

Disaster Preparedness Perception in Baccalaureate Nursing Students Before and After Formal Training: An Observational Study

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Abstract

The purpose of the study was to identify and analyze data on nursing students' perception of disaster preparedness before and after attendance at formal disaster preparedness training. The researchers also aimed to determine the feasibility and value of inclusion of the training in the nursing curriculum. The study population consisted of twenty-three third semester baccalaureate nursing students. The subjects completed a disaster self-perception evaluation tool (DPET) to measure disaster preparedness pre and post attendance at formal two-day training at Federal Emergency Management Agency (FEMA) Center for Domestic Preparedness (CDP) located in Anniston, Alabama. Data were analyzed using SPSS. Data showed that pre-training disaster knowledge, preparedness, and knowledge of role function increased significantly following formal training at the CDP in Alabama.

Keywords : nursing, nursing students, disaster preparedness, disaster training

Introduction and Background

Disasters can occur on local, national, and global levels as natural or man-made events. Disasters may be infrequent in any one location; however, practice and drills are needed to help ensure efficient response (Farra et al., 2015). Nurses often act as first responders during a disaster (Goniewicz et al., 2021; Achora & Kamanyire, 2016). Disaster training assists in the development of adequate response and mitigation plans and contributes to development of disaster related competency (Goniewicz et al., 2021). Training can increase availability of volunteers to assist with surge capacity (Achora & Kamanyire, 2016). Formal disaster training for nurses is invaluable in development of preparedness competence. This study examines baccalaureate student nurses' perception of disaster preparedness before and after attending two-day formal training at The Center for Domestic Preparedness (CDP) located in Aniston, Alabama.

Methods for Developing Disaster Preparedness and Competence Curriculum

Higher education schools and universities can promote disaster preparedness by adopting attitudes that support disaster training and by implementing disaster training into curricula (Achora & Kamanyire, 2016). Data showed that nurses often lack knowledge about disaster preparedness (Said & Chiang, 2019). Disaster training in nursing curriculum may focus on

development of skills in assessment, critical thinking, and providing adequate response in the face of disaster (Pesiridis et al., 2013). Development of competencies surrounding disaster preparedness and response is imperative to curb morbidity rates and financial harms, while increasing the community's health and well-being (Kalanlar, 2018). Students who completed a course in disaster nursing possessed an understanding of the methods to help survivors of disaster in collaboration with interdisciplinary team members (Satoh et al., 2018)

Simulation Disaster Training

Simulation disaster training can result in many benefits. Studies of training and simulated disaster drill training show that study participants could respond during a drill and were able to conduct triage and perform procedures (Alim et al., 2015; Kim & Lee, 2020). Teamwork and team effectiveness also improved (Alim et al., 2015). The literature also revealed that nursing students possess knowledge that can assist survivors of disaster and assist with assessment of physical and mental health needs, hygiene, and health education on the frontlines during disaster (Satoh et al., 2018).

Virtual reality simulation (VRS) training increases preparedness when used with experts in content, education, and technical aspects (Farra et al., 2015). VRS promotes learning in the cognitive, psychomotor, and affective learning domains (Farra, et al., 2015). The use of simulation is

growing in the nursing education arena (Aebersold, 2018). Providing simulation in partnership with local public health and emergency management agencies can enhance nursing students' knowledge of triage, teamwork, role, and decision-making (Aebersold, 2018; DeMarco & Healey-Walsh, 2020). Simulation in disaster nursing education in conjunction with emergency management planners helps communities become better prepared by analyzing potential hazards and susceptibilities in emergency preparedness, increasing the competency of learners, and increasing the available pool of responders (DeMarco & Healey-Walsh, 2020; Kim & Lee, 2020).

Simulation does have challenges. Community health courses at a university in Texas used mass casualty simulation. Faculty found that students asked questions on how to perform during the drill. The recommendation was that faculty be located where observation of students may take place and discuss questions in post-briefing (Smithers & Tenhunen, 2018). Another challenge was to define the best level of preparation of students for the simulation (Smithers & Tenhunen, 2018).

In the wake of the 2016 Kumamoto Earthquakes, many nursing students attending university in Japan assisted with disaster efforts (Satoh et al., 2018). These nursing students were largely responsible for distributing medical supplies, engaging in conversation with victims, sorting relief supplies, and keeping evacuation centers (Satoh et al., 2018). Students' post-disaster reports revealed that they were able to protect personal information, secure their own safety, and maintain their own health (Satoh et al., 2018).

Recent increases in disasters resulted in a decrease in monies to test emergency response plans (Rafferty-Semon et al., 2017). Additional efforts developed a simulation that tests local emergency response plans and develops nursing students' knowledge of disaster response, while remaining cost-effective. One simulation was developed by utilizing a portion of an actual community's disaster response plan with nursing students carrying out the volunteers' responsibilities (Rafferty-Semon et al. 2017). Prior to the simulation, faculty educated students on disaster preparedness, response, mitigation, and recovery. Immediately before simulation, students completed just-in-time (JIT) training that educates nurses on skills needed to run a Point of Distribution (POD) center (Rafferty-Semon et al., 2017; DeMarco & Healey-Walsh, 2020). The students were placed in roles that are typically carried out by Medical Reserve Corps (MRC) volunteers. The simulation allowed students to synthesize knowledge of bioterrorism response and implement skills in the domains of triage, medication review, assessment for exposure to anthrax, medication prophylaxis administration, and exit education (Rafferty-Semon et al., 2017). The local emergency management agency and department of public health were able to evaluate their plans and augment any sections that needed revision. The implications point towards use of simulation to increase the efficiency of the POD system (Rafferty-Semon et al., 2017).

Advanced Disaster Training

MRC

The Medical Reserve Corps (MRC) consists of a national network of local groups of volunteers engaging in local communities to strengthen public health, reduce vulnerability, build resilience, and improve preparedness, response, and recovery capabilities (MRC, 2021). MRC volunteers augment local emergency response teams and Red Cross volunteer efforts. MRC course work located at the MRC Train website helps develop disaster training knowledge and preparedness. The College of Health Sciences at the researchers' university houses the MRC unit and nursing students complete MRC training and course work. This training is easily incorporated into nursing curricula.

American Red Cross

The American Red Cross is a network of volunteers and donors with the mission to prevent and alleviate suffering in wake of disasters and emergencies (American Red Cross, 2019). The American Red Cross' purpose as a nonprofit private agency is to provide care, shelter, and hope to communities that are stricken by disaster or tragedy (American Red Cross, 2019). In addition to serving those effected by disaster, the American Red Cross also educates responders and volunteers to better prepare for disaster before it strikes (American Red Cross, 2019). Since disasters are inevitable and nurses are critical to the disaster response and mitigation, it becomes imperative that registered nurses have adequate training (Nowak et al., 2015).

IDEA Program

Researchers compared the efficacy of a traditional training program to a new program titled Integrated Disaster Education Assimilation (IDEA). This IDEA program focused on preparedness including a point of distribution, field triage, and family preparedness training (Nowak et al., 2015). The researchers assigned one group to the IDEA program and assigned the rest of the students to the traditional lecture-based program and evaluated based on a survey given to both groups before and after the intervention. The results initially revealed that the IDEA program yielded significantly more progress over the traditional format. However, after two weeks retention of the material was about the same in both groups (Nowak, et. al., 2015). The IDEA program additionally yielded 100% volunteer enlistment and improved personal preparedness (Rafferty-Semon et al., 2017).

Theory

The theory of planned behavior (TPB) was developed by Ajzen in 1991. This theory explains how a person intends to perform a behavior. Three factors are related to the intention to perform the behavior: whether the person sees the behavior as favorable, the social pressure to do the behavior, and the ease or difficulty of doing the behavior (Najafi et al., 2017). This theory is suited to the study of perception of disaster preparedness and a person's intention to carry out disaster preparedness behaviors. Najafi et al. (2017) studied TBP and disaster preparedness and found that "perceived control strengthens motivation to do disaster preparedness" (p.1).

Instruments

The Disaster Preparedness Evaluation Tool (DPET) was used for this study after requesting permission from the developer. The tool was developed by Tichy et al. (2009) and was originally intended to measure advanced practice nurses' perceptions of disaster preparedness. The DPET was designed to measure the three stages of disasters: 1) preparedness, 2) mitigation and response, and 3) recovery management. The tool consists of a total of 47 items divided into seven subscales with Likert type scale responses ranging from one to six. The tool was modified for this study to use a five-point Likert type scale to make it simpler for students to complete. The first 25 items consist of responses regarding level of pre-disaster preparedness and is divided into three subscales: knowledge, disaster skills, and personal preparedness. The original Cronbach alpha for the preparedness section was 0.93 when used on Nurse Practitioners in the United States and for the current study on third semester BSN students it was 0.92. The next 16 items relate to disaster response and are divided into two subscales: knowledge and patient management. The Cronbach alpha in the original study for level of response was 0.93 and for this study the Cronbach alpha was 0.90. The final six items relate to the evaluation stage of disaster and are divided into two subscales: knowledge and management (See Table 1). The DPET has also been used in other countries, such as Japan, to determine nurses' perceptions of disaster preparedness. Oztekin, et al. (2016) reported a Cronbach alpha of 0.88 for the level of preparedness section, 0.94 for the level of response section and 0.91 for the level of disaster recovery. The current study adds to the reliability and validity of the Disaster Preparedness Evaluation Tool, as it was used to measure nursing students' perceptions versus registered nurse or advanced practice nurse perceptions.

Methods

A retrospective, descriptive observational design was used to answer the following research question:

1. What effect does formal disaster training have on third semester nursing students' overall perception and knowledge of disaster preparedness and readiness?

Setting and Sample

All students enrolled in third semester nursing courses during the Fall 2019 semester at a School of Nursing (SON) located at a liberal arts university in the southeastern United States were offered the opportunity to participate in the study. Participation in the study was completely voluntary and did not affect the students' ability to attend the training. The formal two-day disaster training occurred at The Federal Emergency Agency's Center for Domestic Preparedness (CDP) in Anniston, Alabama (FEMA, 2021). Fifty-six third semester cohort BSN students attended the training. Twenty-three students volunteered to participate in the study and completed both the pre- and post-assessment surveys. The 23 participants were female, Caucasian, and between the ages of 19 and 21. The main inclusion criteria were that participants attend the training and were able to speak and understand English. No participants required assistance with completing the tool due

to reading or visual difficulty. There were no exclusion criteria. Procedures

Consent and approval of the Institutional Review Board (IRB) was obtained from the university prior to the recruitment of participants for this study. Recruitment occurred during the hour prior to departure to the training center. The researcher presented the opportunity for participation and explained the study procedures. Informed consent was obtained from those interested in participating. Participants were instructed to complete the Disaster Preparedness Tool prior to their arrival at the training center. Each participant was given a unique identification number to protect identity. No personal identification information was obtained. The completed tools were kept in a locked brief case with the researcher. Total time for administration of the tool averaged 20 minutes.

Structured Formal Training

Students and faculty had the opportunity to participate in rigorous, structured formal training. The didactic portion of the formal training included a full day's content on chemical, biologic, radiologic, nuclear, and explosive (CBRNE) disasters. In addition, training on narcotic overdose was included. All aspects of CBRNE disaster were thoroughly explored, including signs, symptoms, and management. The CDP is the only one of its kind and offers premier all hazard training. The expert course faculty included first responders, physician assistants, and doctorally prepared educators. Training methods included lecture, video, demonstration, and simulation, and discussion. The second day of training included additional content on hazardous material protective wear with demonstration. Each participant donned full hazardous material garb and participated in various simulation scenarios. The simulation scenarios included blast victim actors, hemorrhage, drug overdose, chemical burn, and biologic victim assessment with antidotes training. Evaluation and assessment of learner knowledge and competence included pre and post exams. The training center developed the computerized pre and post training exams. Students were required to pass post training exams with a minimum score of 80% in order to receive disaster preparedness certification. All participants successfully passed the exams. The study protocol included completion of the Disaster Preparedness Tool by study participants again before leaving the training center. All completed forms were kept in a locked briefcase carried by the researcher.

Results

Data analysis began with a general evaluation of missing data and standard data cleaning. No missing data were found. All interval/ratio variables were examined for normality and measures of central tendency. Due to the small sample size, normality and central tendency were not achieved, therefore, non-parametric statistical analysis was used.

In this analysis, the research hypothesis was tested that third semester BSN students who attended a formal two-day disaster preparedness training would have an increased

overall perception and knowledge of disaster preparedness and readiness post-training compared to baseline. Because of the small sample size and the variable of disaster preparedness perception and knowledge was not normally distributed, a Wilcoxon Signed Ranks test was used to test the hypothesis. The research hypothesis was supported. An examination of changes in score rankings at baseline and post-intervention indicated students reported significantly greater confidence in disaster skills and knowledge post-intervention than at baseline ($z = -3.98, p = .000$).

Student score ranges on the disaster preparedness section of the DPET indicate students' perception of their ability to obtain increased knowledge on disaster preparedness was significantly greater after FEMA training ($M=101.5$) than before FEMA training ($M=50.25$) $z=-2.07$ to $-4.10, p > .001, r = -0.43$ to -0.86 . Students' perception of their ability to perform disaster skills during a disaster response was significantly greater after FEMA training ($M= 64$) than before FEMA training ($M = 31.68$), $z = -3.69$ to $-4.29. p < .001, r = -0.77$ to $- 0.89$. Regarding evaluation of response following a disaster, student scores indicate a significant increase in their ability to evaluate their response after training ($M =22.32$) than prior to training ($M =12.6$), $z = -3.01$ to $-3.60, r = -.63$ to $-.75$. See Table 1.

Variable	\bar{x} (SD)	Possible Range	Actual Range	p	Cronbach's Alpha α
Pre-Intervention Total Disaster Tool	52.75 (21.62)	47-235	48.88 – 140.06	< .001	.947
Post-Intervention Total Disaster Tool	95.25 (24.44)	47-235	48.88 – 140.06	< .001	.958
Pre-intervention Subscale 1: Disaster Preparedness	50.25 (11.75)	25-125	40 – 91.5	< .001	.920
Post-Intervention Subscale 1: Disaster Preparedness	101.5 (10)	25-125	76 – 106.5	< .001	.928
Pre-Intervention Subscale 2: Disaster Response	31.68 (7.84)	16-80	25.76 – 38.24	< .001	.895
Post-Intervention Subscale 2: Disaster Response	64 (7.52)	16-80	60.48 – 68.16	< .001	.904
Pre-Intervention Subscale 3: Evaluation of Disaster	12.6 (3.84)	6-30	10.68 – 15	< .001	.896
Post-Intervention Subscale 3: Evaluation of Disaster	22.32 (4.2)	6-30	21.12 – 24.24	< .001	.890

Table 1: Comparison of DPET Pre- and Post- FEMA training

Discussion

Student Perceptions of Disaster Education and Disaster Response

The results of this study indicate that formal FEMA training contributed to students' perception of an increase in both disaster knowledge and preparedness. Students gained knowledge on how to function as responders and offer valuable assistance in the wake of disasters. They also gained knowledge of specific methods to help manage disaster victims. Training contributed to students' perception of an increase in the scope of their role and their abilities to help improve outcomes post-disaster.

Existing literature indicated that learners expressed the need for further education concerning disaster nursing in the areas of theoretical knowledge, coordination, triage, and mental health (Kalanlar, 2018; Pesiridis et al., 2013). The results of this study reinforce existing data and show the importance of providing disaster training to learners. A gap in the literature exists involving students' perceptions of disaster preparedness following intense, rigorous training. Students recognized response as a component of disaster, but had limited knowledge of preparedness, recovery, and mitigation (Pesiridis et al., 2013). This study also supports prior findings, and results suggest that formal, intense FEMA training contributed to significant increases in breadth and depth of knowledge and preparedness.

Strengths and Limitations

Data results indicate significant increases in disaster knowledge and preparedness. The formal training event was highly engaging and proved to be a high impact practice. This study is unique in that it allowed researcher's pilot the training method and to determine the feasibility of including formal structured disaster training in the nursing curriculum. The results indicate that formal training should continue to be incorporated during nursing school. Due to the small sample size and the fact that all participants were Caucasian and female, the generalizability of the study is limited. The school of nursing faculty recognize the benefits of inclusion of formal disaster training in the curriculum. The authors see the need for future studies that should include larger and more diverse samples of participants. The authors also have opportunities to study additional cohorts in the future and evaluate disaster knowledge and preparedness at various times throughout the four-semester program.

Implications for Nursing and Nursing Practice

Students often graduate with less than adequate knowledge and training for disaster preparedness and response. Failure to acquire adequate disaster knowledge using existing training methods, such as lecture and simulation, indicate an opportunity to enhance disaster training for nursing students using formal training, such as training offered by FEMA. In addition, prior to FEMA training, the researchers incorporated Medical

Reserve Corps training into the nursing curriculum. These study data support continuing use of this high impact formal FEMA training to enhance students' disaster knowledge and preparedness. Students and faculty were very enthusiastic and engaged. The curriculum would continue to include traditional disaster lecture content and MRC training in second semester, adding FEMA formal training in third semester. Opportunity exists to collaborate with existing emergency networks in the community. Ultimately formal disaster training increases the pool of prepared volunteers and helps improve disaster victims' outcomes.

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