Nurse Education Today 35 (2015) 25–31

Contents lists available at ScienceDirect

Nurse Education Today

journal homepage: www.elsevier.com/nedt

Evaluation of disaster preparedness training and disaster drill for nursing students

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ARTICLE INFO

Article history:
Accepted 23 April 2014

Keywords:
Disaster preparedness training
Nursing students
Disaster drill
Training evaluation

SUMMARY

Background: Preparedness and preventive measures are needed to reduce the impact of disasters. Disaster preparedness training for nurses has a long history. However, the effectiveness of disaster preparedness training for nursing students has been limited, to some extent, since they have been based on self-evaluation.
Objective: The study attempts to evaluate the effectiveness of a disaster preparedness training program followed by a disaster drill designed for nursing students.
Participants: Participants were undergraduate students from Universitas Gadjah Mada and diploma students from four randomly chosen nursing colleges located in Yogyakarta, Indonesia. 309 students participated in the training program whereas 225 students participated in the disaster drill.
Methods: The present study conducted in-class training followed by a disaster drill and evaluated using 3 components: pre-test and post-test evaluation of knowledge (score range: 0–20), observation of skills during disaster drill (5-point Likert scale), and a structured one-to-one interview of participants' responses to the training and drill process.
Results: Pre-test and post-test evaluation scores showed significant improvement ($P < 0.01$, paired t-test) for both university and diploma students. Almost all observation items during the disaster drill were above 4.0 (on 5-point Likert scale). Interview results showed that most participants responded positively.
Conclusions: The present study completely evaluated the effectiveness of a disaster preparedness training and disaster drill: The training and drill improved the knowledge and ability of disaster preparedness for both undergraduate and diploma students.

Introduction

An impact resulting from a catastrophic condition caused by natural disasters affected not only buildings and the surrounding infrastructure but also human life and society itself. In order to reduce the impact of disasters, the World Health Organization (WHO) has stressed that despite the importance of relief supplies in emergencies, preventive measures and preparedness are of equal and perhaps more fundamental importance. In the health sector, the availability of suitably equipped health providers who are able to respond when needed is considered vital. (WHO, 2013)

Nurses, the main source of healthcare providers, are indispensable workforce in disaster situations. It is nurses' responsibility to understand their role in preparedness as well as to prepare in advance in order to be available if necessary (ICN, 2009). In this sense, disaster preparedness education is vital for nurses in order to be sufficient in knowledge and skills to respond in any disaster.

Disaster preparedness training for nurses had increasingly been reported in America since the end of World War II. It was reported by Cole (1960) that in the United States between 1951 and 1960, there were 656,333 home nurses and first aiders trained under the disaster plan project and 14,405 registered nurses had been given courses in disaster nursing. *Exercise London*, conducted in London, Ontario, Canada in 1974, was the first successful large-scale disaster drill. It was a large-scale drill to assess the ability of healthcare providers and other community components to overcome catastrophic conditions using 150 casualties and involving a large-scale community (Cole, 1960).

Despite the efforts to train healthcare providers, there is a gap between what nursing students are taught and what practitioners in

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http://dx.doi.org/10.1016/j.nedt.2014.04.016
0260-6917/

disaster preparedness know (Jennings-Sanders et al., 2005). In addition, the same study also found that students have limitations in finding information related to disasters and this leads to inadequate knowledge regarding disaster nursing such as: (1) incomplete definitions of disaster nursing; (2) lack of knowledge about community resources, mock disaster drills, and how to utilize disaster planning models; and (3) unawareness of the significant role nurses could play in disaster situations.

In order to overcome these conditions nursing education institutions initiated to incorporate disaster-related subjects into their curriculums. Disaster-related subjects are being included as a part of Emergency Nursing and/or Community Health Nursing Programs. Another possibility is to develop disaster nursing as an independent subject. In recent years, many academic institutions introduced disaster topics for students in disaster or emergency-related training programs. Following in-class training they practiced their new skills in disaster drills. A study conducted by Kaplan et al. revealed a positive response from the implementation of Emergency Preparedness Disaster Simulation (EPDS) for nursing students (Kaplan et al., 2012)

However, the effectiveness of these programs has not been properly evaluated yet. It is necessary to have a comprehensive evaluation of both the effectiveness of the training and the disaster drill itself. Feedback and input from the participants could provide additional data to better design and develop curriculums for training and drills.

Methods

All participants in the study were undergraduate students from Universitas Gadjah Mada, and diploma students from four randomly chosen nursing colleges in Yogyakarta, Indonesia. The undergraduate students were fourth grade students who had zero experience in actual hospital practice as part of their academic program. While the diploma students were third grade students from nursing colleges who already been exposed to hospital practices for their academic program. Both undergraduate and diploma students were recruited firstly by giving them information related to this study through the teachers. Participants voluntarily agreed to participate in this study.

A-one day disaster preparedness training and a disaster drill were conducted in the study. In-class training enabled students to gain knowledge and understanding in the context of disaster preparedness. The training sessions were conducted based on a schedule that had been arranged and agreed by all institutions. Each nursing college was responsible for choosing students who participated in this training. The disaster drill stimulated participants to apply their knowledge and skills they had learned in a "real" case condition. In the disaster drill all participants worked in small groups, which gave them the opportunity to develop the sense of teamwork and collaboration needed to respond in a disaster scenario. The scenario was based on real events experienced by the authors of the 2006 earthquake in Yogyakarta. The situation and description of the environment, survivors and availability of resources were all explained in detail.

The study evaluated the effectiveness of the training and drill using 3 evaluation components: (1) Pre-test and post-test evaluation to measure the degree of knowledge achieved in the training; (2) observation to evaluate skills during the disaster drill; and (3) interview to obtain participants' responses and feedbacks on both the training and drill.

Disaster Preparedness Training

A big challenge in conducting this study was that there was no standard guideline related to disaster preparedness training for nursing students. In lieu of this, we followed the International Council of Nurses framework of disaster nursing competency (Dorsey et al., 2009) to develop the curriculum for our training. In addition, the study also incorporated, 'cross-cutting competencies for healthcare workers in disaster training', developed by Hsu et al. (2006) and Core Competencies for Nurses in Emergency and Disaster Preparedness by Gebbie and Qureshi (2002).

The training was held over 8 h. The course was divided into 4 topics (I) Introduction to disaster preparedness for nurses, which covered a general description of health problems in disasters, the role of nurses in every phase of a disaster and nursing care principles in a disaster; (II) Command and management for healthcare, which covered incident command systems, multiagency coordination systems and public information systems; (III) Basic life support I, which covered triage methods in the field and cardio-pulmonary resuscitation; (IV) Basic life support II, which covered management for head trauma, bleeding and fracture (Table 1).

Trainers and instructors for this course were nursing practitioners from hospitals and universities who had expertise in disaster, emergency and critical care. The trainers also had a great deal of actual experience in responding to disaster situations both nationally and internationally. Each trainer was assigned to be responsible for one topic. The guideline book and manual were distributed to all trainers prior to the training session, so that all the trainers had the same competencies related to the process of training and topics.

Twenty minute pre-test and post-test were conducted before and after completing the training session for every participant. There were 20 multiple-choice questions based on topics covering all aspects of the training. Each question was scored as one for a correct answer and zero for an incorrect one. Thus the total score ranged from zero to twenty. The evaluation had five questions from each topic of training. The evaluation sheet was first read and evaluated by all trainers and instructors for content validity and consistency before the training session began.

In the beginning of training, participants filled a sheet of demographic data survey. We also asked information about participants' previous training experience since this information could influence the result of study. Participants might have had previous experience in disaster or emergency response training. All participants received handouts on the topics and were allowed to take notes during the training sessions. At the end of each topic session delivered by a trainer, a question period ensued and was encouraged.

Disaster Drill

Only participants, who completed the in-class training of disaster preparedness, participated in the disaster drill. A number of undergraduate students could not participate in this drill due to their academic schedules while only one diploma student was absent for the disaster drill. The total number of participants in the disaster drill was 225 students. It consisted of 138 diploma students and 87 undergraduate students. Prior to the drill the participants were divided into small groups of 10–15 students.

In this disaster drill, the participants were challenged to respond to the disaster situation written on the scenario sheet (Fig. 2, scenario of the disaster drill). They were encouraged to work together as a group to respond to the disaster situation. Each student was assigned a different task according to the specific role. Some were team leaders, some triage staff, and others treatment, and evacuation staff. (See Fig. 1.)

This disaster drill used actor-patients as well as patient simulators. Actor-patients were non-participant students who played the role of victim patients. They were dressed and made up according to the scenario they were in using artificial wounds and blood. They were then coached by a skillful instructor in disaster, to mimic the real sounds and condition of patients in the field. Patient simulators were used for practicing cardio-pulmonary resuscitation and other treatments that were not suitable to be used on actor-patients.

Disaster drills were conducted in the parking lot of the university and the emergency nursing practice room served as the health facility. All groups prepared medications and equipment necessary for initial