

The knowledge, skill competencies, and psychological preparedness of nurses for disasters: A systematic review

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ABSTRACT

Background: Disasters and the magnitude of destruction are increasing worldwide. Nurses constitute the largest number of healthcare providers and have major roles in disaster response and care. They need to have sufficient knowledge, skill competencies, and preparedness in responding to disasters. This review aimed to evaluate nursing preparedness to disasters in terms of knowledge, skill competencies, and psychological preparedness to disasters.

Methods: A systematic review was conducted from recent research articles published between 2001 and 2018, which included searches from five databases: PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Scopus, Medline, and ScienceDirect. Quality of the selected studies was assessed using Mixed Methods Appraisal Tool (MMAT), and the review results were generated through an iterative narrative process of synthesis to identify common themes.

Results: Twelve studies, with a total of 1443 nurses involved, met the inclusion criteria. The articles revealed the need for further development of disaster preparedness of nurses in the aspects of knowledge and skill competencies; and in particular with more focus on the education of nurses to achieve better psychological preparedness.

Conclusion: The results of this review showed that it is important to enhance the psychological preparedness of nurses, in addition to knowledge and skill competencies, so that they can provide the best care possible to affected individuals as well as for themselves.

1. Introduction

Disasters occur quickly and usually without warning. They may be natural or manmade disasters like earthquakes, hurricanes, thunderstorms, regional conflicts or wars, and even an outbreak of infectious disease. A disaster is defined as a serious threat or great destruction to the community, which causes huge losses and limits the community's functions and capabilities in many aspects [1]. The limitations are demands on human and environmental resources such as services, materials, and information that exceed the ability of that community to cope with the situation through these resources [1–2].

A concept analysis concluded that there is an absence of theoretical or practical definitions of disaster preparedness based on specific attributes [3]. From a qualitative study of the relief experiences of Chinese nurses following two earthquakes, disaster preparedness could be defined as “activities and measures taken in advance to ensure an effective response to the impact of hazards, including the issuance of

timely and effective early warnings and the temporary evacuation of people and property from threatened locations” (p. 17) [1]. However, this is a definition that focuses on the instrumental aspect of disaster preparedness. In order to be prepared, nurses in general must possess enough knowledge and skills to minimize the impact and negative consequences of disaster on a community, such as traumas, injuries, the spread of diseases, stress, and psychological distress [3,4]. In particular, nurses specialized in emergency, trauma, and disaster care must be professionally and individually prepared for disasters [4] by making themselves available and being willing to work and care for victims after disasters [5]. Recently, disaster preparedness and response have come to be considered part of nursing practice [6].

Researchers in Australia, Europe, and the United States have reviewed the literature about the disaster preparedness of nurses in terms of their roles in and awareness of disaster preparation and response [7–9], knowledge and skill competencies [10], experience [8], and effective training [9]. However, with respect to disaster preparation, the

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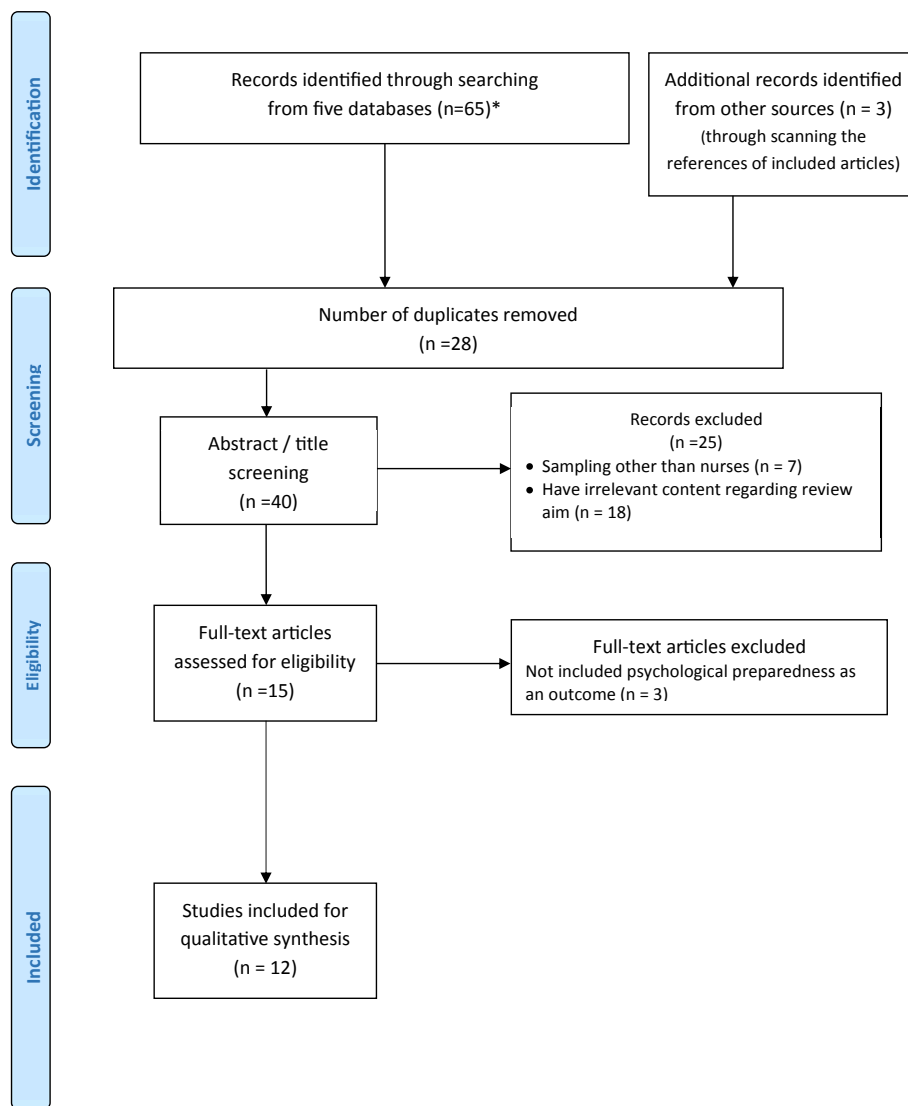


Fig. 1. PRISMA flow of the search process. * The first search (S1) included [nurs* AND knowledge AND (skills OR competencies)] = 24,575 hits in total; the second search (S2) included [(S1) AND [disaster AND psych*]] = 169 hits in total; and the final search (S3) included [(S2) AND prepare*] = 65 hits in total.

psychological preparedness of nurses to deal with disasters has not been critically considered in systematic reviews. The aims of this review were to evaluate how prepared nurses are to deal with disasters in terms of their knowledge, skill competencies, and essential psychological attributes, to determine the possible causes of low preparedness, and to generate implications for future studies. We considered skill competencies as the ability to perform skills acquired through education, training, and experience. The following question was asked: “What knowledge and skill competencies do nurses have for dealing with disasters, and what is the state of their psychological preparedness?”

2. Methods

2.1. Design and registration

The current systematic review was framed by SPIDER [11], with nurses as the Sample (S); disaster preparedness as the Phenomenon of Interest (PI); Design (D) as “unlimited” and including quantitative, qualitative, or mixed-methods studies; Evaluation (E) as covering assessments of knowledge, skill competencies, and psychological outlook; and Research Type (R) as referring to all types of studies with the exception of case studies and review articles. The protocol was performed

based on the guidelines of the Preferred Reporting Items for Systematic Review and Meta-Analyses Protocol (PRISMA-P) [12]. In addition, the review was registered in PROSPERO (CRD42018084875).

2.2. Data sources and search strategy

Five electronic databases were searched for relevant articles published since the first of January 2001 until 16th August 2018. These databases were: Pubmed, the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Scopus, MedLine via EBSCO, and ScienceDirect. The following keywords and medical subject headings were used as the search strategy: [nurs* AND knowledge AND (skills OR competencies)] AND [disaster AND psycho*] AND prepar*.

2.3. Eligibility criteria

The inclusion criteria were full-text peer-reviewed studies in the English language, including studies of various designs, such as quantitative, qualitative, or mixed-methods studies; and excluding case studies, interventional studies, psychometric validation studies, and review articles.

2.4. Search outcomes

Articles were considered for inclusion in a full review by means of the three stages of identification, screening, and eligibility checking according to the PRISMA-P guidelines [12].

2.5. Quality appraisal

The studies selected for inclusion in this review were assessed for quality using the Mixed Methods Appraisal Tool (MMAT) [13]. With the MMAT, two basic screening questions must first be posed to determine whether or not the quality appraisal for a particular study will continue to be conducted. The first question is on whether there are clear research questions or objectives in the related qualitative, quantitative, or mixed-methods study. The second is about whether the data collection method addresses the research questions or objectives. When positive answers are given to these initial screening questions, qualitative (QUAL) or quantitative (QUAN) studies can then be rated as follows: ‘**’ (25%) for one criterion met, ‘***’ (50%) for two, ‘****’ (75%) for three, or ‘*****’ (100%) for a study deemed to be of the highest quality. For this review, studies with a rating of ** or above were considered to be of acceptable quality and were included for further analysis.

2.6. Data extraction and synthesis

Data extraction was conducted by the first author based on author/year, country, aims/objectives, research design, sample source/type/size, the instrument used, major findings, and the implications of the relevant studies. The data were then cross-checked with MMAT ratings by the second reviewer for a critical review. As there was a mix of qualitative and quantitative studies with heterogeneity for this review, the relevant data were analyzed using an iterative narrative process of synthesis [14] to generate essential and common themes from all of the studies that would capture common and representative findings about disasters, and the psychological preparedness of nurses. The narrative synthesis consisted of four stages, (1) identifying a frame of how findings of related studies work, why and for whom; (2) synthesizing themes through an iterative process of contrasting and examining findings of the included studies; (3) exploring relationships of the themes; and (4) assessing robustness of the synthesis [14,15].

3. Results

Through the flow of PRISMA-P (Fig. 1), 12 articles were finally included to undergo a quality appraisal and data synthesis to generate results (Table 1).

3.1. General characteristics

The studies were conducted in seven countries or geographical regions, including mainland China (6), the United States (1), the Philippines (1), Saudi Arabia (1), Sierra Leone (1), Japan (1), and Hong Kong (1). There were a total of five qualitative [16–20] and seven quantitative studies [21–27]. Six of the seven quantitative studies were cross-sectional surveys, while in the remaining study data had been collected from three focus group interviews that were then subjected to a quantitative analysis [24]. Overall, the disaster preparedness of the nurses in these studies was evaluated under one of two conditions, either 1) in anticipation of disaster [21,23–24]; or 2) following a disaster relief effort [16–19,22,25–27].

The sample size varied from 10 to 900 nurses in the respective studies, with a total of 1443 nurses involved in the 12 studies.

3.2. Instruments

Among the seven quantitative studies, one measured the disaster

preparedness of nurses using the Disaster Preparedness Evaluation Tool [23] developed by Tichy et al. [28]; while another used the Disaster Preparedness Questionnaire [21] to measure their perceived readiness to manage disaster situations. Furthermore, the Questionnaire on the Nurses’ Disaster Nursing Skills at Earthquake Sites, which contained nine open-ended qualitative questions [26], was used to evaluate the nurses’ knowledge, attitudes, experiences, and competence in carrying out disaster care. Other studies used questionnaires developed from the literature by relevant researchers to evaluate the knowledge, skills, and attitudes of nurses on disaster preparedness [22,25,27].

3.3. Findings of the narrative analysis

From synthesizing the data from the 12 studies through the narrative analysis, four themes related to disaster preparedness were identified.

3.3.1. Insufficient knowledge despite education or training

The review of the studies highlighted the importance of the work and responses of nurses during different types of disasters, e.g., typhoons, earthquakes, and hurricanes. Some studies explored the preparedness of nurses in terms of relevant disaster knowledge and experiences after responding to disasters [16–19,25]. Nurses perceived their disaster preparedness as insufficient in that they felt that they were lacking in knowledge about

1. disasters in general [22–23,25];
2. the proper use of protective equipment and trauma care [16]
3. biological information and the management of bioterrorism [23];
4. infectious diseases and living conditions [25];
5. the disaster policies, plans, and role of hospitals during disasters [19,21–22];
6. and their own roles during disasters [24].

Regarding the lack of knowledge of nurses in disaster preparedness, Shipman and colleagues explored the experiences of nurses who had responded to a disaster. The results showed that nurses suffered from a lack of prior knowledge about volunteering and what to expect during a disaster response [19]. In the same study, nurses pointed to the importance of knowing the disaster and emergency plans in their health care agency and community. The results suggested that an improvement in disaster preparedness in terms of knowledge could be achieved through education in addition to enhancing the undergraduate nursing curriculum. It is important to enhance and increase the resources available to support nurses in preparing for and facing disasters [27]; and to offer standardized disaster education for nurses either at the undergraduate level or through continuous education on knowledge about disasters, response plans, disaster coordination, working in a multicultural environment, the various roles that nurses play in disasters, and management skills [18,23]. However, even with some previous education and experience, nurses might still demonstrate a low level of knowledge and awareness of disasters [22]. Nurse educators and administrators are responsible for identifying how to more effectively prepare nurses, hospitals, and healthcare facilities for future disasters; and to bridge the gap between knowledge and skills to ensure that nurses have the required competence to deal with disasters [19,21]. Although effective education and training are believed to be essential in preparing to deliver disaster care and in sustaining a confident nursing workforce [19–21], the existing evidence has not indicated good success from education and training.

Öztekin and colleagues explored the effects of different factors on nurses’ knowledge of disaster preparedness. The results indicated that both age ($F = 10.278, p = .000$) and years of experience ($F = 2.340, p = .000$) had a positive influence on knowledge related to disaster preparedness [23]. On the other hand, nurses emphasized the need for facility preparedness, especially with regard to hospitals (including, but

Table 1
Table of Evidence.

No	Author / Year (country)	Aims / Objectives	Research Design	Sample source/type/Size	Instrument(s) Used	Major Findings	Implications	Identified Themes	MMAT Rating
1.	Alzahrani, F. & Yiannis, K. (2017) (Saudi Arabia)	<ol style="list-style-type: none"> To assess hospital emergency nurses' self-reported knowledge, role awareness and skills in disaster response. To assess the current roles and skills in disaster preparedness during the Hajj MG. To identify the type of training programmes and education deemed appropriate and relevant. 	A cross-sectional online survey	106 Nurses working in Emergency departments in a convenience sample	Self-developed questionnaire including structured and open-ended questions	<ul style="list-style-type: none"> Nurses have low knowledge in disaster preparedness, and deficit in awareness to effectively respond to disaster. Nurses perceived their dominant role as providing triage. 	<ul style="list-style-type: none"> Another research for more understanding of the nurses' abilities needed. Nurses to gain more knowledge, skills and psychological support. 	<ul style="list-style-type: none"> Insufficient level of knowledge despite education or training Lack of skill competencies The need to enhance psychological preparedness 	***
2.	Labrague, L.J., Yboa, B.C., McEnroe-Petite, D.M., Lobrino, L.R., & Brennan, M.B. (2016) (Philippine)	<ol style="list-style-type: none"> To determine the perceived level of disaster preparedness in Philippine nurses. To clarify their perceived roles during disasters. 	A descriptive, cross-sectional design	170 Nurses working in the Central Philippines in a convenience sample	The Disaster Preparedness Questionnaire	<ul style="list-style-type: none"> Nurses were not sufficiently prepared for disasters, and not aware of disaster management protocols in the workplace. 	<ul style="list-style-type: none"> Assuring that nurses and future nurses are equipped with the necessary knowledge and skills to be prepared. Nurses should be engaged in disaster planning and drills. 	<ul style="list-style-type: none"> Insufficient level of knowledge despite education or training Lack of skill competencies The need to enhance psychological preparedness 	***
3.	Li, Y.H. et al. (2017) (China)	To investigate the disaster experiences of nurses called to assist survivors one month after the 2013 Ya an earthquake.	Qualitative descriptive design	16 Nurses who were deployed after the Ya'an earthquake in a purposive sampling	Semi-structured interviews and observation notes	<ul style="list-style-type: none"> Half of the participants had received disaster-nursing training before deployment. Nurses expressed a lack of physical and psychological preparedness Lack of disaster response management in an organizational level. 	<ul style="list-style-type: none"> Creating policy that focused on capacity-building training in a systematic manner. Nurses should learn to develop their personal and family care disaster plans. 	<ul style="list-style-type: none"> Lack of skill competencies The need to enhance psychological preparedness 	****
4.	Li, Y., Turale, S., Stone, T.E., Petrini, M. (2015) (China)	To identify a substantive theory to enhance nursing's knowledge about how to prepare nurses to work more effectively in disasters.	Qualitative study using grounded theory (GT)	15 Registered nurses from Jiangxi Province, in a convenience and theoretical sampling	In-depth interviews and field notes	<ul style="list-style-type: none"> Nurses were unprepared educationally and psychologically for their disaster work. 	<ul style="list-style-type: none"> Addressing disaster nursing education and disaster preparedness. Nurses' mental health knowledge and skills should be improved. 	<ul style="list-style-type: none"> Insufficient level of knowledge despite education or training Lack of skill competencies The need to enhance psychological preparedness 	***
5.	Loke, A.Y. & Fung, O.W.M. (2014) (Hong Kong)	To explore Hong Kong nurses' perceptions of competencies required for disaster nursing.	Quantitative study (as the transcribed text data of this study were mechanically analyzed by tabulation and categorization)	45 Nurses working in the medical/surgical, critical care and community health settings using purposive sample for focus group and convenience sample for the written inquiry	3 focus group interviews and written inquiry	<ul style="list-style-type: none"> Nurses expressed the need of disaster response competencies. 	<ul style="list-style-type: none"> Hospital administrators need to develop continuing education to prepare their nurses with the competencies for disaster care. Building disaster-nursing competencies for Hong Kong nurses. 	<ul style="list-style-type: none"> Insufficient level of knowledge despite education or training Lack of skill competencies The need to enhance psychological preparedness 	***

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Table 1 (continued)

No	Author / Year (country)	Aims / Objectives	Research Design	Sample source/type/Size	Instrument(s) Used	Major Findings	Implications	Identified Themes	MMAT Rating
6.	Öztekın, S.D., Larson, E.E, Akahoshi, M., & Öztekın, I. (2016) (Japan)	1. To explore nurses' perceptions regarding their knowledge, skills, and preparedness for disasters. 2. How nurses acquired their knowledge about disaster preparation using a quantitative approach.	A descriptive cross-sectional survey	902 nurses working in six hospitals in one prefecture in Japan in a random selection from a convenient sample	Disaster Preparedness Evaluation Tool (DPET)	- Most nurses wished to have more education on their role as a nurse in a disaster situation. - Nurses were well equipped with knowledge, skills were low in in bioterrorism/biological attacks.	- Emphasis more on nurses' abilities in disaster preparedness, response, and evaluation.	psychological preparedness - Insufficient level of knowledge despite education or training - Lack of skill competencies - The need to enhance psychological preparedness - Insufficient level of knowledge despite education or training - Lack of skill competencies - The need to enhance psychological preparedness	***
7.	Shipman, S. J., Stanton, M. P., Tomlinson, S., Olivet, L., Graves, A., McKnight, D., & Speck, P. M. (2016) (USA)	1. to examine the reflections of the lived experiences of nurses responding for the first time to a disaster.2. to identify the essential thematic knowledge and skills necessary to provide care to disaster survivors in communities.	A narrative inquiry, with a phenomenological analysis	10 nurses responded to disasters in a snowball sampling	Open-ended and participant-driven interview	- Enhancing emergency preparedness content in the curriculum. - Lack of prior knowledge about volunteering during a disaster response.	- Bridging the gap between actual disaster response experiences and realistic emergency preparedness content in undergraduate nursing curricula.	psychological preparedness - Insufficient level of knowledge despite education or training - Lack of skill competencies - The need to enhance psychological preparedness	****
8.	Von Strauss, E., Paillard-Borg, S., Holmgren, J., & Saaristo, P. (2017) (Sierra Leone)	To investigate nursing staff during and after having worked for the Red Cross at an Ebola Treatment Center in Kenema, West Africa.	A descriptive, cross-sectional study	44 nurses in a convenient sample	Self-administered questionnaire	- Participants were generally satisfied with their deployment. - They revealed the importance of mental health support combined with psychosocial support after deployment.	- Mental health support combined with psychosocial support should be considered for nurses. - Workload reduction, as exhaustion is a risk for safety.	psychological preparedness - Insufficient level of knowledge despite education or training - Lack of skill competencies - Attitude and willingness to provide health care - The need to enhance psychological preparedness	***
9.	Wenji, Z., Turale, S., Stone, T.E., & Petrini, M.A. (2015) (China)	To describe the experiences of Chinese nurses who worked in disaster relief after the Wenchuan and Yushu earthquakes, and their views about future disaster nursing education/training programs.	Qualitative study using narrative inquiry and in-depth interviews	12 Registered nurses from four hospitals in Wuhan, Hubei Province in a convenience sample	In-depth interviews	- Resilience, problem solving, critical thinking, organizational ability, adaptability, and strong professional knowledge and skills were the most qualities needed.	- Nursing involvement in effective plans, policies, research and education about disaster responses. - Improving nurses' knowledge, skills, and mental health capacities.	psychological preparedness - Insufficient level of knowledge despite education or training - Lack of skill competencies - The need to enhance psychological preparedness	****
10	Yang, Y., Xiao, L., Cheng, H., Zhu, J., & Arbon, P. (2010) (China)	To provide an understanding of how Chinese nurses acted in response to the 2008 Wenchuan earthquake	Qualitative study using hermeneutics approach	A purposive sample of ten RNs	Semi-structured interviews	Three themes were identified - feeling under-prepared; - perceived challenges and coping strategies; and - the rediscovery of the helping and caring role.	- A systematic educational approach to respond to natural and manmade disaster.	psychological preparedness - Lack of skill competencies - Attitude and willingness to provide health care - The need to enhance psychological preparedness	***

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Table 1 (continued)

No	Author / Year (country)	Aims / Objectives	Research Design	Sample source/type/Size	Instrument(s) Used	Major Findings	Implications	Identified Themes	MMAT Rating
11.	Yan, Y. E. et al., (2015) (China)	To explore the skills, knowledge and attitudes required by registered nurses from across China who worked in the aftermath of three large earthquakes.	A descriptive study using a questionnaire survey that collected quantitative and qualitative data	89 RNs who had engaged in Wenchuan, Yushu or Mangliang earthquake disaster relief in a purposive sample	Questionnaire of Nurses' Disaster Nursing Skills at Earthquake Sites (plus nine open-end qualitative questions)	<ul style="list-style-type: none"> - The most important groups of skills required were CPR; hemostasis, bandaging, fixation, and manual handling; and emergency management. - They emphasized the need for psychological care of victims as well as that of fellow health workers. 	<ul style="list-style-type: none"> - More attention for disaster nursing competencies. - Developing disaster education contents and training in China and specific policies needed. - Nurse leaders and other leaders in health, education and government China need to work collaboratively to help ensure the nursing preparedness for disasters. 	<p><i>psychological preparedness</i></p> <ul style="list-style-type: none"> - <i>Insufficient level of knowledge despite education or training</i> - <i>Lack of skill competencies</i> - <i>Attitude and willingness to provide health care</i> - <i>The need to enhance psychological preparedness</i> 	***
12	Yin, H., He, H., Arbon, P., & Zhu, J. (2011) (China)	<ol style="list-style-type: none"> 1. To determine nursing skills most relevant for disaster nurses. 2. Set out recommendations to enhance training of nurses responding to disasters. 3. To improve the capacity of nurses to prepare and respond to severe natural disasters. 	Cross-sectional design	24 nurses in a convenience sample	Self-designed questionnaire	<ul style="list-style-type: none"> - Nurses identified the most essential, frequently used, proficiently, and most important for training skills in disasters. 	<ul style="list-style-type: none"> - The core of disaster management training should include some skills such as mass casualty transportation and emergency management. - The training content should be in accordance with the characteristics of disasters and the trainees' background knowledge and clinical experience. 	<ul style="list-style-type: none"> - <i>Lack of skill competencies</i> - <i>Attitude and willingness to provide health care</i> - <i>The need to enhance psychological preparedness</i> 	***

not limited to, support and leadership coordination plans); continuous team preparedness, including education and practical exercises [18,25]; and knowledge about orthopedics and first aid [21–26]. Nurses also demanded short courses on disaster and emergency management because they perceived that they had insufficient knowledge about disaster preparedness [22]. In summary, the studies reflected a concern about inadequate disaster preparedness related to insufficient knowledge, despite the strong emphasis on more training and education in this regard.

3.3.2. Lack of skill competencies

A study on different factors of core competencies in disaster preparedness found that the skills preparedness of the nurses differed significantly by place of employment ($F = 16.026$, $p = .000$), age ($F = 3.827$, $p = .000$), and years of experience ($F = 1.900$, $p = .001$) [23]. Competencies during disasters refer to the qualities and abilities of applied skills (and knowledge) that enable nurses to do their work in such a situation [29]. However, nurses perceived that their competencies were low in familiarity with disasters [19–20], bioterrorism or biological attacks, and leadership in a disaster situation [23]. They also perceived that their competencies were moderate to low in disaster relief [19], disaster or emergency preparedness [16–18,19,22], and role awareness [24].

Nurses believe that a diversity of skills are important for disaster preparedness. On a Likert scale ranging from ‘1’ (not important) to ‘4’ (very important), 89 nurses in a study ranked cardiopulmonary resuscitation (CPR) (mean = 3.96, SD = 0.26); and hemostasis, bandaging, fixation, and manual handling (mean = 3.94, SD = 0.23) as the more important practical skills to acquire [26]. In another study, the skills ranked as most important were intravenous insertion ($M = 3.96$, $SD = 0.24$), observation and monitoring ($M = 3.96$, $SD = 0.20$), and mass casualty triage ($M = 3.92$, $SD = 0.28$); while intraosseous infusion 2.00 (1.06) was ranked as the least important ($M = 2.00$, $SD = 0.20$) [27].

On training and education towards skill competencies, CPR ($M = 2.73$, $SD = 0.54$) and psychological crisis intervention ($M = 2.72$, $SD = 0.50$) were considered as being of high priority on a scale of “1” (not needed) to “3” (urgently needed) [26]. Other skills such as triage and first aid with frequent updates were also believed to enhance the capabilities and awareness of nurses to function during disasters [16]. Their unfulfilled training needs in disaster preparedness included drills (64%), followed by disaster management protocols (56%) [21].

Overall, although many studies have been conducted, the evidence continues to support the need for more and better training of nurses in a variety of skill competencies for disaster preparedness. The design of the related education programs should be advanced to better utilize the associated factors in order to produce stronger outcomes in skill competencies from the training.

3.3.3. Attitude and willingness to provide health care

There have been few studies on the attitudes of nurses towards disasters, and on their willingness and intention to provide health care during disasters. In China, it was found that 33% of the 89 participants considered “nurses being willing to sacrifice their personal feelings or actions, or to dedicate themselves to the work,” as the attitude that they were taught to have in preparing themselves for earthquakes [26]. Furthermore, all of the nurses who were involved in this study reported that their participation in the relief efforts for the Wenchuan earthquake was voluntary, which indicated their willingness to provide care during disasters. Notably, they showed a positive attitude about participating in disaster relief, as they regarded this experience as a chance for professional and personal growth, and as an opportunity to care for and help each other. It gave them a sense of self-value, and an appreciation and awareness of the value of life.

3.3.4. The need to enhance psychological preparedness

Good physical and psychological quality is important for nurses to better respond to disasters [19,26], and they will be better prepared to effectively and efficiently provide the required care and ongoing support to victims. Only 20% of participating nurses considered that their main role during disasters was to provide psychological care [22]. Around 30% of the nurses who participated in another descriptive study considered psychological care to be their second priority after saving lives, with 24% considering there to be a need for skills training in the psychological domain for nurse competence in disaster relief [26]. However, other nurses considered that providing psychological support was their main role in disaster relief [17], as well as their learning need for disaster preparedness in terms of providing post-traumatic psychological [20] and mental health care [18]. Nurses considered capacity in psychological intervention an essential need for disaster preparedness [24]; and in another study 56% of the nurses held that having such a capacity in terms of psychological qualifications enabled them to participate in disaster relief [26]. There was also a moderate level of perceived importance among nurses about “psychological crisis interventions” as a component of their important skills set ($M = 2.61$, $SD = 0.50$), on a scale of “1” (not needed) to “3” (strongly needed) [27]. However, the familiarity of nurses in Japan with psychological interventions and their ability to implement them, were found to be low ($M = 2.04$, $SD = 1.006$) on a scale of “1” (lowest) to “6” (highest) [23]. “Peri-trauma counseling” (13.5%) and “post-traumatic psychological care” (3.5%) were perceived by the nurses to be the areas of least educational need [21].

Nurses did not mention if they had difficulties in fulfilling their role to provide psychological support, but they could experience psychological stress during or after their work in disaster care [19]. Wenji et al. suggested the importance of developing nursing resilience, as resilient nurses will bounce back more uneventfully from stress and dysfunctional emotions to a steady situation that their work of caring can sustain [18]. The discovered category of “turning into a strong nurse” as “trying to let disaster experiences fade away” revealed the intensity of emotions and psychological problems that nurses might face during and after disaster relief [16]. It is not unusual for nurses themselves to experience some psychological problems after disasters. They may have nightmares, develop post-traumatic stress disorder (PTSD), and may avoid talking about their experiences of the relief effort [16]. Nurses are also in need of community and psychological support to overcome their stress. Notably, in a cross-sectional descriptive study, nurses who participated in an Ebola virus outbreak reported having had a need for mental health and psychological support before, during, and after their deployment, in addition to employing coping strategies [25].

In summary, there has been a lack of knowledge and skills in psychological care, as nurses are not well trained to provide counseling and support to victims or their colleagues after disasters; and nurses themselves might also be affected psychologically during the process of delivering disaster care or relief (some nurses experienced PTSD even years later) [18].

4. Discussion

Since disasters can cause a huge amount of damage to properties and the local community, sufficient knowledge and competence in the delivery of both physical and psychological care are essential if nurses are to respond effectively during disasters, on site or in hospitals [26]. However, researchers have identified inadequate levels of preparedness on the part of nurses and other healthcare staff [6,9,26–28]. The findings from this review add to the evidence that there is still room for nurses to further develop their disaster preparedness in the aspects of knowledge, attitudes, and skill competencies, and particularly in their psychological preparedness to deliver disaster care [16,18]. There is a need for nurses to receive more and better education and training in preparing for disasters. The education may be planned and prepared by

staff in various disciplines with specific expertise, e.g., mental health nurses and psychologists, and the curriculum and content can be designed based on robust guidelines and standards of competence developed by the International Council of Nurses [10,29]. Learning and teaching strategies that drive nurses to develop their critical thinking skills and competence are also required. These pedagogies should be combined with realistic experiences through drills and emergency exercises, e.g., advanced simulations; and followed by an appropriate program evaluation in order to continuously and effectively improve their education and training. In addition, disaster education can be included in curricula at the bachelor's level. The syllabus should be regularly updated or renewed over the period of the program, and focus on different types of disasters, and the education has to be made consistent with individual national plans and healthcare systems [8,10,11,24].

Disasters can cause psychological problems such as PTSD. Nurses need to have the knowledge of how to care for people with PTSD [23–25,27] and other psychological traumas related to disasters [16]. Nurses have to be a source of support, with the resources to cope and to instill courage in the victims and their families. At the same time, nurses also need to receive support themselves, so as to be able to efficiently care for others. Psychological support through counseling, early intervention, and the prevention of PTSD [30] is as important to the nurses as to the care recipients. Such preparedness, in addition to knowledge and skill competencies, is also a priority to develop among nurses. Good preparedness, including in the psychological dimension, can be a positive support to nurses in the first place, and hence to their caring for the community, by giving them the inner resources of facing negative emotions and stress after disasters [31]. Special education and training, such as psychological first aid (PFA) and psychological debriefing and counseling, may contribute to better preparing nurses and other healthcare providers to respond to the psychological needs of victims and their families suffering from the negative impact of disasters [32]. A good level of psychological preparedness is also a buffer to the mental health of the nurses themselves in responding to distress during disasters.

The question is raised of what measures will enhance the psychological capacity and attributes that contribute to a more comprehensive state of disaster preparedness in nurses. For instance, a lack of resilience can be negative to nurses, and is probably related to feelings of nervousness, fear, worry, and isolation, so that they may also suffer from post-disaster psychological problems [16]. Developing, fostering, and enhancing resilience among nurses is thus also considered an important focus of education and training [18]. It will help nurses to transition from experiencing psychological challenges and dealing with the negative emotions of the victims, to focusing more effectively on the future and on caring for the patients as well themselves. Strengthening resilience may also help them to maintain their professional self-efficacy [33], and safeguard their mental health. Prior and sufficient education and learning activities for psychological preparedness can help nurses to build up their resilience and minimize the psychological effects on them of disasters [16].

Giving nurses training in psychological first aid (PFA) may lead to better psychosocial support for trauma victims. There is a need to invest in such training for nurses and other healthcare workers [34]. Related interventions may also incorporate resource and social support from different personnel, such as supervisors, friends, and families, to give positive reinforcement to nurses so that they are more psychologically prepared when delivering disaster relief [24]. However, there is a paucity of studies on the implementation of more comprehensive education and training programs focusing on all aspects of the knowledge and skill competencies required to deliver care to disaster victims, and especially in the building of the necessary psychological attributes and capacity for disaster preparedness. There is an urgent need to strengthen the skills of nurses to deliver psychological support to disaster victims, and to themselves, as a component of their complete

preparedness to deal with disasters.

5. Limitations

The search for studies to include in this systematic review encompassed only articles in the English language. Relevant information might also be available from other studies in different languages. The search included only articles published since 2001. The review may not be fully comprehensive, as it did not cover studies that appeared prior to that year, and from other regions with a high incidence of natural disasters. The current review did not cover policy papers and guidelines, and it is possible these may contain recommendations on psychological preparedness for disasters. Furthermore, we were unable to identify papers that investigated or reported the experiences of nurses working in humanitarian organizations. Literature focusing on the humanitarian perspective in disaster responses and care may provide clearer insights and highlight the needs of nurses in the area of psychological preparedness for taking care of victims of disasters, and for themselves.

6. Implications

The results of this systematic review indicate that nurses must strive to develop and establish better education and training programs to strengthen their knowledge and skills in disaster care, with a specific focus on psychological preparedness. Lessons learned from previous disasters, and from high-fidelity simulations or realistic role-playing, can be taken into account in constructing these programs. The research in this more comprehensive type of training can provide further directions and evidence to prepare nurses and other healthcare professionals for disaster care. An experimental design like randomized control trials may be used to investigate the effects of the training. Consideration should also be given to the design of the curriculum of a basic nursing education based on a multidisciplinary approach, which could include continuing education, role development, drills and simulations, and the building of disaster preparedness plans. Post-disaster planning is another important aspect to tackle, with resource sustainability and psychological support to all healthcare providers being important issues to address if they are to carry out their duties over the longer term in preparation for disasters.

7. Conclusion

The main goal of education and training in disaster nursing is to prepare nurses physically and psychologically to respond to disasters. The aim of the current review was to evaluate how prepared nurses are to deal with disasters in terms of their knowledge, skill competencies, and psychological outlook. This systematic review revealed that nurses still have low to moderate levels of disaster preparedness in knowledge and skill competencies, while less attention has been paid to psychological preparedness. Education for the acquisition of knowledge and skills has focused on the theoretical aspect of disaster management, establishing competencies, and clinical applications. Clinical skills, on the other hand, vary from basic nursing care to a focus on specialized trauma care. This involves triage and the stabilizing of victims until it is safe to transfer them to a hospital; and the practice of effective communication and leadership. Advanced learning and teaching methods should be used to enhance the nurses' learning and improve their self-confidence and self-efficacy in disaster preparedness. As the negative effects of disasters can also influence the psychological well-being of nurses, it is also essential to enhance their psychological preparedness by strengthening their psychological capacity and mental well-being. They will then in turn be able to provide better psychological support and humanistic care to affected individuals. Mental health nurses and professionals may be included in the education and training programs to foster the psychological attributes and skills of nurses in the field for

the good of the victims, and for the nurses themselves, such as in the learning of psychological first aid.

8. Registration

The review is registered in PROSPERO (CRD42018084875).

Ethical statement

The study is aligned with Ethical guidelines for journal publication.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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