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Evaluation of a Collaborative Project in Disaster Preparedness

Lynette G. Landry, PhD, RN
Andrew Stockton, MS, MA, RN

Nurses play an important role in responding to disasters. Preparing nurses to participate in planning for and responding to a disaster is integral to undergraduate nursing education. The authors describe the evaluation of a collaborative learning model that has been used to teach undergraduate nursing students about disaster preparedness.

Because of its geographic location, disaster preparedness is essential to San Francisco and its surrounding communities. The 1989 Loma Prieta earthquake highlighted the communities' vulnerability. During the event and its aftermath, healthcare professionals were called on to meet the needs of those affected by the earthquake in communities around the Bay Area. Subsequent events such as hurricanes Katrina and Rita and the terrorist attacks on September 11, 2001, further highlighted the need for nurses and other healthcare professionals to be prepared to respond to a disaster in their community. Although not the first responders, nurses play an integral role in assisting communities to prepare for and respond to disasters. In a survey of nurses in Wisconsin, researchers found that practicing nurses were most familiar with triage and first aid and that they need more education focused on the other competencies that they will need to have to effectively respond to a mass casualty event.¹

The Columbia University, School of Nursing, Center for Health Policy identified the competencies required from

public health professionals to ensure an effective response to a disaster, including (1) participation in the development of the disaster response plan, (2) identification of areas of expertise and seeking training in areas that need skill building, (3) knowledge of triage principles and the ability to direct or participate in triage activities, (4) provision of health support, (5) proper use of personal protective equipment, and (5) provision of psychological support.² Eight specific competencies have also been identified: (1) triage and first aid; (2) detection; (3) resource identification, access, and required reporting; (4) command center; (5) isolation, quarantine, and disinfection; (6) mental health issues; (7) epidemiology and related clinical decision making; and (8) communication.¹

Several universities have added disaster preparedness emphases or certifications to their existing graduate curriculum.³ However, schools of nursing in the United States have been slow to incorporate or expand disaster preparedness in their prelicensure curriculum. Traditionally, disaster preparedness content has been delivered to students as a component of a theory course.⁴ It is suggested that multiple teaching modalities, including Web-based training modules and hands-on practice, are the most effective modalities in delivering disaster preparedness content to students.⁵ Over the last several years, nursing schools have been moving to include hands-on

training experiences for nursing students into their undergraduate curriculum including participation in mock drills⁶ and use of simulation.⁷

Collaborative Training Project

In preparing nursing students to take an active role in disaster preparedness activities in their communities upon graduation, the School of Nursing at San Francisco State University has been actively engaged in identifying educational opportunities for students. One of these educational opportunities has been a collaborative project with the staff of University Housing (UH) to prepare the staff to more adequately respond to the needs of their community when a disaster occurs in San Francisco. Approximately 5,000 persons live in university-owned housing. In the case of a disaster, UH is responsible for meeting the immediate needs of these residents. In addition, the university has identified nursing students as a resource that can be called on to meet the needs of the general student body in the event of a disaster.

This ongoing project started during the summer of 2004. The focus of most of the training has been the response to an earthquake since an earthquake is the disaster most likely to have a significant impact on the campus community. As part of the community health nursing theory and practicum courses, prelicensure nursing students have been assigned to participate in this collaborative project. Approximately 450 nursing students have participated since the collaboration's inception. The curriculum includes a 3-hour didactic course focused on the role of the nurse in disaster preparedness; Web-based training materials; an online disaster training curriculum, *Nursing Curriculum for Emergency Preparedness*, developed by the International Nursing Coalition for Mass Casualty Education⁸; and a half-day disaster preparedness training exercise (credit for which is given as part of the community health practicum grade).

Authors' Affiliation: Assistant Professor (Dr Landry), School of Nursing; and Technology Officer (Mr Stockton), University Housing, San Francisco State University, California.

Corresponding Author: Dr Landry, 1600 Holloway Ave, San Francisco, CA 94132 (llandry@sfsu.edu).

Lecture

During the first day of class, students are informed of the activities that they will participate in during the semester. Content was added to the didactic part of the course to coincide with the planned activities in the community health practicum. The framework for teaching disaster preparedness uses the 5 focus areas of disaster preparedness: preparedness, mitigation, response, recovery, and evaluation.⁴ The 3-hour lecture discusses (1) definitions and terminology, (2) disaster planning, (3) core competencies, (4) stages of a disaster, (6) emergency preparedness resources, and (7) category A biological agents. Mental health issues are presented to students in the psychiatric nursing class. Special emphasis is placed on personal preparedness, triage, and first aid. Students are assigned readings specific to disaster preparedness. These include materials provided online and reading from the course text (Figure 1). During the class session, students are given materials particular to personal preparedness, such as developing a personal disaster plan, what to include in a disaster kit,

and information sheets regarding how to prepare for fire, earthquake, and flood. Students are encouraged to copy the information sheets and share them with clients seen in conjunction with their community health practicum.

The 3-hour theory course uses interactive group learning methodologies,⁹ and so to engage students in the learning process, students are assigned to groups. Each group is assigned a preparedness topic such as triage, communication, or incident command center. Group assignments are made before the day on which the topic will be presented. Each group is responsible for preparing a short presentation, approximately 10 minutes, about the assigned topic. The group presentations are interwoven with the lecture on disaster preparedness. Encouraged to be creative in presenting their assigned topics, students have opted to do role plays, skits, and slide shows.

Web-Based Training Materials

Using the university's online learning system, materials were provided to

students to review before the course lecture and the training exercise. Materials included the *Neighborhood Emergency Response Training Manual*; the university's disaster response plan including reporting requirements and forms that will be completed during an actual event; information specific to UH such as the emergency supplies pack (a list of the supplies that are kept by UH) and emergency cards (a series of cards that describe the teams that will be formed in an emergency and the roles of team members); and hyperlinks to external Web sites including the Federal Emergency Management Agency, the American Red Cross, and the City and County of San Francisco disaster preparedness Web site (www.72hours.org).

Online Emergency Preparedness Curriculum

Students are also required to complete the online emergency preparedness curriculum, *Nursing Curriculum for Emergency Preparedness*.⁶ This curriculum takes approximately 8 hours to complete and includes streaming video and audio. Topics in the curriculum include basic principles that need to be considered when responding to a disaster, personal preparedness, the nurse's role in responding to a disaster, core competencies, and information about responding to radiological, nuclear, and biological events.

Training Exercise

The goal of the training exercise is to give students and UH staff the opportunity to practice skills, become familiar with equipment and supplies that will be used in the case of a mass casualty event (Figure 2), and work together as an interdisciplinary team. The training exercise is done during a scheduled clinical day and included as a practicum assignment. Students are given time during their clinical practicum to prepare for the exercise. Hands-on training preparedness activities, done in collaboration with UH staff, have included tabletop exercises, mock drills, and training sessions. Students are given a tour of UH facilities before the day of the exercise. During the tour, students are given an opportunity to see the supplies and equipment available for use

Assigned Readings <ul style="list-style-type: none">• Course Text
Web-based materials <ul style="list-style-type: none">• Neighborhood Emergency Response Training (NERT) manual• San Francisco State University Disaster Response Plan<ul style="list-style-type: none">◦ Damage assessment form◦ Situation status report• University Housing<ul style="list-style-type: none">◦ Equipment list◦ Supply list◦ Emergency supplies pack◦ Emergency cards• Links to other materials<ul style="list-style-type: none">◦ American Red Cross◦ Federal Emergency Preparedness Administration◦ The city and county of San Francisco disaster preparedness website (www.72hour.org)
Materials given during lecture <ul style="list-style-type: none">• Information sheets<ul style="list-style-type: none">◦ Developing a family disaster preparedness plan◦ How to prepare for and respond to<ul style="list-style-type: none">▪ Earthquake▪ Fire▪ Flood◦ Developing a personal disaster preparedness kit
Online training module <ul style="list-style-type: none">• Nursing Curriculum for Emergency Preparedness

Figure 1. Pre-exercise preparatory reading materials.

Equipment

- Hand held radios
- Water filtration system
- Generator
- Chain saw
- Cabana (privacy shelter)
- Folding or chemical toilets
- Emergency chair
- Tent
- Back board
- Pump
- Cots
- Stretcher
- Carabiner
- Lights
- Heater
- Stoves
- Anchor straps
- Automatic electronic defibrillator

First Aid Supplies

- Crutches
- Splints
- Eye wash
- Elastic bandages
- Butterfly closures
- Splints
- Cold pack

Figure 2. Equipment and supplies with which nursing students become familiar.

by UH during a disaster. The students are also given time to become familiar with the supplies and equipment before the training exercise. Materials relevant to student housing are provided on the online learning system and include the supply and equipment list for UH, an emergency pack that includes information regarding what is available in the emergency packs that are kept in each of the dormitories, basic first aid instruction, and emergency cards that describe the various disaster response teams that UH will form when a disaster occurs and the roles and responsibilities of each team. Students are required to be familiar with these materials before participating in the exercise.

Representatives from UH come to the theory class early in the semester and explain the training exercise. Clinical faculty and students are aware of the topics to be covered during the exercise in advance. For instance, during a given semester, students are assigned to prepare a training exercise focused on a disaster preparedness topic such as moving a victim, triage, first aid (arterial bleed, unconscious victim, shock, broken limb, and neck or back injury), and so forth. Students act as trainers, victims, and coaches during the training exer-

cises with UH. Clinical faculty members help students prepare for the training exercise. Working in groups, the students are assigned specific role tasks in the activity, such as teaching staff how to set up a first aid station or acting as victims of a major earthquake so that staff members have the opportunity to practice their triage and first aid skills.

The format for the training exercise has varied over time to meet the needs of the UH staff. Initially, the training exercise lasted for 4 hours, but currently, it lasts for 2 hours (Table 1). The first training exercise was done as a tabletop exercise. A tabletop exercise consists of the construction of a disaster scenario. Once the scenario has been constructed, response teams are briefed and given a specific timeframe to respond to different events built into the scenario. Unlike a mock drill, a tabletop exercise is conducted without props. The purpose of a tabletop exercise is to facilitate team problem solving and critical thinking as events in the scenario unfold. The students worked with UH staff on an earthquake scenario. Subsequent to the tabletop exercise, students were assigned a topic, and UH staff members were divided into groups. Students set up different rooms so that UH staff members were trained on up to 6 different disaster preparedness topics during the exercise. Each topic area was seen as a station so that UH staff moved from station to station during the exercise and the students repeated the topic for each new UH group until all UH staff had received training on all the topics presented during the event.

Another training format that has been used is a mock drill; however, because of time constraints for the UH

staff, mock drills are only done in the summer. New residential life assistants start work in UH at the end of August so nursing students enrolled in the course during the summer have engaged in planning and participating in mock drills. Students are assigned to participate on a specific response team such as incident command center, communication, building assessment, or search and rescue. In their roles, students act as coaches as the mock drill unfolds.

Currently, the training exercises during the regular semester are completed in 2 hours during which students provide a short (15 minutes) overview of the topic they have been assigned and then lead a hands-on practice. All of the training exercises start with an orientation to the exercise and end with a debriefing session during which UH staff and nursing students are asked to provide feedback regarding the exercise.

Initial evaluation of the project served the following purposes: (1) identify gaps in knowledge of housing staff members since they will be first responders on campus in the case of disaster; (2) identify gaps in the knowledge of nursing students, as they will be required to participate in preparedness activities either in the workplace or in their communities after graduation; (3) make improvements to the existing project so that future participants gain a more complete understanding of their roles in disaster preparedness; and (4) identify training needs so that external funding for future endeavors can be sought.

Outcomes

Nursing students who had participated in the training exercise between June 2004 and December 2005 and UH staff

Table 1. Format for Training Exercises With University Housing Staff

Summer 2005	Fall 2005/ Spring 2006	Summer 2006/2007	Fall 2006/ Spring 2007	Fall 2007/ Spring 2008
Tabletop	Topic stations	Mock drill	15-Min topic overview	15-Min topic overview
	Hands-on practice at each station		Hands-on practice	Hands-on practice

members were asked to provide feedback on the program using a survey that was developed by the authors. Approval for the program evaluation was obtained from the university Committee for the Protection of Human Subjects. Twenty-two UH staff members and 30 nursing students participated in the program evaluation.

Both UH staff and nursing students ranked their preferred method of learning about disaster preparedness. The one most preferred by survey respondents (both groups) was hands-on practice (40.8%), followed by mock drill (10.2%), and tabletop exercise (6.1%). Lesser preferred methods were video (4.1%), case presentation (4.1%), lecture (4.1%), and CD-ROM (2.0%). Internet, printed materials, and audio recordings were not any respondents' first preference.

University Housing staff and nursing students indicated that they felt prepared to participate in only 4 of the 15 listed activities: communication, triage, first aid, and cardiopulmonary resuscitation. Not surprisingly, of the remaining 11 activities on the list, UH staff members felt more confident in their ability to conduct a building assessment, manage the water filtration system, provide food for survivors, and manage the roster of residents, whereas nursing students felt better prepared to perform infection control activities.

Respondents were given a list of equipment (18 items) and first aid supplies (9 items) with which they should be familiar with and competent to use when a disaster occurs. There was no difference in perceived competency between UH staff and students regarding handheld radios (81% and 79.3%, respectively), automatic electronic defibrillators (66.7% and 86.2%, respectively), and stretchers (81% and 72.4%, respectively). For the other equipment listed, students felt that they were competent to use backboards (62.1%), whereas UH staff felt that they were competent to use the emergency chairs (66.7%), tents (61.9%), cots (61.9%), and lights (57.1%). Both students and UH staff felt that they were competent in the use of the first aid supplies that would be available to them when an emergency occurs.

University Housing staff and nursing students were asked if they felt competent in setting up triage, casualty

collecting, patient holding, and first aid stations for the casualties of a disaster as well as a morgue. Most respondents felt that they could set up the triage station (62.2%) and the first aid station (88.9%). In contrast, only 11 (24.4%) felt that they could set up the casualty collecting station, whereas 12 respondents (26.7%) felt that they could set up the morgue and 22 (48.9%) felt that they could set up the patient holding area. Most nursing students did not feel competent in setting up the casualty collecting station (22.2%) or the morgue (14.8%).

Respondents were also asked about their ability to manage victims with 11 specific injuries that are likely to occur in a disaster including managing victims with arterial bleed, blunt trauma, venous bleed, and broken limb. Most students felt that they could manage all injuries listed except head or neck injury (48.3%) and impalement (44.8%). University Housing staff members felt that they would be able to manage victims with a broken limb (52.6%), a victim who was in shock (78.9%), and a victim with an obstructed airway (63.2%). Most of UH respondents did not feel that they had the ability to manage any of the other 8 injuries on the list.

To gauge whether respondents knew how to deal with potential environmental contaminants and how to protect their own safety, 6 questions were asked. Most respondents (91.5%) felt that they knew how to protect themselves in case of disaster. Most UH staff members did not feel that they knew how to handle infectious waste (42.9%), hazardous waste (33.3%), a toxic spill (33.3%), and the remains of the dead (38.1%) or to control the spread of infection (38.1%). On the other hand, students felt that they knew how to handle infectious waste (84.6%) and hazardous materials (82.1%) and control the spread of infection (79.3%). However, only 7 (24.1%) of the student respondents felt that they knew what to do with the remains of victims who died in the disaster, and only 13 (43.3%) felt that they knew how to handle a toxic spill.

Comments made by both nursing students and UH staff indicated that the training exercises were beneficial. In general, nursing students indicated that they had more training needs than did UH staff across all topics except for cardiopulmonary resuscitation (8.2% vs

10.2%, respectively). Nursing students indicated that they needed more training on less traditional roles that nurses may assume in the event of a disaster including building assessment, search and rescue, water filtration, and command center. Surprisingly, nursing students also felt that they needed more training in infection control (34.5%), triage (41.4%), and first aid (24.5%). Several nursing students recommended expanding this content area in the entire curriculum.

Conclusion

Based on our assessment and similar to the findings of previous research,¹ nursing students need further education on the following: building assessment, command center, transport, communication, search and rescue, crowd control, water filtration, mass sheltering, and food and roster. Nurses will not necessarily be required to do all these tasks, but familiarity with these aspects of disaster preparedness will enhance their response capability.

Any disaster preparedness curriculum should also include the opportunity to become familiar with the use of equipment typically used when a disaster occurs. Training should include when to use the equipment and a demonstration of how to use the equipment. If possible, training exercise participants, including nursing students, should be given the opportunity to use the equipment during a mock drill. For those pieces of equipment, which most respondents in this study felt comfortable using, multiple opportunities were provided to practice using the equipment. As with an equipment that is typically used when responding to a disaster, nursing students should be given more education regarding when and how to use the first aid supplies. Practicing nurses do not use many of the first aid supplies that are used during a disaster on a daily basis.

In developing training exercises, planners should consider the preferred learning methods of respondents. Most study respondents preferred to use either hands-on, mock drill, or tabletop exercise to train for disaster. There have been efforts to restructure our training exercises to include more hands-on training for both students and staff. Course faculty members are considering

how to use the simulation laboratory that is under construction to increase a student's hands-on experience with assisting victims in the case of a mass casualty event.

The focus of much of the training has been on developing skills relative to using equipment and supplies and responding to the disaster, for example, search and rescue. Our assessment indicated that both UH staff and nursing students need more education regarding how to set up stations to deal with the casualties of the disaster. Exercises need to be developed that allow the training exercise participants to practice setting up these stations. Protecting the safety of first responders is paramount in any disaster. Responders are going to have to manage environmental contaminants, as well as know how to protect their own safety. Our outcomes indicate that both staff and students need more education concerning environmental hazards expected in a disaster and the management of victim remains.

Disaster preparedness curricula need to include a thorough discussion of disaster preparedness concepts with students. Recommendations on how to enhance disaster preparedness curricula include the following:

- Inclusion in nursing theory courses (psychiatric, gerontology, maternal/child, and pediatrics as well as com-

munity health) of roles performed in responding to a disaster that are typically performed by nurses.

- Developing hands-on training exercise to facilitate more opportunities for practice by nursing students.
- Using simulation technologies to allow more realistic practice of the skills that will be used in responding to a mass casualty event.
- Providing more opportunities for students to become familiar with the equipment that is typically used when responding to a disaster (this would be in addition to the hands-on training exercise).
- Developing training exercises that include more members of the campus community (especially those who will be called upon to respond in the case of a disaster such as the public safety department, student health services, and other students and faculty from the health and human services schools and departments).
- Ensuring that students are exposed to content specific to the handling of toxic, hazardous, and infectious waste, either during training exercise, as part of the Web-based training, or in the didactic portion of the course.

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Eliminate Disparities and Increase Diversity in U.S. Health-Care System

Students from the University of Pennsylvania School of Nursing and School of Medicine visited Washington, DC, July 7-12, to learn about communicating with law makers in Congress, creating policy and strengthening leadership skills in an effort to eliminate health disparities while increasing the number of racially and ethnically diverse health-care policy leaders. It is part of Penn's Leadership, Education and Policy program, or LEAP, which encourages nursing and medical students to use their research and clinical skills to lead and shape health policy and make a difference in the U.S. health-care system.

"A need exists to prepare the next generation of nurse and physician leaders to transform what is already known about health disparities research and practice on high-risk populations into health-policy recommendations for federal, state and local government officials," said Mary Lou Siantz, an assistant dean in the Penn School of Nursing.

The LEAP program is co-sponsored by the Penn School of Nursing's Office of Minority and Cultural Affairs and the Penn School of Medicine's Office for Diversity and Community Outreach. For more information go to <http://www.upenn.edu/pennnews/sourcesheet.php?id=406>

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