular field of study. This drill gave all involved students a unique opportunity to learn from each other, with an exchange of knowledge taking place at a student-to-student level under the direction of faculty. Furthermore, the experience allowed sophomores to witness the performance of their upperclass counterparts and allowed juniors and seniors to assess their own growth while recognizing their gaps in knowledge. Research into the
use of these types of simulations as a teaching strategy could prove a valuable addition to the literature.

Our first two disaster drills were well received by faculty and students and proved to be beneficial. We will now conduct research on overall student perceptions and outcomes of learning after participation in a series of interdisciplinary disaster drills. Each year, students will fulfill a different role in the disaster drill. Course and level competencies will be matched to the roles assigned to the students. Our research will look at changing outcomes and perceptions over a three-year period as students progress through the program and participate at each level. This interdisciplinary program incorporating nursing and radiology students from all program levels working with each other, faculty, and disaster management professionals from the community provides an innovative method of using simulation for today’s nursing students.

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KEY WORDS
Simulation – Disaster Drill – Patient Actors – Interdisciplinary Simulation – Nursing Education – Problem Solving

REFERENCES