



Original research

Interprofessional education: A disaster response simulation activity for military medics, nursing, & paramedic science students



Bethany Murray¹, Deborah Judge^{*,2}, Toni Morris³, Angela Opsahl⁴

Indiana University School of Nursing at IUPUC, 4601 Central Avenue, Columbus, IN, 47203, USA

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ABSTRACT

Health care providers need to be able to function and react appropriately and efficiently during a community-wide disaster situation. Traditional health care education is not adequately structured to provide realistic experiences with respect to high-risk or infrequently encountered events such as a disaster. As a result, many healthcare providers graduate into practice with inadequate exposure or skills to intervene in a disastrous event. Previous studies validate that active participation by students during a simulation can translate into positive, meaningful learning applicable to practice. This paper describes how a disaster response simulation can be utilized as an innovative experiential learning technique. Additionally, interprofessional collaboration and positive learning experiences were fostered between military trainees and health care students in nursing and paramedic sciences. The constructivist framework utilized enabled educators to incorporate interprofessional collaboration, clinical reasoning, and technical skills in the safe learning environment of a simulation.

In the last decade, natural worldwide disasters have increased in both frequency and severity (Alfred et al., 2015). The American Red Cross responds to approximately 68,000 small and large scale disasters in the United States annually, and utilizes more than 333,000 volunteers in order to do so (American Red Cross [ARC], 2017). According to the United Nations Office for Disaster Risk Reduction (UNISDR), disaster is defined as a significant breakdown in operations of a community causing human, material, economic and/or environmental losses (UNISDR, 2017). Disasters may be meteorological in nature (e.g., floods, hurricanes, tsunamis, earthquakes, extreme heat, drought or wildfires); man-made (e.g., terrorist attacks, oil spills, nuclear disasters, wars or genocide); or biologic (e.g., insect infestations or disease plagues). Disasters are events that are expensive, tax local community resources, and often require the mobilization of emergency services.

Our students – as future healthcare providers – need to be able to act in the case of an event occurring within their own communities. Healthcare education does not do an adequate job in training healthcare providers to high-risk or infrequently encountered events such as community disasters (Veenema et al., 2016); however, simulation can be used to augment real-life experiences for students (Murray, 2014;

Pesiridis et al., 2015). Simulation scenarios are complex, intentional teaching tools which require an understanding of experiential, constructivist, and reflective learning theories in order to maximize learning. This paper describes how a disaster response simulation can be utilized as an innovative experiential learning technique fostering interprofessional collaboration and positive learning experiences among students both in civilian and in military health care.

1. Background

Simulations are increasing as a desirable means to obtain clinical hours in nursing education and, as such, they are frequently used as a teaching strategy to cultivate skills such as the identification of patient safety issues, critical thinking to solve problems, interpersonal communication, and documentation (Gunnell et al., 2016; Schaar et al., 2015). New teaching strategies are vital as nurse educators strive to maintain integrity and fidelity with each simulation. As nurse educators become more comfortable in implementing simulations, it is likely that the simulations will expand entailing increasingly involved and detailed scenarios.

* Corresponding author. Course Faculty; Western Governors University, 4001 700 E. #700, Salt Lake City, UT 84107, USA

E-mail addresses: bamurray@iu.edu (B. Murray), debbie.judge@wgu.edu (D. Judge), tomorris@uindy.edu (T. Morris), agopsahl@iu.edu (A. Opsahl).

¹ Bethany Murray, PhD, RN, Academic Specialist, Indiana University School of Medicine, 1001 E. 3rd St., Jordan Hall 104, Bloomington, IN 47405, United States of America.

² Deborah Judge, DNP, RN, Course Faculty, College of Health Professions, Western Governors University, 4001 700 E #700, Salt Lake City, UT 84107.

³ Toni Morris, DNP, MSN, RN, Assistant Professor, University of Indianapolis, UIndy Health Pavillion, 1400 East Hanna Avenue, Indianapolis, IN 46227.

⁴ Angela Opsahl, DNP, RN, CPHQ, Assistant Professor, Indiana University Bloomington, 1033 E. Third Street, Sycamore Hall #441, Bloomington, IN 47405.

Please answer the following questions as honestly as possible:

This experience taught me to:	1 Strongly Disagree	2 Disagree	3 Neutral or Undecided	4 Agree	5 Strongly Agree
Communicate effectively with simulated patients and families, the health care team, peers, and faculty					
Apply knowledge and critical thinking skills to a simulated community disaster.					
Develop a plan of care that holistically addressed the unique needs of the simulated patient and family.					
Demonstrate psychomotor skills for the efficient, safe and compassionate delivery of patient care.					
Collaborate with other disciplines and health care providers to coordinate care across the health care continuum.					
Demonstrate critical self-reflection of own assumptions and values as applied to community disasters.					

Fig. 1. Faculty objectives attainment.

Please answer the following questions as honestly as possible:

This experience was able to:	1 Strongly Disagree	2 Disagree	3 Neutral or Undecided	4 Agree	5 Strongly Agree
Implement an interdisciplinary simulation as a method to deepen understanding of community-based disasters.					
Enhance students' subject matter learning in applying classroom knowledge to practical experience.					
Enrich student learning of course material in rapid assessment, triage and appropriate care of individuals and families experiencing a community-based disaster.					
Broaden perspectives of diversity issues in nursing and paramedic/emergency medical technician (EMT) students.					
Improve interpersonal and intraprofessional communication skills between educators.					
Evaluate the process of interprofessional collaboration in providing a simulated disaster experiences to nursing and paramedic/EMT students.					

Fig. 2. Student objectives attainment.

Interprofessional education simulations (IPES) should be implemented in colleges and universities offering any combination of allied health, nursing or medical programs (Gunnell et al., 2016). To reach successful outcomes the diverse health professionals must collaborate and receive support from administration and educational leaders. The IPES should be designed to meet student and program outcomes. According to Gunnell et al. (2016) evidence reveals “students are ready and willing to participate in IPE through the safe, controlled environment that simulation offers. Simulation increases their recognition of the need for efficient teamwork and communication skills”

(Gunnell et al., 2016, p.46).

A recent study by Zapko et al. (2015), utilized radiology students (n = 25) in collaboration with nursing students (n = 132) to conduct a disaster drill simulation. This interdisciplinary approach allowed students to experience diverse roles as patient, caregiver, triage worker, or disaster manager in the simulation. The simulation used standardized patients, high-fidelity and medium-fidelity manikins, and included members from a community disaster management agency. The scenario developed revolved around a tornado that resulted in numerous injuries and fatalities. The simulation was held on the campus grounds with

Table 1
Survey of Disaster Simulation - Student.

Please answer the following questions as honestly as possible.

	1	2	3	4	5
	Strongly Disagree	Disagree	Neutral or Undecided	Agree	Strongly Agree
This experience taught me to:					
Communicate effectively with simulated patients and families, the health care team, peers, and faculty					
Apply knowledge and critical thinking skills to a simulated community disaster.					
Develop a plan of care that holistically addressed the unique needs of the simulated patient and family.					
Demonstrate psychomotor skills for the efficient, safe and compassionate delivery of patient care.					
Collaborate with other disciplines and health care providers to coordinate care across the health care continuum.					
Demonstrate critical self-reflection of own assumptions and values as applied to community disasters.					

faculty from both programs assisting: ten faculty from nursing and four from radiology. Overall findings were that both nursing and radiology students found the collaborative disaster simulation to be a positive learning experience. The researchers also discovered that the opportunity students had to learn from each other and gain knowledge through a simulation experience revealed role changes as students progressed through their programs. The authors suggested that more research is needed on this type of interdisciplinary simulation (2015).

A mass casualty incident (MCI) was the focus of a study conducted in the fall semester of a critical care course, followed up in the spring semester with a handoff communication simulation (Furseth et al., 2016). This study utilized a pretest and posttest for evaluation of the junior nursing (n = 131) and first year paramedic (n = 58) students. Findings included the nursing students had better attitudes toward IPES, as well as increased levels of satisfaction and self-confidence, after handoff communication simulations in comparison with MCI simulations. A greater positive impact on nursing students was noted with active participation in simulations (Furseth et al., 2016).

One recent exemplar of a collaborative disaster simulation provided nursing students with disaster response training skills and allowed the county emergency management teams to test their current systems (Rafferty-Semon et al., 2017). The uniqueness of this particular exemplar is in the utilization of a Point of Distribution/Dispensation (POD). A POD is aimed at identifying a central location where the general public may obtain needed supplies such as food, water, and any medical necessities. In the study, a public health nurse provided on-site training minutes prior to the simulation for nursing students who would be responsible to maintain the POD. The information was relayed via the trained nurse and skills sheets were provided. The success of the student response would be based solely on the information provided by the public health nurse. Evaluation included a focus on whether or not the student nurses could comprehend the importance of providing valuable information in a limited time frame (Rafferty-Semon et al., 2017).

King et al. (2013) described a learning community between four post-secondary institutions and a health provider for the purposes of producing, assessing and implementing interprofessional learning modules in simulation environments. The goals included development of student skill competencies and promoting education between health disciplines. Participants conveyed that positive learning occurred and debriefing improved their level of confidence through peer feedback. The authors believed that this type of collaboration can reduce barriers and promote “health professionals who are better prepared to provide leadership in complex health systems” (p. 430).

2. Method

This project was an experiential learning activity developed through a collaborative effort of three educational systems in the rural Midwest. A traditional university offering a baccalaureate of nursing degree

program, a community college offering an associate degree in nursing and paramedic training, and a branch of the military (US Army) specializing in medical simulation training worked together to develop, implement and evaluate a mock disaster event in the form of a Tornado Disaster. Faculty from both schools of nursing, the director of the paramedic training program, and the personnel from the military training facility were invited to participate in the planning and execution of the simulation event. The simulation organizers consisted of the faculty on the planning committee which were associated with IPES events in their respective settings. The project was approved by the xxxxxxxx University Institutional Review Board as an exempt study. This project was developed utilizing the framework of a disaster simulation. Objectives for the event included:

2.1. Faculty/program objectives

1. Implement an interdisciplinary simulation as a method to deepen understanding of community-based disasters in healthcare students.
2. Enhance students' subject matter learning in applying classroom knowledge to practical experience.
3. Enrich student learning of course material in rapid assessment, triage and appropriate care of individuals and families experiencing a community-based disaster.
4. Broaden perspectives of diversity issues in nursing and paramedic/emergency medical technician (EMT) students.
5. Improve interpersonal and intraprofessional communication skills between students and educators.
6. Evaluate the process of interprofessional collaboration in providing a simulated disaster experience.

2.2. Student objectives

1. Communicate effectively with simulated patients and families, the health care team, peers, and faculty.
2. Apply knowledge and critical thinking skills to a simulated community disaster.
3. Develop a plan of care that holistically addresses the unique needs of the patient and family.
4. Demonstrate psychomotor skills for the efficient, safe and compassionate delivery of patient care.
5. Collaborate with other disciplines and health care providers to coordinate care across the health care continuum.
6. Demonstrate critical self-reflection of own assumptions and values as applied to community disasters and working in interdisciplinary teams.

Table 2
Survey of Disaster Simulation - Faculty Please answer the following questions as honestly as possible.

	1	2	3	4	5
	Strongly Disagree	Disagree	Neutral or Undecided	Agree	Strongly Agree
This experience was able to:					
Implement an interdisciplinary simulation as a method to deepen understanding of community-based disasters.					
Enhance students' subject matter learning in applying classroom knowledge to practical experience.					
Enrich student learning of course material in rapid assessment, triage and appropriate care of individuals and families experiencing a community-based disaster.					
Broaden perspectives of diversity issues in nursing and paramedic/emergency medical technician (EMT) students.					
Improve interpersonal and intraprofessional communication skills between educators.					
Evaluate the process of interprofessional collaboration in providing a simulated disaster experiences to nursing and paramedic/EMT students.					

3. Study design

3.1. Conceptual approach

Experiential learning (EL) is a process through which a learner constructs knowledge, skill, and value from direct experience and reflecting on that experience with purposeful guidance by educators (Poore et al., 2014). The principles of EL require that teachers challenge students to ask questions, problem solve, investigate, test solutions, and construct personal meaning out of their experiences. EL facilitates the process of knowledge creation, sense-making and knowledge transfer in teaching, training and development. Other benefits include practice in teamwork, rapid decision-making, critical thinking, improved confidence, and the ability to learn from one's mistakes and successes.

Experiential learning is vital in education. Individuals learn best when they can be directly involved in an experience, and then reflect on this experience in order to internalize new information and apply it to a variety of related situations (Kolb et al., 2000). A simulated disaster event helps teach concepts and encourage critical thinking for students in nursing, paramedic sciences and emergency medicine by allowing them to experience as closely as possible the real-life challenges (physical, emotional and spiritual) encountered in community-based healthcare.

3.2. Participants and setting

3.2.1. Participants

A convenience sample of 38 sophomore (second year of college) nursing students from the traditional baccalaureate nursing program enacted the role of patient/families who had just experienced a Category Four tornado in their community. Based on a disaster vulnerability assessment, the Midwest is at higher risk for tornados which contributed to the realism of the scenario. Twenty junior (third year of college) nursing students from the traditional baccalaureate nursing program, sixteen nursing students from the community college associate in nursing program and four paramedic students from the community college served as care providers along with fourteen military Medics-in-training. One of the soldiers was also a Physician's Assistant with a graduate education and enacted the role of the Incident Commander. Ranging in education preparation from the level master's degree to doctoral degree, eight faculty members and four administrative support persons, one member invited from each discipline, were on hand to manage the simulation. A total of 78 nursing and paramedic students were transported to the facility from campus by two school buses acquired for the specific event.

3.2.2. Physical facility

The physical layout of the military grounds consists of a main building with three medical simulation rooms and an adjoining warehouse space. One simulation room was converted into a morgue and the remainder of the activities took place outside or in the adjoining warehouse.

3.2.3. Activities

The faculty on the planning committee created the disaster simulation based on the International Nursing Association for Clinical Simulation and Learning (INACSL) Standards of Best Practice (Sittner et al., 2015). The INACSL framework supports effective simulation for understanding community need, measurable objectives, scenario and case design, perception of realism, participant centered, pre-briefing/preparation, debriefing, evaluation of participants, provision of resource materials, and previous simulation-based experiences before full implementation. The simulation took place at a military base located in the Midwest United States. On the day of the simulation all participants were gathered together in the large warehouse space on bleachers where we introduced the activity and the faculty. Survivors were

dismissed to an adjoining building for the application of realistic makeup representing injuries, torn clothing, and artificial blood. Stations were then randomly assigned to each provider using a stratified counting system. Stations identified were: 1. Outside Triage; 2. Urgent Care; 3. Delayed Care; 4. Pediatric Care; and, 5. Recovery. Simulation organizers also created a morgue in a separate room and used a simulation manikin as a victim. Once the makeup was applied, the providers and the survivors had no contact with one another. The students had a quick brown bag lunch, and then providers were released to their stations and survivors were put into place outside of the facility. The simulation began at 12:45 p.m. It took approximately 45 min to triage, assess, treat or refer the 38 survivors. At 1:30 p.m., organizers brought all participants back together (survivors included this time) and did a short after-action report (AAR) where faculty reported to the students their observations. Due to time constraints from the length of the simulation, only faculty observations were shared through the AAR. Many problems were identified in the enacting of the simulation; most of these revolved around problems in organization and communication:

3.2.4. 1st simulation after-action report

- No defined leader among nursing in any station.
- Seemed overwhelmed with rapidity of patients
- No one accounting for patients as they arrived
- Patient ignored (even after collapse on the floor)—patient died
- One RN was sent with family member to identify a body at the morgue—need support people
- No SBAR between nurses when patients transferred between stations

Simulation Organizers added a sixth station, “Referrals Waiting for Transport”, and ran the same simulation a second time. We noted improvements in some areas (more organized, better communication) but in other areas (patient care) we noticed continued deficits. For example, in both Sim #1 and Sim #2, unscripted deaths of patients due to provider neglect of their critical injuries were noted.

3.2.5. 2nd simulation after-action report

- Attempted to better record patients being brought in but still did not register eight survivors
- Stations were reconfigured to alleviate the bottle neck at the door
- SBAR used in some cases
- Still confusion on what to do with patients from the field
- Role confusion for nursing students—triage and ship out versus triage and treat
- Students did not seem as frantic and confused about their role
- Pediatric station reconfigured to have an intake person and a way in which to reassess pediatric patients for reunification with family.

Simulation organizers then divided up into smaller groups of approximately eight students per faculty for guided reflection and feedback. The overall themes of the reflection that emerged were around maintaining fidelity of the simulation, working in a chaotic environment, role differentiation, and enjoying the experience.

4. Evaluation

Guided reflection through debriefing and a structured survey were used for student evaluation of the activity. The structured survey was directly tied to the student objectives which were created by the interprofessional team during planning. These student objectives were reflective of the objective expectations of the professional disciplines involved in the event. The number of patients correctly triaged by the active participant student groups was compared from the Simulation #1 to Simulation #2. Students displayed improvement in the number of patients triaged correctly and the time to triage patients from

Simulation #1 (n = 19) to Simulation #2 (n = 30). The six student objectives were all partially, if not fully, obtained by faculty observation during the simulation and individual feedback from the debrief sessions.

4.1. Findings

Simulation organizers surveyed faculty (see Fig. 1) and students (see Fig. 2) using two different survey tools of six questions each based directly on the objectives for the activity. Surveys’ quantitative evaluation was based on a 1–5 Likert-type scale. Each tool included an opportunity for open-ended qualitative comments. Some of the open comments from participants are included the following:

- “As a military provider, this was an excellent eye-opener (opportunity) to working with civilian EMS or hospital care.”
- “Please explain prior to exercise what each station is responsible for.”
- “Evacuate patients to buses – one for hospital care and the other to an ARC after triaged.”
- “Consider having an am/pm session to have more students rotate through [stations]”
- “[Need] more supplies and orientation to the equipment”
- “[Need] Walkie-talkies for communication”

Faculty surveys indicated an overall mean score of 4.65 (n = 8, s = 0.53). Individual objective scores are displayed in Table 1. The lowest scoring item for faculty was objective #4: Broaden perspectives of diversity issues in nursing and paramedic/emergency medical technician (EMT) students and the highest faculty item was objective #1: Communicate effectively with simulated patients and families, the health care team, peers, and faculty.

Student surveys showed an overall mean score of 4.29 (n = 90, s = 0.74). Individual objective scores are presented in Table 2. The lowest ranked objective in the student surveys was #3: Develop a plan of care that holistically addressed the unique needs of the simulated patient and family; while, the highest ranked item was objective #5: Collaborate with other disciplines and healthcare providers to coordinate care across the healthcare continuum. Student feedback on the simulation objectives conveys that all students perceived their level at $\geq 4.5/5.0$ or greater in attaining all event objectives. Faculty reviewing the results of the surveys have been involved in simulation events for greater than three years. Simulation organizers plan to use this information to better inform future simulation and engagement activities.

5. Discussion

Communication and organization were ongoing challenges, both before and during the activity. Most of the community partners comprised of local hospitals, participant campuses, and other area healthcare organizations were very prompt in responding to emails; however, simulation organizers had difficulty in confirming participation and numbers of paramedic students until the day of the event. These community partners were overall helpful to the funding of resources needed for the event. Several strong personalities between faculty members of the different organizations involved in the event emerged during the simulation. Organizers were able to negotiate roles with one another by using courtesy and compromise. Funding was another challenge. Transporting this number of students to the site required the use of busing due to parking constraints and organizers did not anticipate this early enough to include it in our grant application. Fortunately, we were able to secure a small grant that paid school buses for the day.

An overarching goal for both schools of nursing, paramedic school, and the military training facility surrounded the need for improved inter-professional education in a realistic simulation experience with different disciplines and health care providers. Nursing education

strategies are needed to engage students in critical thinking while allowing practice in safe environments (Farra et al., 2015).

Faculty feedback during the AAR and in a later post-evaluation session conveyed the students actively participated and displayed a great deal of clinical reasoning during the simulation event to make appropriate critical decisions in caring for the survivors over a short period of time. One problem identified by the team was communication. The difficulty in team communication was due to multiple issues which included lack of resources (walkie-talkies) and faculty inexperience with disaster simulation (in a realistic environment).

Lastly, the positive relationship developed during the planning and execution of the event between the three institutions collaborating on this project successfully addressed the goal to improve inter-professional education. Simulation organizers had hoped that this activity would support the advancement of community-based learning and simulation for healthcare students, especially in our local community, and it did.

6. Conclusion

This project was highly successful as assessed by the students and faculty who participated. The original proposal was to develop and implement a simulated community disaster that included nursing students from both a university and a community college, and paramedic students from a community college, in collaboration with military individuals from a medical simulation training center in the Midwest. The simulation organizers were able to also include an additional military unit, Medics-in-training, upon arrival to the military base for the day of the simulated event adding a deeper complexity of disaster simulation response often found in real-life but almost never encountered in an academic setting.

The students learned how to apply the knowledge they gained in the classroom to a real-life situation. Nursing and paramedic students must be able to assess, prioritize and provide care to victims that is holistic, i.e. takes into consideration their physical, mental and spiritual needs of the patient, and is safe, compassionate and ethical. These concepts were clearly demonstrated in this project. Additionally, the faculty learned how to better implement a simulation activity that will assist students in making these connections between knowledge, theory and application.

Simulation organizers believe that programs such as nursing and the paramedic sciences must incorporate service learning and community engagement into their programs across the curriculum and practicing disaster scenarios is an ideal method to implement these processes.

Conflicts of interest

- 1) The authors declare no conflict of interest.
- 2) Funding for this project was used for staff training, supplies and student transportation. Grant funding was provided by Indiana Campus Compact and the East Indiana Area Health Education

Center. No financial interests or conflicts exist.

- 3) All work done for this manuscript submission was original and was done collaboratively by the authors listed.

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Appendix A. Supplementary data

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