

Review

Factors affecting nurses' ability to provide effective care in a disaster response: A review

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Abstract

Disasters cause death, trauma, and psychological distress. Comprising the largest number of healthcare workers, nurses play a crucial role in reducing the impact of a disaster. The objective of this review is to identify the factors that influence nurses' ability during a disaster emergency response to provide adequate care. This research was conducted by doing a literature search from the Pro-Quest and Science-Direct databases using the PRISMA-ScR to screen the articles. The final results included 13 articles. An analysis was performed to identify themes in line with the purpose of the review. All factors affecting nurses' ability to respond to a disaster situation were classified into three themes: 1) factors increasing nurses' ability, 2) barriers to delivering effective nursing care, and 3) support needed to maintain the nurses' ability. During an emergency situation due to a disaster, adequate knowledge and skill to save lives, treat injuries, manage stress and coordinate between teams are the basic competencies needed for optimal care. Nurses' clinical experience or previous disaster experience and training could increase nurses' adaptability in disaster conditions. Support from nurses' workplace and proper implementation of disaster management policy enhance nurses' services and prevent barrier under disaster condition. The results emphasize that future training should aim for improving nurses' knowledge and skills, including the knowledge of nurses' family to protect themselves and deal with disasters. Such knowledge increased family preparedness, which is an important factor to enhance nurses' willingness to work following a disaster.

Introduction

In addition to causing death, trauma, and damage, disasters can lead to psychological, social, and spiritual distress, which can have long-term effects, potentially leading to post-traumatic stress disorder (PTSD).^{1,2} Nurses need to be prepared to overcome the complexity of health problems caused by a disaster. They are required to possess the proper competences to reduce trauma due to the physical, psychological, and social distress suffered by the

disasters' survivor; however, it was found that nurses' preparedness level in dealing with disasters is still low.³⁻⁷ Research on emergency nurses in hospitals in New York,³ and in Mecca Saudi Arabia⁴ are indicating that nurses not fully prepared to handle disaster. It was also found that Indonesian nurses' preparedness level is still low.^{5,6} This low level of preparedness causes a lack of ability and confidence when nurses must act during disasters.⁷ It is necessary to identify the factors that influence nurses' services during a disaster emergency response in relation to providing adequate services so that a program to improve the ability of nurses can be developed by considering the factors identified. Therefore, a literature review was conducted to find studies related to the factors affecting nurses' performance in responding to a disaster emergency.

The aim of this study was to review information through a literature review to identify the factors that influence nurses' ability during a disaster emergency response to provide adequate care after a disaster occurs.

Design and Methods

A literature review was conducted to analyze previous research publications. The search was carried out using the ProQuest and Science-Direct databases with the following keywords: nurse OR nurses AND preparedness AND disaster response AND emergency response. This search process was conducted by the first author, and then the third author re-checked the information found during the screening process.

The inclusion criteria were full-text, peer-reviewed studies in the English language, including studies with various designs, such as quantitative, qualitative, and mixed-method studies. The articles were published from January 2010 to March 2020. Full access to the file was provided, and the keywords are mentioned in the titles or abstracts. The exclusion criteria were articles that do not discuss nurses and articles that are not accessible. To enhance the quality of this literature review manuscript, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) checklist was used as the reporting guideline.⁸ The search using the keywords

Significance for public health

This review provides an overview of the factors affecting nurses' performance in responding to a disaster. This information is important to related parties in making necessary plans and actions so that nurses, who comprise the majority of the healthcare workforce, can deliver safe, effective, and efficient health services to the public during disasters.

produced 132 articles. All articles were then checked for duplication, which resulted in 34 articles. The search continued by checking the abstracts, and 68 articles were excluded. All articles found (n=18) were then checked by the relevancy of the content, and the final result of the search produced 13 articles (Figure 1).

The data from the articles were charted manually using Excel, including their general characteristics: author/year/country, aims, research design, sample/type/size, major findings, and the implications of the relevant studies, such as factors supporting a disaster response and potential barriers. The extraction was carried out using the Mixed Methods Appraisal Tool (MMAT).⁹ The aim of the screening using the MMAT was to determine whether the literature obtained in the previous stage was adequate to be included in

the literature that may be analyzed. The final articles were analyzed to identify the major findings from each article, which were the factors affecting nurses' ability to respond to a disaster. All findings then were classified into themes in accordance with the factors increasing nurses' ability, the barriers, and the support needed to deliver optimal services during the response to a disaster.

Results

This study includes four articles using quantitative methods, five articles using qualitative methods, one article using mixed-

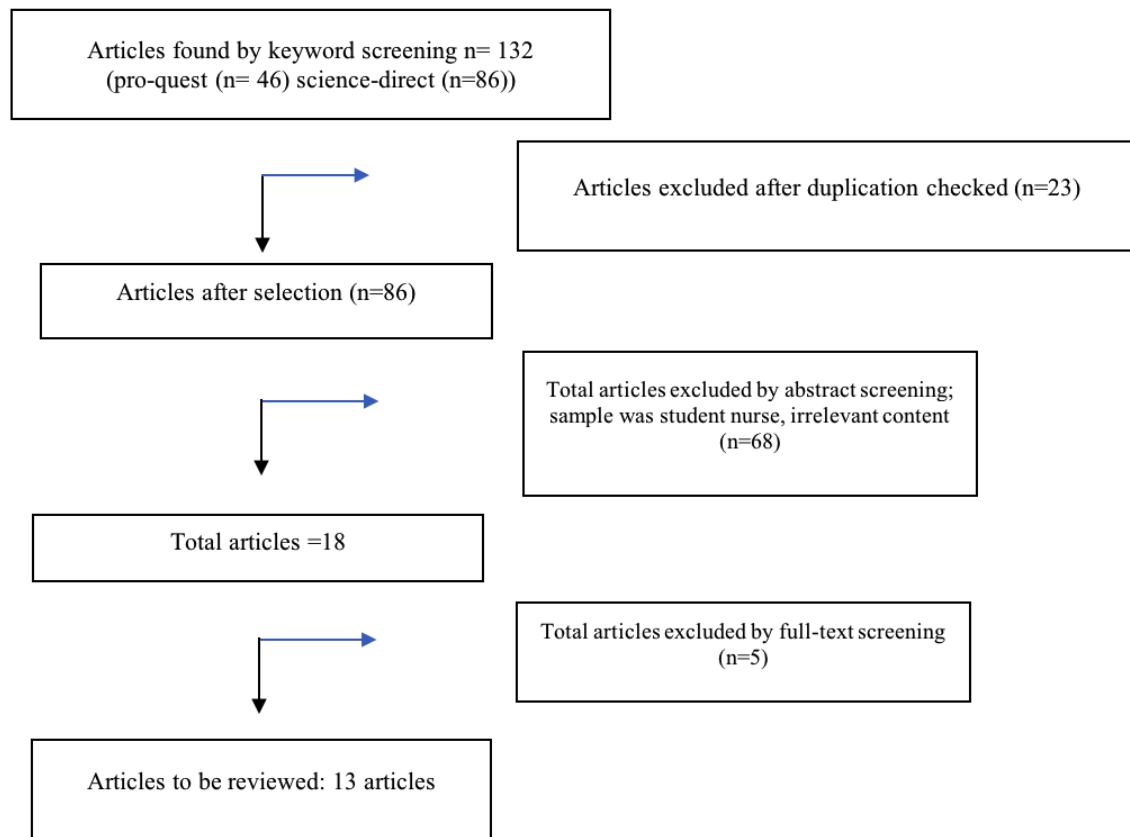


Figure 1. PRISMA flow diagram for included articles.

Table 1. Characteristics of the included articles.

Quantitative 4 articles		Qualitative 5 articles		Mix methods 1 article	
Sample	Countries	Samples	Countries	Samples	Countries
132 hospital nurses	KSA	10 hospital nurses	Southeastern US	16 hospital nurses	New York
384 hospital nurses	Iran	12 hospital nurses	Chine	528 hospital nurses	
852 healthcare workers	Israeli	11 hospital nurses	New Zealand		
311 hospital nurses	Taiwan	11 hospital nurses and 11 midwives 13 hospital nurses	Bantul Indonesia		
			Australia, Indonesian, Israel, Kapan, Kenya, Palestine, Saudi Arabia, and US		

Table 2. Factors supporting nurses' ability in disaster responses and potential barriers.

Author, year	Country	Objectives	Design	Sample	Instrument	Outcome	Factors that support nurses' ability	Potential barriers
Al Thobaity <i>et al.</i> (2016)	Kingdom of Saudi Arabia	To develop nurses' core competencies and roles and to identify potential barriers	Non-experimental research design using a paper-based, self-report survey.	132 nurses work in public hospitals (66% response rate)	Self-developed questionnaire - the overall Cronbach's alpha was 0.96 for all factors: 0.98 for Factor 1; 0.92 for Factor 2; 0.86 for Factor 3	3 factors identified: 1. core competencies of disaster nursing. 2. barriers to developing disaster nursing 3. nurses' roles in disaster management	1. Training and disaster drills 2. Adequate knowledge in disaster plans 3. Guidelines 4. Personal and family preparedness plan 5. Knowledge on ethical issues for the local community	1. Restricted roles of nurses 2. Lack of education, training opportunities 3. Lack of expertise 4. Limited disaster research and evaluation tools
Maleki <i>et al.</i> (2018)	Iran	To evaluate the factors predicting the nurses' attitudes to respond to disasters	Cross-sectional research	384 HCW working in hospitals in Iran (the majority were nurses 58.5%)	Self-developed questionnaire including demographic characteristics, knowledge, and attitude	Knowledge as a predictor of attitude (OR 1,638 p=0.00001) Working experience (OR 1, 072 p+0.024) Having a kit of items needed in a disaster (OR 20, 746 p+0.044)	1. Adequate knowledge and skills 2. Proper tools and equipment 3. Clinical experience 4. Nursing training in clinical aspect	-
Shapira <i>et al.</i> (2019)	Israel	To know nurses' willingness to respond (WTR) following a disaster	Cross-sectional used linear model and a quantile regression model	852 health care workers	Questionnaire on knowledge, perceptions, and attitudes	Predictor of healthcare WTR 1. Concern for family well-being (91 and 92% of participants) 2. Participants' efficacy and professional commitment to care for the ill and injured	1. Training on the sense of efficacy, commitment, and family preparation 2. Staff preparedness for earthquakes and managing acute conditions	1. Concern for safety 2. Fear of losing one's place of employment 3. Gender issues; most nurses are women and have childcare obligations
Tzeng <i>et al.</i> (2016)	Taiwan	To identify the readiness of hospital nurses for a disaster response and the factors influencing their report for work outside the hospital	Cross-sectional study used descriptive statistics, <i>t</i> -tests, and linear models	311 registered nurses in Taiwan	Researcher-designed questionnaire on personal preparation, self-protection, emergency response, and clinical management	The majority of nurses had poor readiness for disaster responses for their: 1. Personal preparation 2. Self-protection 3. Emergency response 4. Clinical nursing skills	1. Educational background 2. Disaster-related training, 3. Nursing experience ≥10 years 4. Experience in emergency or intensive nursing 5. Disaster-response experience	1. Low personal preparation 2. Lack of knowledge regarding self-protection

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Author, year	Country	Objectives	Design	Sample	Instrument	Outcome	Factors that support nurses' ability	Potential barriers
Shipman <i>et al.</i> (2016)	United States of America	To examine the lived experiences of nurses in shelters or temporary community medical clinics	A narrative inquiry, with a phenomenological analysis	10 participants from Southeastern United States	Narrative inquiry guideline	<ol style="list-style-type: none"> 1. Role of nurses: organization, physical assessment, psychosocial needs, and resourcefulness. 2. Knowing the plan: organization, coordination, emergency and disaster plan, communication, team work, staffing volunteering 3. Nurses growth: personal nurse experience 	<ol style="list-style-type: none"> 1. Personal experiences: 2. Have disaster training 3. Strong clinical skill ability 4. Nurses' trait: resourcefulness and flexibility 	Lack of community disaster training because training for community and mass casualty in emergency response are different
Wenji <i>et al.</i> (2015)	China	Describe the experiences of Chinese nurses who worked in disaster relief	Riessman's narrative inquiry	12 registered nurses from Hubei Province	Semi-structured interview guidelines	<ol style="list-style-type: none"> 1. Unbeatable challenges 2. Qualities of a disaster nurses 3. Mental health and trauma 4. Disaster planning and coordination 5. Urgently needed disaster education 	<ol style="list-style-type: none"> 1. Psychological skills for victims, self and their own colleagues 2. Knowledge on local ethics 3. Ability to work with other cultures 4. Nurses' resilience 5. Clinical experience 	<ol style="list-style-type: none"> 6. Do not have adequate competency 7. Poor disaster coordination 8. Physical and mental stress
Johal <i>et al.</i> (2015)	New Zealand	To explore nurses coping with the dual challenge of personal and professional demands during the disaster recovery process	Grounded theory approach	11 nurses from New Zealand	Qualitative semi-structured interviews	<p>Nurses had faced challenges:</p> <ol style="list-style-type: none"> 1. Practical impact was caused by damage environment and facilities 2. Emotional impact led to nurses' fatigue or empathy exhaustion 3. Professional impact nurses' professional life issues and practice 	<ol style="list-style-type: none"> 1. Concerns on the situation and caring value 2. Ability to work in limited resources and damaged environment 	<ol style="list-style-type: none"> 1. Emotional impact during a disaster 2. Lack of support from nurse' workplace institution 3. High workloads 4. High level of stress after the earthquake
Sugino <i>et al.</i> (2014)	Indonesia	To identify the nurses' and midwives' perceptions and understanding of their roles and needs of disaster training	Qualitative research used focus group discussion	11 nurses and 11 midwives of public health centers in Bantul	Semi-structured questionnaire	<p>Four general themes</p> <ol style="list-style-type: none"> 1. Heavy roles and disturbing working conditions 2. Difficulties and limitations in post-disaster training 3. Morale in post-disaster 4. Needs of disaster nursing professional development 	<ol style="list-style-type: none"> 1. Nurses' ability to care 2. Psychological skills 3. Adaptability to manage an increased number of patients 4. Religion, culture, and family ties 	<ol style="list-style-type: none"> 1. Lack of health equipment and staff 2. Fear of self and family safety 3. Lack of community disaster training

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Author, year	Country	Objectives	Design	Sample	Instrument	Outcome	Factors that support nurses' ability	Potential barriers
Hammad <i>et al.</i> (2017)	-	To collect experience during disasters to reflect on the meaning	Hermeneutic Phenomenological approach (Van Maneen)	13 nurses from Australia, Indonesia, Israel, Kapan, Kenya, Palestine, Saudi Arabia, and the US	Hermeneutic interviews guideline	Phases of a disaster: 1. Notification: Increasing nurses' willingness to participate in a disaster 2. Waiting: nurses nervous, scared, alert, and some preparation 3. Patient arrival: uncertainty related to which patients to treat for traumatic injuries 4. Caring for patients: caring in increasing volume and severity of patients in a relatively short time frame 5. Reflection the nurses begin to do their routine and reflect on their abilities	1. Nurses' skill in daily emergency care 2. Nurses' psychological adjustment 3. Nurses' willingness to respond due to professional commitment 4. Prior disaster experiences or disaster training 5. Support from workplace institution for training and emotional impact	1. Lack of awareness of the realities of a disaster response 2. Ignorance or misunderstanding relating to their involvement 3. Feel less prepared because disasters are different from the everyday experience of working in the ED
Raveis <i>et al.</i> (2017)	United States of America	To explore nurses' experiences after impacted by the disasters and how they can best be supported for their nursing services	A sequential mixed-methods study consisting of in-depth qualitative interviews followed by quantitative research	Qualitative interviews: 16 nurses Quantitative surveys: 528 nurses of New York University Langone Health	In-depth interviews and internet survey of the hospital nursing staff	Qualitative interviews indicated themes: 1. Peri-event phase. The nurses tried to make arrangements for their personal responsibilities 2. The event phase, the nurses' triage, treat and evacuated patients and provided psychological care as well 3. The recovery phase, nurses caring for patients based on nurses' professional commitment	1. Self and family preparedness 2. Professional commitment 3. Psychological skill for the patients and their self to cope with stress 4. Social support program to reduce stress	1. Lack of ability to balance professional and personal responsibilities 2. Stress caused by trauma and personal loss 3. Infrastructures and communication breakdown

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Author, year	Country	Objectives	Design	Sample	Instrument	Outcome	Factors that support nurses' ability	Potential barriers
Al Thobaity <i>et al.</i> (2016)		To identify the most common domains of the core competencies of disaster nursing	A scoping review using the Joanna Briggs Institute methodology	12 articles	Keywords and inclusion - exclusion criteria	The most common domain: 1. communication, 2. planning, 3. decontamination and safety, 4. ICS, and 5. ethics. Each competency is a key component of disaster preparedness and response	1. Knowledge and skills on disaster management and decontamination 2. Have access to protective personal equipment or vaccinations	1. Lack of training in disaster management 2. Limited research on detailed nurses' disaster competencies
Veenema <i>et al.</i> (2019)	United States of America	To conduct a systematic review of the literature to assess nurse readiness for radiation emergencies and nuclear events	A systematic review	62 articles	-	Themes identified: a) preparedness/capacity, b) education/training, c) role, d) willingness to respond, e) Health hazards/perception of risk, and f) clinical practice	1. Well-planned preparation 2. Personal and family preparedness to improve willingness to respond	Health hazard: nurses' fear of radiation and failure to report symptoms of post-traumatic stress disorder
Said <i>et al.</i> (2020)	-	To evaluate nursing preparedness to disasters in terms of knowledge, skills, competencies, and psychological preparedness	A systematic review	12 studies, with a total of 1443 nurses involved	-	1. Nurses perceived their disaster preparedness is insufficient in knowledge 2. Skills ranked as most important to their skill; cardiopulmonary resuscitation (CPR), bandaging, fixation, and manual handling, iv insertion, observation and monitoring, and mass casualty triage. 3. Attitude and willingness as important factors to provide health care 4. The need to enhance psychological preparedness	1. Ability in clinical skills 2. Critical thinking ability 3. Support for nurses to overcome stress	1. Lack of disaster management knowledge and skills 2. Lack of skills in psychological counseling and support 3. Need for training that increases self-confidence and self-efficacy

methods, and three articles using a literature review. The respondents were from several countries, including China, Taiwan, Australia, Indonesia, Israel, Iran, Kapan, Kenya, Palestine, Saudi Arabia, and the US. The quantitative and mixed-methods studies had 2,171 respondents, while the qualitative studies had 73 participants. From these articles, three articles used a literature review, including a total of 84 articles. In the quantitative and qualitative articles, all samples met the criteria: 1) nurses involved in a disaster emergency response or disaster response from an earthquake, storm and flood, forest fire, or mass riots, and 2) nurses working in a hospital or in community services. There were only two articles that involved other healthcare professionals (doctor and midwife) as their respondents. Table 1 presents the characteristics of the included articles.

Most of the articles (n=5) identify nurses' competencies in both knowledge and skills during a disaster response. Three articles that identify nurses' readiness and willingness to respond a disaster, four articles that discuss the effects of disasters on nurses, and one article focusing on the factors predicting nurses' attitudes during a disaster response. The instrument used in the quantitative research articles was generally a questionnaire that had been modified by the researcher, while the qualitative studies involved in-depth interviews.

All 13 articles analyze the factors affecting nurses' abilities, the supporting factors, and the barriers involved when responding to disaster situations (Table 2).

All articles identified the importance of knowledge and skills for nurses to provide optimal services when disasters occur. Hence, knowledge level is a strong predictor of nurses' ability to work effectively in disaster responses.¹⁰ The required knowledge and skills for disaster-trauma treatment consist of post-disaster trauma treatment, post-disaster psychological treatment, and disaster management and leadership (Table 3). Nurses' knowledge should be increased by implementing continuing training in hospitals because their experience in clinical aspects would improve the effectiveness of their response to disasters. It is identified that participating in disaster's training and drilling is a very strong positive correlation that would increase nurses' ability.¹¹

Nurses' self-preparedness

Nurses' self-preparedness includes the ability to prepare themselves and their families for self-rescue and managing limitations in disasters. Nurses' self-preparedness is crucial because it strengthens nurses' self-confidence and commitment. These aspects induce a willingness to respond in a disaster.¹²⁻¹⁵ Another factor was nurses' personal traits.¹⁶⁻¹⁸ Certain traits, such as adaptability and flexibility, are important because these traits increase nurses' adaptability in chaotic situations and when experiencing a high level of stress.

Nurses' experience

Nurses' experience in clinical aspects is considered a factor that can improve the effectiveness of the response to disasters.¹⁶ One article mentioned that nursing experience of ≥ 10 years, emergency/intensive nursing care experience, ability to function in the clinical management domain, and disaster response experience improve nurses' ability to respond to a disaster.¹⁹

Barriers in providing nursing care

Barriers make it difficult to provide effective nursing care. It was reported that concerns about their own and their family's safety, stress and anxiety, and limited equipment and human resources are considered factors that decrease the effectiveness of the healthcare system in responding to a disaster.^{14,18,20}

Supports to maintain the nurses' ability

Support from nurses' working institutions and governments were identified as important external influencing factors. The implementation of a disaster policy, the provision of tools, resources, and funds, and inter-collaborative practice training help nurses provide good health services during a disaster.^{10,21} Other support needed includes psychological health services for nurses after working in a disaster situation to help them recover from trauma.¹⁵⁻²²

Table 3. List of knowledge and skills of earthquake emergency response.

Managing traumatic patients	Psychological treatment	Management and leadership	Supporting knowledge
<ul style="list-style-type: none"> - Physical assessment, disaster triage, life assistance and trauma treatment, bleeding control and fluid administration, trauma stabilization, victim evacuation, vulnerable group care, and infection prevention - Decontamination and safety - Communication - Observation and monitoring, documentation 	<ul style="list-style-type: none"> - Psychological First Aid (PFA) - Crisis intervention for patient's psychological problems - Psychological treatment for nurses or health team - Debriefing and counseling 	<ul style="list-style-type: none"> - Crisis management and disaster planning - Incident command system - Coordinated teamwork - Opening field hospitals 	<ul style="list-style-type: none"> - Ethical aspects - Local culture of the affected area - Critical thinking and adaptability

Discussion

During a disaster, priority actions are emergency assessments, saving lives, and caring victims, which is comprised of disaster triage, emergency first aid, evacuation, transportation for victims, and treatment of mental and psychosocial disorders for those affected, also. Other actions needed is coordination to manage a healthcare post as the center of prehospital health crisis management.^{23,24} Communication skills and the ability to make rapid decisions concerning the disaster situation is important to act as a leader in a crisis.²⁵ Training is a significant aspect in preparing nurses. Duration of work does not influence nurses' preparedness levels; however, if it is combined with disaster training and drilling, it could significantly correlate with disaster preparedness. Therefore, regular training and drilling with a method similar to disaster conditions should be practiced more frequently.^{13,26}

Self-preparedness is critical for nurses. Previous studies show that a better preparedness score can be obtained by nurses who have previous training and disaster response experience, have good self-confidence, and are supported by their working institutions.²⁷ It was also mentioned that good self and family preparedness, such as planning to manage children, families, and pets when disasters occur, increases the willingness to work in disaster.^{3,12,28,29} Another study showed that more than half of respondents reported not having personal planning for dealing with disasters, and this group showed a low willingness to work during disasters.³⁰

Factors affecting health services in earthquake areas include support from workplace institutions, opportunities for training, provision of logistics, infrastructure for disasters, and financial support as external factors, while nurses' competencies and self-preparedness are internal factors that affect nurses' ability to manage a disaster.³¹ The identification of these two factors helped to develop strategies to support nurses during a disaster. There is special emphasis on future training to enhance the employees' sense of efficacy and professional commitment and to address the increasing concern regarding family preparation and well-being following an earthquake. Hence, organizations should also provide disaster standards of care and psychology support programs that influence nurses' willingness to respond.

Conclusions

Although a careful approach has been used, the search only included electronic scientific databases accessible to the authors' institution, and only articles published in English were included. The populations, contexts, and concepts of the literature are features of their methodologies rather than their quality. The review may not be fully comprehensive as it only covers studies between 2010 and 2020 and does not cover policy papers or guidelines.

The competencies of disaster response include not only the ability to care for patients during a disaster, which can induce physical and psychological trauma, but also to coordinate and manage health posts during a disaster. Concerns regarding nurses' personal safety and the safety of their families are also factors that affect nurses' readiness. It is emphasized that future education and training must include methods that can simulate disaster conditions and increase family self-rescue. Support from nurses' workplaces in their clinical and disaster continuing education as well as a psychological support program would enhance the effectiveness of nursing care.

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