

WORLD HEALTH

Nurses' Preparedness and Perceived Competence in Managing Disasters

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Key words
Disasters, disaster preparedness nursing,
nursing research, emergency preparedness

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Accepted: February 21, 2013

doi: 10.1111/jnu.12029

Abstract

Purpose: This article is a descriptive analysis of rural nurses' perceived readiness to manage disaster situations.
Design and Methods: The 58-item Disaster Readiness Questionnaire was used to survey hospital-based nurses from rural communities in Texas during the summer of 2011. The data were collected by emailing a link through the various hospital intranet sites, resulting in a sample size of 620 nurses.
Results: Findings revealed that most nurses are not confident in their abilities to respond to major disaster events. The nurses who were confident were more likely to have had actual prior experience in disasters or shelters. Self-regulation of behavior (motivation) was a significant predictor of perceived nurse competence to manage disasters only in regard to the nurse's willingness to assume the risk of involvement in a disaster situation. Healthcare climate (job satisfaction) was not a determinant of disaster preparedness.
Conclusions: Global increases in natural and human-induced disasters have called attention to the part that health providers play in mitigation and recovery. Since nurses are involved in planning, mitigation, response, and recovery aspects of disasters, they should actively seek opportunities to participate in actual disaster events, mock drills, and further educational opportunities specific to disaster preparedness. Administrators must support and encourage disaster preparedness education of nurses to promote hospital readiness to provide community care delivery in the event of a disaster situation.
Clinical Relevance: Nursing comprises the largest healthcare workforce, and yet there is very little research examining nurses' readiness for disaster.

Natural and human-induced disasters have increased in prevalence in recent years. Factors promoting disasters include global civil unrest resulting in human-induced disasters; direct and indirect effects of global climate change; denser populations living in coastal areas; and emerging infectious diseases with pandemic potential. The Intergovernmental Panel on Climate Change projects extreme weather events and associated natural disasters to increase in prevalence and intensity around the globe (Scheffran & Battaglini, 2011). Nurses serve in vital roles to mitigate effects of disasters, yet few research studies analyze perceived disaster preparedness of American nurses that differentiate and explore possible mediating factors.

This research study was undertaken to describe the current status of nurse preparedness to manage disasters in order to help communities and healthcare systems strengthen their emergency response programs.

Brief Overview of the Literature

Human-induced disasters refer to disasters related to human error or human action that cause significant damage to the environment, people, or property, such as a terrorist event or arson resulting in wildfire. Doig, Coenraads, Lowe, and Makula (2006) described natural disasters as geological events triggered by nature; variant changes in global weather patterns due to meteorological

events; and biological disasters that result from the actions of living agents such as disease or insect pests. According to the Pan American Health Organization (2000), a disaster takes place somewhere in the world every day.

Emergency preparedness as defined by Slepski (2005) is comprehensive skills, abilities, knowledge, and actions that are needed to respond and prepare for a threat, actual or suspected, chemical, radiological, nuclear, biological, or explosive in nature. During major disaster events, the demand for nursing staff is much greater than the demands for any other healthcare professionals (Lavin, 2006). Nurses should anticipate an expanded role during disaster events to include caring for the sick and injured (Gebbie & Qureshi, 2002), infection control, contingency planning to prevent further damage, triage, mass immunizations, mass evacuations, and treatment for mass casualties. Disaster preparedness for nurses is of paramount importance for effective response to mitigate the detrimental effects to person, community, and property (Fung, Lai, & Loke, 2009). Not only must nurses be prepared to respond to major disasters to meet the needs of those affected, but they must also possess the knowledge needed for management of patients with special needs, such as the elderly, children, persons with mobility impairments, and even persons with mental health issues. The nurse must be familiar with needed core abilities (Gebbie & Qureshi, 2002) to be an effective team member.

It is believed that the majority of nurses in most U.S. states, including Texas, are largely unprepared to respond to and manage major disaster situations (Twedell, 2009). Factors that affect mitigation may include age, lack of disaster preparedness education in nursing schools (Garbutt, Peltier, and Fitzpatrick, 2008), lack of knowledge of a formal plan regarding preparedness in the practice setting (Goodhue, Burke, Chamber, Ferrer & Upperman, 2010), lack of understanding of communication methods in disaster preparedness (Coyle, Sapnas, & Ward-Presson, 2007), and perception of what constitutes disaster preparedness (Fung et al., 2009). According to Fung et al. (2009), research is scarce regarding disaster nursing. There is a lack of understanding regarding nurses' perceptions of their roles and preparation for providing safe and effective care during and after a disaster. Training in mass-casualty or mass-incident and disaster preparedness remains inadequate, and research is limited in regard to nursing preparedness (Coyle et al., 2007). Training for disasters is vastly different from hospital to hospital, community to community, and among various organizations. Garbutt et al. (2008) claimed that more research is needed to assess nurses' familiarity with emergency preparedness because it is

crucial to have a nursing workforce ready to respond to a major disaster occurrence.

The rural nursing workforce has unique disaster preparedness challenges because of the potential for geographic isolation, delays in initiation of treatment, and decreased attainment of higher degrees by nurses (Skillman, Palazzo, Keepnew, & Hart, 2005). Further, rural hospitals may have a lower budget for what they may view as "extras" (i.e., sending nurses for disaster preparedness education and conducting mock disaster events).

Theoretical Framework

The theoretical underpinning of this study consisted of certain aspects of Deci's Self-determinism Theory (SDT). SDT uses an organismic perspective by claiming that individuals are active organisms who seek challenges in their environment in an attempt to achieve personal growth and development (Deci & Ryan, 2002). A desired outcome of this study was to determine what factors may influence nurses' actions to achieve personal growth and development to be prepared for major disaster events. The four basic factors relating to engagement are individual differences, self-regulation of behavior (which includes motivation and relatedness), and perceived competence and healthcare climate (which includes autonomy and control). These four factors form the basis for a person's readiness, ability, and commitment to take action in a disaster event.

Conceptual and Operational Definitions of Study Variables

Individual differences are factors pertinent to the nurse or nurse group, which may indicate more experience or exposure, suggesting that extraneous factors can influence the person's readiness to change and maintain behavior (Ryan & Deci, 2000). These are operationalized as demographic information such as age, years of experience, and previous disaster experience. Self-regulation refers to intrinsically generated motivation to take an action that will impel a person toward a specific goal (Ryan & Deci, 2000) and is measured by the three-question Self-regulation (SR) scale. Perceived competence is the feeling that one can accomplish the behaviors and reach a goal (Deci & Ryan, 2000). It is measured by the Emergency Preparedness Information Questionnaire (EPIQ) and a new instrument called the Nurse Assessment of Readiness (NAR) scale. Healthcare climate includes socio-environmental conditions that facilitate the satisfaction of three basic psychological

needs: relatedness, competence, and autonomy (Deci & Ryan, 2002). Climate is measured by the Job Satisfaction Scale (Wieck, Dols, & Northam, 2009). The conceptual contribution of the SDT model to the current study was to determine if measuring these four factors (individual differences, self-regulation, perceived competence, and healthcare climate) provided a context for describing the disaster preparedness state of nurses.

Study Design

A descriptive, correlational design was used to measure nurse preparedness for disaster response. Nurses ($N = 620$) responded to a survey link that was available to two major rural healthcare systems and two small rural hospitals located in the Panhandle, north, and central Texas. The participating facilities had approximately 2,480 nurses employed at the time of the survey. Not all respondents' data were complete, and a listwise deletion was used that resulted in smaller sample sizes depending on the variables that were analyzed. There were no exclusion criteria for the acquired sample. Sample size was estimated using the G-Power 3.1.0 (<http://www.psych.uni-duesseldorf.de/abteilungen/aap/gpower3/download-and-register>) online program. A priori power analysis for multiple regression with four predictors using a moderate effect size of 0.15, power of 0.80, and $\alpha = 0.05$ yielded a minimum sample size of $N = 85$ (Faul, Erdfelder, Buchner, & Lang, 2009). There were approximately 176,000 registered nurses in Texas in 2010 (Texas Board of Nursing, 2010), with 9% working in rural areas (Combs, 2008). The sample for this study represents 4% of the available rural nurse workforce in Texas (rural nurses = 15,540; usable sample = 620, or 25% of the 2,480 accessible nurse employees).

Research Questions and Instruments

Research questions were:

1. What is the perceived competence of rural nurses regarding their disaster preparedness?
2. Which of the variables—individual differences (age, years of experience, and previous disaster experience), self-regulation, and healthcare climate—most influence perceived competence in disaster preparedness?
3. Is there a predictive relationship between self-regulation scores and perceived competence in disaster preparedness?

Measurement involved a survey that contained 58 questions divided into four main sections. The survey

incorporates components of the EPIQ, a tool that comprehensively assesses civilian nurses' perceived familiarity with eight competency dimensions of emergency preparedness (Garbutt et al., 2008).

Professional and demographic data consist of role, specialty area, years in nursing, age, ethnicity, and two researcher-generated questions regarding previous experience with disaster situations: "Have you ever actively participated in an actual major disaster event?" and "Have you ever worked in a postdisaster shelter?" The summed total of the EPIQ subscales measured a nurse's self-reported familiarity with aspects of emergency preparedness. Garbutt et al. (2008) reported Cronbach's α for the subscales ranging from 0.83 to 0.94 and 0.97 for the EPIQ total score. Cronbach's α for the subscales in the current study ranged from 0.84 to 0.95 and 0.98 for the EPIQ total score. The total summed score of the EPIQ (potential range 41–205) is used as a measure of nurses' perceived competence in disaster preparedness. A separate measure of nurses' perceived competence in disasters was used to add rigor to the findings. The Nurses Assessment of Readiness (NAR) scale consisted of two questions: "Please provide an assessment of your overall familiarity with response activities/preparedness in the case of a large-scale emergency event" and "If you had to respond to a major disaster in your hospital/community today, how prepared do you feel you are to effectively respond?" Both were measured on a 5-point Likert scale. The NAR scale attempts to encapsulate a more global measure of perceived competence in disasters, which can be administered immediately in a disaster or predisaster period. The items were summed and had a potential range from 3 to 15. Cronbach's α for the NAR in this study sample was 0.90.

The SR survey contained three questions related to engagement in disaster preparedness activities. The SR questions explored the nurses' likelihood of participating in community disasters (1 = *not likely* to 5 = *very likely*), commitment to participation should a large-scale disaster occur (1 = *not at all committed* to 5 = *very committed*), and willingness to assume risk of involvement in a disaster situation such as a pandemic or bioterrorism (1 = *not likely* to 5 = *very likely*). The potential summed score ranged from 3 to 15. Cronbach's α for the SR in this study sample was 0.91.

Healthcare climate was measured by the Job Satisfaction Questionnaire (Wieck et al., 2009). It specifically addresses questions related to employment based on a 5-point Likert scale, such as overall job satisfaction; likelihood to recommend current employer to colleagues; willingness to accept the same job again; and consideration of reward and responsibility commensuration. The four items of the Job Satisfaction Questionnaire were summed

for a potential total score from 4 to 20. Cronbach's α for the healthcare climate in this study was 0.85.

Findings

The nurses averaged 42 years of age and 15 years of nursing experience. Most respondents were registered nurses (84%) and White (86%). The nurses represented a broad range of specialties, predominantly medical-surgical (19.8%) and myriad responses of "other" (33%).

The nurses' perceived competence in disaster preparedness was measured using the EPIQ summed score ($n = 618$; $M = 90.0$; $SD = 31.7$; range = 41–205). A median of 82.5 and a mean of 90 suggest a somewhat low overall perceived competence to their familiarity with disasters. The alternate measure of perceived competence was the NAR scale (a two-item scale). The sum scores of the NAR scale ($n = 618$; $M = 4.2$; $SD = 1.85$; range = 2–10) indicates that nurses do not feel prepared to effectively respond in a disaster situation. They are not very familiar with response and preparedness activities for large-scale emergency events.

Perceived disaster preparedness was a key component of the study. While traditional demographics (age, education, etc.) had no notable impact on the nurses' perceived disaster preparedness, two of the individual differences, previous participation in a major disaster event ($r = 0.347$, $p < .001$) and prior work in a postdisaster shelter ($r = 0.226$, $p < .001$) were significantly correlated with the EPIQ total score. These two individual scores were included with the total SR score and the healthcare climate score in a standard regression procedure to examine the contribution of each to the perceived competence in disaster preparedness. The $R^2 = 0.259$ and adjusted $R^2 = 0.254$ indicate for the population that approximately 25% of the variance in perceived competence could be explained by these predictors [$F(4, 615) = 53.79$, $p < .001$].

Participation in a major disaster ($t = 6.58$, $p < .001$), past experience in a postdisaster shelter ($t = 2.27$, $p = .024$), and SR ($t = 9.84$, $p < .001$) were significant predictors, with the greatest contribution coming from the SR (motivation) scale. The contribution of each variable to perceived competence in disaster preparedness is presented in Table 1.

The predictive relationship between SR scores and perceived competence in disaster preparedness was answered by measuring the three individual questions making up the SR scale against the outcome variable, the EPIQ summed score. A standard multiple regression resulted in an $R^2 = 0.195$ and adjusted $R^2 = 0.191$ [$F(3, 609) = 49.2$, $p < .001$]. The beta weights contributed

Table 1. Coefficients for the Individual Differences Influence on Disaster Preparedness

Dependent variable: EPIQ summed score	B	β	t	p	n
Constant	105.63		9.61	.000	620
Individual differences					
Previous disaster experience	-20.14	-0.242	-6.57	.000	
Worked in postdisaster shelter	-9.58	-0.084	-2.27	.024	
Self-regulation (SR)	3.35	0.36	9.84	.000	
Healthcare climate	0.37	0.04	1.02	.308	

Note. EPIQ = Emergency Preparedness Information Questionnaire.

Table 2. Coefficients for Specific Self-regulation Questions ($n = 3$) Influence on Disaster Preparedness

Dependent variable: EPIQ summed score	B	β	t	p	n
Constant (EPIQ)	48.1		13.2	.000	613
Q1. Likelihood of involvement in disaster	2.60	0.103	1.60	.122	
Q2. Commitment to participation in disaster	3.20	0.119	1.52	.129	
Q3. Willingness to assume risk of biologic event	6.80	0.251	3.90	.000	

Note. EPIQ = Emergency Preparedness Information Questionnaire.

by each of the three domains of the SR scale are depicted in Table 2. It is interesting to note that among the SR domains, "willingness to assume risk of involvement in a bioterrorism event" ($t = 3.88$, $p < .001$) makes the only significant contribution to the nurses' perceived competence in disaster preparedness as measured by the EPIQ. It is necessary to interpret the individual contribution of these predictors with caution because all of the predictors were expectedly intercorrelated ($r > 0.80$); however, the collinearity statistics (Variance inflation factor < 10 and tolerance > 0.2) were all acceptable.

Discussion of Findings

Deci's SDT was proposed as a basis for assessing a person's readiness, ability, and commitment to making a behavior change. The change focus of this study was the actions to prepare one to respond to a disaster situation. The four engagement factors of the model (individual differences, self-regulation, perceived competence, and healthcare climate) were used to examine rural Texas nurses' readiness, ability, and commitment to take action in a disaster event. Previous participation in a major disaster and past experience in a postdisaster shelter, individual differences, and self-regulation significantly predicted

the nurses' perceived competence in disaster preparedness. Job satisfaction and healthcare climate did not significantly influence the model of nurses' perceived competence in disaster preparedness.

Approximately 20% of the survey respondents worked in critical care and emergency departments (EDs). A disaster event can create a surge of patients that could easily overwhelm the ED's ability to provide organized and effective care (Powers, 2009). ED nurses are often at the forefront of care and have the potential of exposure to deadly gasses, toxins, and biologic agents. Powers advised that ED staff should possess the ability to recognize signs and symptoms of various types of agents and infectious disease as well as knowledge of the decontamination process. The low scores of nurses regarding their preparedness for disaster indicates that training for both ED and critical care nurses may be indicated. A positive correlation between previous experience and higher scores on the EPIQ would indicate that providing hands on training or participation in actual events may increase nurses perceived preparedness and hence, actual abilities in preparedness. This education must be comprehensive and include not only basic classes reviewing disaster preparedness content, but application of knowledge, mass care, and contingency planning.

The two demographic questions "Have you ever actively participated in an actual major disaster event?" and "Have you ever worked in a postdisaster shelter" both influenced nurses' perceived competence in disaster preparedness. These two items were significantly correlated with the EPIQ scores, which gives some support to their effectiveness in evaluating overall perceived competence of nurses in disaster preparedness and the influence of situational experiences on overall competence. Self-regulation of behavior was a significant predictor of perceived nurse competence to manage disasters only in regard to the nurse's willingness to assume the risk of involvement in a disaster situation such as a bioterrorism event or pandemic. One can speculate that perhaps nurses' fervor and devotion to help others while putting themselves at risk denotes dedication and commitment to going above and beyond to learn about disaster preparedness (motivation) or to directly participate (relatedness) in a disaster event. The nurses' average perceived competence was lower than the midpoint of the range of competence scores. This suggests that most nurses are not confident in their abilities to respond to major disaster events in a multitude of scenarios, populations, and settings. The nurses who were more confident in their abilities, or scored higher on the EPIQ, were also those willing to assume greater risk. The implications suggest that there may be a need for consistent training in differ-

ent types of disaster scenarios with contingency planning in order for nurses to feel more confident in their abilities to respond to an actual event. The Joint Commission on Accreditation of Healthcare Organization EM 03.01.03 mandates that hospitals have disaster drills for their organizations and communities in which they serve and regularly check their emergency operations plan (The Joint Commission, 2008). The Joint Commission suggests that drills be critiqued to identify deficiencies and opportunities for improvement. However, since the sample of rural nurses all worked in hospitals, the data do not support the effectiveness of current disaster drills in helping nurses feel competent in their abilities to manage a disaster.

The healthcare climate was measured by a job satisfaction scale. Nurses' job satisfaction was found to have no relationship to the nurses' overall perceived competence in managing disasters.

Regarding overall nurse readiness for disasters, most nurses reported a perception of low to average competence in responding to a major disaster event. Most scores were consistently below the midpoint. These findings are consistent with nursing research literature of overall preparedness (Fung et al., 2009; Garbutt et al., 2008; Gebbie & Qureshi, 2002). These evidence-based recommendations indicate that nurses need opportunities to engage in disaster planning, mock drills, and actual events when possible to increase competence in disaster situations, confidence in abilities, and familiarity with disaster preparedness. Helping nurses participate in these events by allowing paid time off, travel, and support might be an investment by hospitals that would pay high dividends in the event of a subsequent local disaster.

Limitations

As with all studies of a single geographic area, caution should be used in generalizing these findings to other hospitals or other rural areas. The capricious nature of disasters and the specific needs of different hospitals and regions related to the types of anticipated and unanticipated disasters make broad generalizations risky. However, due to the close proximity of Texas to Mexico, a long coastal border, and high immigration rates, findings from this study of nurses in rural Texas may be more applicable in rural areas both inside and outside of the United States than other similar studies might be.

The sample in this study, though large enough for statistical power, only represented 25% of the accessible population and 4% of all rural nurses in Texas. In light of the low overall population representation, all conclusions and recommendations are made with caution.

Conclusions and Recommendations

The purpose of this study was to provide an accurate description and in-depth analysis of the factors that affect disaster preparedness of rural Texas nurses as a means of supplying a context for future disaster planning. Following a comprehensive systematic review of the literature, Williams, Nocera, and Casteel (2008) concluded that the available literature was insufficient to determine whether training interventions for healthcare providers are effective in improving knowledge and skills in disaster response. This study lends support to the idea that actual participation in disaster events may improve nurses' perceived competence in disaster preparedness response. Nurses stated that hands-on education would make them feel better prepared, as expressed in the responses to an optional question. A study of the perceived preparedness of hospital-based nurses in rural Texas is an important first step in assessing the capability of rural nurses to react to a disaster. The lives and safety of many individuals will be in the hands of nurses when a disaster strikes.

On an international level, nurses should be encouraged to participate in and seek out opportunities for training in mock disaster drills and actual disaster events. Nurses should conduct research and publish the findings in international journals to share their experiences and lessons learned with nurses around the globe. The findings of this study may contribute on a global scale as the development of new technologies and mobility allow for stronger international collaborations. International organizations should take advantage of others' experiences by bringing in expert trainers, speakers, and evaluators to assess current methods of planning and preparation for disasters. Nationally, nurses must understand their role in the planning, mitigation, response, and recovery aspects of disasters and make a contribution by creating awareness and participating (volunteering) in national disaster events and trainings. They should be encouraged to step out of their comfort zone and assume other positions, such as emergency operations coordinator and positions of leadership in the emergency operations center during a mock drill or actual event. The American Nurses Association (ANA) Code of ethics (second provision) states that nurses' primary commitment is to the patient (ANA, 2001); however, the fifth provision states that the nurse owes the same duties to self as to others, including the responsibility to preserve integrity and safety (Twedell, 2009). The nurse must be clear regarding personal responsibilities during a major disaster event, which will include being faced with ethical considerations. These considerations, as well as the emotional and physical aspects of disasters, should be incorporated into the training pro-

cess. The responsibility of caring for the injured and afflicted during a major disaster is important, but nurses cannot take care of others if they first do not take care of themselves. Nurses should be proactive in disaster preparedness legislation and policies by keeping informed and serving in consultant roles when discussions on disaster response occur.

Among local communities, it is clear that nurses do not feel prepared to deal with disasters. The hospital nurse population may not be ready to step into a disaster response role. Public health organizations should include mitigation and contingency planning seminars and forums that include hospital nurses. Public health nurses will often be responsible for setting up shelters and infection control, and seeing to the needs of the public en masse. Aside from providing direct care to those in need, nurses should be aware of potential disease threats in the aftermath of disasters, including short- and long-term illnesses that disasters leave in their wake (Jones, 2006). These sequelae of disasters are often managed in the hospital setting. Increasing nurse competence in managing disasters would benefit local response and management to help prevent unnecessary admissions and utilization of limited hospital resources during surge situations.

A major message from this study is that training for nurses must be a consistent ongoing aspect of their careers and should be commensurate with the possibilities of both human-induced and natural disaster events. Previous experience seems to be the greatest determinant of perceived competence in disaster preparedness. Self-regulation also contributes to perceived competence in disaster preparedness for nurses. Nurses should encourage their facilities to host disaster training, especially mass casualty, mass evacuation, mass immunization, mass triage, and mass fatality training, on a regular basis involving community partners when possible. In addition to being strong patient advocates, nurses must speak up for their colleagues, community, and their selves so that the health needs during disasters are quickly and efficiently addressed.

Acknowledgments

The authors would like to acknowledge K. Lynn Wieck, PhD, RN, for her critique and guidance in writing this article, and serving as a mentor to me throughout my dissertation process. Partial funding was received from the Jacqueline M. Braithwaite Professorship at The University of Texas at Tyler. IRB protocols were followed throughout this research project. Documentation is available upon request.

Clinical Resources

- American Nurses Association Disaster Preparedness and Response: <http://www.nursingworld.org/MainMenuCategories/WorkplaceSafety/DPR>
- Federal Emergency Management Agency, U.S. Government: <http://www.fema.gov/>
- International Council of Nurses Disaster Response Network: <http://www.icn.ch/networks/disaster-response-network/>
- International Nursing Coalition for Mass Casualty Education Educational Competencies for Registered Nurses Responding to Mass Casualty Incidents: <http://www.aacn.nche.edu/leading-initiatives/education-resources/INCMCECompetencies.pdf>
- The Joint Commission: www.jointcommission.org/standards
- National Center for Emergency Preparedness: <http://www.ncep.vanderbilt.edu/index.html>
- World Association for Disaster and Emergency Medicine Nursing Section: <http://www.wadem.org/nursing.html>

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