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.3,4 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.

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-

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**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 | Bantul Indonesia | Australia, Indonesia, Israel, Japan, Kenya, Palestine, Saudi Arabia, and US |   |
| Author, year | Country      | Objectives                                                                 | Design                                      | Sample | Instrument                                                                 | Outcome                                                                                           | Factors that support nurses’ ability                                                                 | Potential barriers                                                                                           |
|-------------|--------------|----------------------------------------------------------------------------|---------------------------------------------|--------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Al Thobaity et al. (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 et al. (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 et al. (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 et al. (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, t-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 |
Table 2. Factors supporting nurses’ ability in disaster responses and potential barriers.

| Country          | Sample | Design          | Outcome                                                                 | Factors that support nurses’ ability | Potential barriers                                      |
|------------------|--------|-----------------|-------------------------------------------------------------------------|--------------------------------------|---------------------------------------------------------|
| United States    | 12 licensed nurses from New York City community clinics | Qualitative semi-structured interviews | Nurses had faced challenges: Practical impact was caused by damage to environment and facilities | Factor 1: Adequate disaster training for nurses’ workplace | Lack of community disaster training for nurses and nurses’ workplace | 1. Emotional impact during a disaster | 2. Lack of support from nurses’ workplace institution | 3. High level of stress after the earthquake | 4. Need of community disaster training |
| China            | 12 registered nurses from Hubei Province | Semi-structured interview guidelines | Nurses’ ability to care for patients during a disaster | Factor 2: Nurses’ ability to care for patients | Lack of community disaster training for nurses and nurses’ workplace | 1. Nurse’s ability to care for patients | 2. Psychological skills for nurses’ ability to care for patients | 3. Clinical resilience | 4. Need of community disaster training |
| New Zealand      | 11 nurses from New Zealand | Grounded theory approach | Nurses’ ability to manage working conditions | Factor 3: Nurses’ ability to manage working conditions | Lack of community disaster training for nurses and nurses’ workplace | 1. Nurse’s ability to manage working conditions | 2. Emotional impact led to nurses’ fatigue and empathy exhaustion | 3. Professional impact led to nurses’ professional life issues | 4. Need of community disaster training |
| Indonesia        | 11 nurses and midwives of public health centers in Banul | Qualitative research used focus group discussion | Nurses’ ability to make decisions during disaster recovery process | Factor 4: Nurses’ ability to make decisions during disaster recovery process | Lack of community disaster training for nurses and nurses’ workplace | 1. Nurse’s ability to make decisions during disaster recovery process | 2. Knowledge on local emergency response and disaster planning and coordination | 3. Clinical resilience and flexibility | 4. Need of community disaster training |

**Factors that support nurses’ ability**
1. Personal experiences: factors of organizational, psychological, social, and environmental contexts.
2. Case studies: factors of disaster preparedness, response, and recovery.
3. Personal beliefs and initial ability.
4. Community resilience and flexibility.

**Potential barriers**
1. Lack of communication and coordination during disaster response.
2. Poor disaster response coordination.
3. Nurses’ growth in personal nurse experience.
4. Psychological skills for nurses’ ability to work with victims and their families.
5. Clinical resilience.
6. Do not have adequate competency.
7. Poor disaster response coordination.
8. Physical and mental stress.
Table 2. Factors supporting nurses’ ability in disaster responses and potential barriers.

| Factors that support nurses’ ability | Potential barriers |
|-------------------------------------|--------------------|
| 1. Nurses’ skill in disaster response | 1. Lack of awareness of the realities of a disaster response |
| 2. Nurses’ willingness to respond | 2. Ignorance or misunderstanding of the nurses’ involvement |
| 3. Nurses’ willingness to respond | 3. Feel less prepared due to the everyday experience of working in the ED |
| 4. Prior disaster experience or disaster training | 4. Prior disaster experience or disaster training |
| 5. Support from the workplace institution | 5. Support from the workplace institution |

**Outcome**

1. Phases of a disaster:
   - Notification: Increasing nurses’ willingness to participate in a disaster preparation
   - Waiting: Scared, alert, and some nurses feel unsure how to treat patients
   - Caring: Informed nurses experience the need to care for patients with injuries
   - Reflection: Nurses begin to do their routine

**Sample**

13 nurses from Australia, Indonesia, Israel, Kenya, Palestine, Saudi Arabia, and the US

**Design**

Phenomenological approach (Van Manen)

**Objectives**

To collect experience during disasters to reflect on the meaning

**Country**

United States of America

**Author, Year**

Ravesis et al. (2017)
| Author, year | Country | Objectives | Design | Sample | Instrument | Outcome | Factors that support nurses’ ability | Potential barriers |
|-------------|---------|------------|--------|--------|------------|---------|-------------------------------------|-------------------|
| AI Thobaity et al. (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 et al. (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 et al. (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, 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. 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.

**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. Another factor was nurses’ personal traits. 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. 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.

**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.

**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. Other support needed includes psychological health services for nurses after working in a disaster situation to help them recover from trauma.

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

| Managing traumatic patients                                      | Psychological treatment                  | Management and leadership                     | Supporting knowledge                           |
|-----------------------------------------------------------------|-----------------------------------------|-----------------------------------------------|-----------------------------------------------|
| Physical assessment, disaster triage, life assistance and trauma treatment, bleeding control and fluid administration, trauma stabilization, victim evacuation, vulnerable group care, and infection prevention | Psychological First Aid (PFA)           | Crisis management and disaster planning        | Ethical aspects                               |
| Decontamination and safety                                      | Crisis intervention for patient’s psychological problems | Incident command system                       | Local culture of the affected area            |
| Communication                                                   | Psychological treatment for nurses or health team | Coordinated teamwork                          | Critical thinking and adaptability            |
| Observation and monitoring, documentation                       | Debriefing and counseling                | Opening field hospitals                       |                                               |
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. Communication skills and the ability to make rapid decisions concerning the disaster situation is important to act as a leader in a crisis. 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.

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. 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. 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.

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. 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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