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Improve disaster literacy in nurses: a qualitative descriptive study

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Abstract

Background The enhancement of nurses' disaster literacy is crucial for effective disaster emergency management, especially for clinical nurses with no prior experience in disaster rescue. This study aims to explore the perspectives of nurses who have been involved in disaster rescue operations on strategies to advance nurses' disaster literacy.

Methods A qualitative descriptive study, which follows unified qualitative study reporting guidelines. Thirty disaster rescue nurses were recruited to participate in this study, who came from 30 third-class hospitals in China. From October to December 2021, information was acquired by conducting semi-structured telephone interviews with participants. Qualitative content analysis was used to examine the data.

Results Six categories and eleven subcategories were created. Strengthening disaster education and training was the main focus, and its subcategories included continuing education, nursing curriculum development, and disaster rescue experience guide. The second focus, which included scene simulation, actual combat/military simulation, and virtual reality simulation, was strengthening disaster simulation and drill. The third focus was on providing psychosocial support, which included improving self-psychological adjustment, developing resilience, and engaging in active coping. The fourth category was to strengthen nurse/hospital managers roles and leadership, which included enhancing professional identity and policies/leadership support. The fifth category was disaster preparedness, and the sixth was enhancing knowledge transformation.

Conclusions Government agencies or healthcare organizations should actively promote the formation of nurses' disaster literacy from multiple viewpoints. Disaster education and training, simulation exercises, and psychosocial support should be prioritized.

Keywords Disaster literacy, Rescue nurses, Qualitative study, Disaster medical rescue, Emergency management

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Introduction

Disasters are dynamic, long-term cumulative processes that are frequently unpredictable and generate a wide variety of suffering. As a result, disaster emergency management is an efficient strategy to prevent and alleviate disaster crises. The international evidence is mounting that disaster emergency management has evolved into a critical component of national governance systems and capacities [1]. Increasing team construction is the key to significantly raising the level of national disaster emergency management. Nurses are the most numerous health groups in disaster response and the largest group of health professionals worldwide [2]. As a result, the nurse team has become a major force in national disaster emergency response. Despite this evidence, nurses' roles in national disaster emergency management are frequently neglected [3].

In 2014, Dr. Brown of the University of South Florida proposed the concept of public disaster literacy, which refers to individuals' ability to acquire, understand, and use disaster information, as well as make wise decisions with information, during the disaster mitigation, preparation, response, and recovery processes [4]. According to Dr. Brown's definition of disaster literacy, disaster literacy is a developmental goal of disaster emergency response ability. In disaster rescue, saving lives and saving the disabled is the key ability, life first is the value and belief, and willingness to contribute is the necessary character. Knowledge, skills or abilities are the phased goals leading to literacy, but not everyone has disaster literacy. Nurses play a scientific and effective organization and management role in disaster rescue, demonstrate excellent professional skills, provide post-disaster psychological crisis intervention, and implement infectious disease prevention and control. However, in most countries worldwide, the concept of nurses' disaster literacy has not been fully explored, its connotation has not been properly understood, and the nursing team often overestimates their ability to prepare for and respond to disasters [5, 6]. As a result, it is critical to explore and comprehend effective disaster literacy strategies for nurses to raise the emergency response ability of nurses in national or medical institutions.

Background

Hospitals are often designated as first responders for disaster rescue, and they are also one of the most significant organizations. Healthcare providers in hospitals play a critical role in aiding disaster victims and strengthening community resilience [7]. As a result, as the largest group of health professionals, nurses from different medical institutions should be familiar with catastrophe emergency management and have the skills to handle a variety of emergencies. Furthermore, the practice has shown that in the unpredictable disaster rescue site, nursing staff collaborate closely with other emergency teams, apply the unique knowledge and skills of disaster nursing systematically and flexibly, and carry out a series of rescue activities to reduce the social harm and life threat caused by disasters, which plays an important role in the overall disaster response and post-disaster reconstruction and recovery [8]. To reduce catastrophe-related mortality and morbidity, disaster rescue and nursing disciplines must be established.

The disaster site, on the other hand, differs from the hospital environment due to its harsh treatment environment, inadequate facilities, lack of equipment and medications, urgent tasks, and significant psychological pressure on rescue workers, all of which place increased demands on nurses' disaster emergency work [9]. At the same time, according to the State of the World's Nursing Report 2020, the future of global nursing will be focused on disaster nursing discipline development [10]. Consequently, there is a greater need than ever for nurses to be potentially involved in disaster relief efforts.

Despite this, not every nurse is sufficiently prepared to confront these situations. Most studies show that nurses lack experience, knowledge, and competencies in disaster emergency management [11]. In addition, knowledge, skills, or abilities do not always result in literacy. Literacy, according to the OECD, is more than just knowledge and skills; it is also the competence to use and mobilize psychological resources to solve complex requirements in a given situation [12]. Competence should be emphasised as applying skills and knowledge to achieve specific tasks. Literacy is acquired by training and practice and sublimated into a long-term, stable, internal cultivation of the individual [13]. It could be portrayed as a more profound, internalized knowledge developed through training and practice, contributing to long-term personal and professional growth. As a result, nurse disaster literacy is the goal of nurse disaster nursing competency development. Strengthening nurses' disaster literacy is beneficial for nurses to deal with various hard scenarios in a crisis based on local factors.

Globally, however, little is known about disaster literacy in nurses. Furthermore, few mature practice strategies have been formed due to a lack of broad attention and recognition of nurses' involvement and role in disaster emergency events. According to recent research, the number of disaster nursing education and training programs worldwide has increased over the last 20 years, but most existing programs lack effective disaster management strategies for the entire disaster management process, including the mitigation, preparedness, response, and recovery phases [14]. As a result, to assist the state or medical institutions in cultivating a well-trained disaster emergency nurse team, it is critical to promote the

construction of a disaster nursing discipline, especially to identify effective strategies for the formation of nurses' disaster literacy during the disaster cycle.

Methods

Aims

The objective of this research endeavor was to investigate and comprehend the viewpoints of nurses engaged in disaster rescue operations regarding approaches to enhance nurses' disaster literacy.

Design

The qualitative descriptive design is used in this study since it is the most effective method for gathering information directly from survey participants [15]. Qualitative descriptive research aims to provide comprehensive accounts of experiences in real settings in simple language, a strategy that can gather detailed descriptions of occurrences that are otherwise unknown [16]. As a result, a qualitatively descriptive study design increases the possibility that researchers' analyses will be faithful to the descriptions of participants and increases the transparency with which researchers' judgments are given. This study preliminarily created the interview outline after reading relevant literature and clarifying research questions. Two disaster rescue nurses were interviewed one-on-one by the researchers. Based on the test results, three disaster response specialists assisted in modifying the interview outline. The interview outline is shown in Table 1.

Participants and settings

The purposive sampling method was utilized for participant recruitment in this study. The selection criteria for participants were as follows: (1) Licensed registered nurses from medical and health institutions throughout the country; (2) Taking part in at least two of the four major disaster types: natural disaster (earthquakes, floods, snowstorms, etc.), accident disaster (mining accidents, traffic accidents, accidents at public facilities and equipment, etc.), public health event (SARS, Avian Influenza, New Crown Pneumonia Pandemic, etc.), and social security event (mass incidents, terrorist attacks, emergencies affecting market stability, particularly significant foreign-related incidents, etc.); (3) Volunteer to be interviewed. The exclusion criteria were as follows: (1) Participation in fewer than two disaster rescue events; (2) Inability to conduct effective screening due to incomplete personal information; (3) Interview duration of fewer than 30 min. A semi-structured telephone interview was conducted with 30 disaster rescue nurses from 30 tertiary hospitals in seven geographical regions of China.

Table 1 Semi-structured interview guide

No.	Questions
1	What initially comes to mind when I mention disaster literacy in nurses?
2	How do you view or comprehend nurses' disaster literacy?
3	Do you believe that your coworkers are developing their disaster literacy? Why not, if not?
4	Which disaster literacy do nurses possess or lack the most, in your opinion?
5	What actions have you and your team made to improve your individual and collective disaster literacy?

Data collection

The recruitment notice was distributed to all provincial disaster nursing professional committees through the Disaster Nursing Professional Committee of the Chinese Nursing Association. Rescue nurses who met the inclusion criteria were contacted via email or phone as stated in the recruitment notice, and they provided their personal contact information to us. Prior to conducting pre-interviews and formal interviews, we communicated with each individual by phone or email and sent them an informed consent form, which they signed and returned to our research team. Individual semi-structured interviews were used to collect data between October and December 2021. Due to the COVID-19 preventative and control measures, the interview was performed over the telephone. Each interview was taped and transcribed verbatim. The interviews lasted an average of 46 min, ranging in length from 30 to 70 min. A total of 31 disaster nurses were recruited for interviews, one of which lasted less than 30 min. Consequently, we obtained 30 valid interview materials. The nurses were recruited from 30 tertiary hospitals in seven geographical regions of China.

Data analysis

The EQUATOR Guidelines for Research Reporting, as well as the Comprehensive Criteria for Reporting Qualitative Research (COREQ), a set of 32 items that can be used for individual interviews, are followed in this report [17]. In China, data collection and analysis were done concurrently, and the analysis was done utilizing inductive qualitative content analysis [18]. Inductive analysis denotes the use of no framework or template to encode or comprehend data. Two researchers listened to the tapes repeatedly and personally examined the sentences. The researchers incorporated key information recorded during the interview, paid attention to the interviewee's voice, intonation, and pauses when transcribing and analyzing the text, and extracted meaningful statements that matched the research questions, summarized, distilled, and coded independently of category. Data analysis is a circular process, and the categories and subcategories obtained from the data may be iterated several times before being finalized [19]. The two researchers compared their findings until they agreed. Where there was

uncertainty about the content covered in the analysis of the interviews, the researcher contacted the participants using phone calls and cell phone text messages for additional verification.

Rigour

To increase the research's credibility, reliability, confirmability, and transferability, we adopted several safeguard strategies based on the qualitative and descriptive research standards established by Bradshaw et al. (2017). Firstly, all researchers received systematic training and study in the field of qualitative research before the study.

Table 2 Demographics of the participants ($n=30$)

Characteristics variable	Frequency(*n*)	Ratio(%)
Region		
Northeast	2	6.7
North	3	10.0
East	8	26.7
South	4	13.3
Central	3	10.0
Northwest	3	10.0
Southwest	7	23.3
Gender		
Female	17	56.7
Male	13	43.3
Educational background		
Undergraduate	26	86.7
Postgraduate	4	13.3
Department		
Critical care medicine	4	13.3
Emergency department	16	53.3
Pre-hospital emergency department	3	10.0
Anesthesia surgery department	3	10.0
Orthopedics	2	6.7
Cardiology department	1	3.3
Vascular surgery	1	3.3
Occupational title		
No	14	46.7
Deputy head nurse	4	13.3
Head nurse	12	40.0
Professional title		
Nurse	2	6.7
Nurse in charge	14	46.7
Deputy chief nurse	13	43.3
Chief nurse	1	3.3
Number of disaster rescue efforts		
Twice	11	36.7
Three times	13	43.3
Four times or more	6	20.0
Participate in disaster rescue categories		
Natural disaster	14	46.7
Accident disaster	16	53.3
Public health event	21	70.0
Social security incident	8	26.7

During the recruitment phase, we established specific inclusion and exclusion criteria to identify individuals with extensive experience in disaster relief operations and who possess the ability to effectively articulate that experience. Given that the content analysis emphasizes changes in content, diversity, and variations across different types of disasters, we conducted purposeful sampling by recruiting participants from various regions of the country for interviews. Disaster response experts and qualitative research experts were consulted in developing participant selection criteria and interview outlines. Moreover, the research team and all participants did not know each other before the study but established a rapport of trust during the interview. Secondly, in data analysis, we followed the content analysis steps proposed by Graneheim and Lundman (2004), and the two researchers reached a consensus on data coding and topic extraction. We used a purposive sampling methodology and retained the original recordings, transcripts, and coded memos of all participants so that they could be used for audit and cross-validation. We also followed the recommendations in the Comprehensive Criteria (COREQ) of the report's inventory of qualitative studies [17].

Ethical considerations

This study was part of a large subject study. All phases of this study have been approved by the Medical Ethics Committee of Jiangsu University. Before formalizing the study, the process was explained to all participants and their participation was entirely voluntary. Before data collection, a paper informed consent form was sent by mail, which was completed and returned by the participants. Informed consent was again obtained from participants during telephone interviews. Participants have the freedom to withdraw from the event at any moment without penalty. All data was kept private, and recordings and transcripts were only available to researchers. The research findings from the interviews were shared with all participants and, after receiving informed consent, were distributed online to nurses throughout China at the Nursing Conference.

Results

Sample characteristics

The average age was (38.13±6.37) years old. The average working life was (16.4±7.27) years, with a range of 5 to 36 years. The number of disaster rescues ranges between 2 and 6, and the average being (2.90±0.92). The demographics of participants are shown in Table 2.

Strategies for disaster literacy formation

A total of 6 categories and 11 subcategories can be concluded, as shown in Table 3.

Table 3 Results of inductive analysis

Category	Subcategory
Strengthen disaster education and training	Continuing education School education Disaster rescue experience guide
Strengthen disaster simulation and drill	Scene simulation Actual combat/military simulation Virtual reality simulation
Provide psychosocial support	Improve self-psychological adjustment Resilience development Active coping
Strengthen nurse/hospital managers roles and leadership	Policy/leadership support Enhance professional identity
Strengthen disaster preparedness	
Strengthen knowledge transformation	

Strengthen disaster education and training

Continuing education

The consensus among nearly all participants is that strategies must be implemented to enhance disaster literacy within the nursing workforce, either on an individual basis or collectively, as well as within government departments and medical institutions. For instance, individual nurses should take proactive measures to acquire knowledge while on the job, while governmental departments and medical institutions ought to fortify the development of a robust system for providing continuing education and training in disaster relief nursing. Additionally, they should conduct courses specifically focused on disaster nursing training.

Every month, our hospital will hold disaster nursing training, which will include both theoretical and practical skills. I believe that nurse organizations should organize disaster nursing training and study on a regular basis to swiftly increase their disaster literacy. (N24)

I believe that our working nurses should attend this disaster training once or twice a year and that it should be a required course in continuing education. (N13)

Nursing curriculum development

The majority of participants agreed that disaster nursing courses, preferably mandatory courses, are urgently needed in universities or vocational colleges. Simultaneously, we must strengthen disaster nursing ideological education for young nurses who are afraid of suffering and have no sense of crisis.

I firmly advocate disaster nursing education, particularly mandatory disaster nursing courses, as part of nursing undergraduate and graduate training. (N2)

Some post-90s pupils, in particular, are woefully unprepared for a crisis. I believe they must obtain disaster preparedness training. (N16)

Disaster rescue experience guide

Almost all participants stated that they had previously encountered technical challenges in disaster rescue work and sought expert assistance, emphasizing the importance of disaster rescue experience in enhancing disaster literacy.

None of the nurses at the time seems to have used this type of device, so what should they do in this situation? We reviewed the instructions with others who were familiar with this type of technology, watched videos together, contacted engineers, and attempted to fix the problem. (N6)

Some of the nurses involved in the rescue work in this epidemic had participated in the Ebola epidemic assistance before, accumulated some experience in epidemic prevention and control, and based on this accumulated experience in disaster rescue, they completed some tasks in this epidemic rescue. (N11)

Strengthen disaster simulation and drill

Scene simulation

Disaster scenario simulation exercises, according to all participants, are essential. Simultaneously, multidisciplinary collaboration or individualized case simulation, scenario exercise, and continual quality review spanning many disaster types are recommended.

I believe that disaster rescue scenario simulation exercises should be conducted during peacetime, with as many disaster kinds and potential emergencies as possible included. (N9)

A sequence of collaboration can be cases or scenes to increase the team's cooperation abilities in disaster assistance. (N16)

Actual combat/military simulation

Participants stated that using practical simulation exercises such as debris flow and earthquake could improve the nurse team's rescue ability.

We participated in the national emergency medical rescue team's mountain collapse practical simulation exercise around a month to two months ago, which was quite beneficial. (N17)

I think it is necessary for disaster nurses to take part in military exercises and get some training in the army. For example, when in the shelter, the mind can not help, but the physical condition is OK, then at this time we must be as strong as soldiers. (N1)

Virtual reality simulation

Participants generally stated that in the past, we only paid attention to a certain component of nurses' knowledge and skills, but did not provide large-scale disaster response ability training for nurses. As a result, they proposed large-scale emergency readiness drills,

comprehensive desktop simulations, and so on. They specifically urged that virtual reality simulation technologies should be properly developed and implemented.

We now frequently create movies or virtual platforms to play on a loop in hospital rooms, which is also a practical strategy to increase disaster literacy. (N9)

Because we have limited touch with disaster rescue in our business, developing a virtual reality simulation system is nevertheless possible and required. (N10)

Provide psychosocial support

Improve self-psychological adjustment

All participants agreed that the ability of rescue team members to adjust psychologically and emotionally is critical when working at a disaster site.

I believe that the nurses' emotions are so important that the rescue team's psychologist gave all of the nurses a centralized online lecture. (N2)

The mental health of disaster nurses requires immediate attention for them to feel confident enough to participate again. (N23)

Resilience development

The majority of participants stated that due to the difficulty of their work, some rescue nurses are prone to emotional breakdowns at disaster rescue sites. They contend that improving nurses' mental resilience is an important component of disaster literacy. Simultaneously, it is advised to improve mental resilience through family support and increased engagement.

It is necessary to establish disaster rescue resilience psychology, as well as the courage to face it and adjust their mentality. I believe we can play the role of family members, coordinating the relationship between family and work, and empowering nurses to do their jobs well. (N21)

Disaster nurses, you must be proactive because it is critical. (N8)

Active coping

Participants indicated that prior professional beliefs and social status, as well as the media response following the disaster, would influence nurses' disaster literacy level.

We need to do a good job with media response, especially after a large emergency response. (N17)

Many nurses are hesitant to take risks because their overall social status is low. As a result, I believe nurses' social standing should be elevated. Only love can motivate to succeed. (N23)

Strengthen nurse/hospital managers roles and leadership

Policy/leadership support All participants agreed that improving nurses' disaster literacy necessitates policy direction, leadership support from their medical institutions, and assistance from social institutions.

The most important thing is that hospital administrators encourage and organize people to guide training. The construction of disaster rescue teams is still dependent on policy forces and should be policy-oriented. (N5)

It requires the cooperation of the entire hospital or society, not just the nurses. It requires the assistance of the hospital or society. (N24)

Enhance professional identity

Almost all participants mentioned the importance of improving nurses' professional identity and social recognition to motivate them to take on more difficult disaster rescue work.

Nurses' professional identities are extremely important; with that sense of worth, they will strive to do their jobs well. (N11)

As nurses, we want to be recognized by our colleagues and the general public, and we will work harder if we do. (N16)

Strengthen disaster preparedness

Participants agreed that to promote the development of nurses' disaster literacy, professional and technical capabilities must be enhanced, disaster emergency plans must be developed and updated, and a disaster rescue information base must be established.

In times of peace, medical institutions should develop emergency plans and initiate emergency plans and responses at various levels and personnel based on the types of disaster events. (N13)

For example, we regretted not being well prepared during the Wenchuan earthquake, including team selection, personal belongings, personnel management, materials, and so on. (N20)

Strengthen knowledge transformation

The majority of participants agreed that improving nurses' disaster literacy could be accomplished by improving their leadership, resilience, critical thinking, coordination, problem-finding, and problem-solving abilities.

It necessitates a strong mental fortitude as well as the ability to adapt to changing circumstances, and critical thinking is essential. (N8)

Every nurse must have command and leadership abilities. (N4)

The vast majority of nurses are incapable of systematic and comprehensive coordination. (N17)

The most important thing is to find resources, integrate them, and place them in the most appropriate location. (N28)

Discussion

This study explored disaster rescue nurses' perspectives on disaster literacy strategies. The findings revealed that disaster literacy for nurses is a multifaceted concept that necessitates the collaborative efforts of individuals, organizations, and systems. Six disaster literacy improvement strategies for nurses were identified: strengthening disaster education and training, strengthening disaster simulation and drill, providing psychosocial support, strengthening disaster team construction, strengthening disaster preparedness, and strengthening knowledge transformation. These strategies enable nurses to access, understand and use disaster information and make informed decisions in disaster rescue. The study proposed potential implementation measures to develop nurses' disaster literacy based on real-world disaster rescue experience, and it enriched the theoretical framework for expanding the field of disaster rescue nursing and training better emergency nursing teams to respond to disasters.

Strengthen disaster education and training

Much prior research has revealed that effective education and training are crucial for enhancing disaster literacy in the existing nursing workforce [20, 21]. However, prior research has revealed that over half of nurses worldwide lack any kind of emergency or disaster response education or training [22]. Recently, Loke et al. (2021) did a study that found that over the last 20 years, there have been more disaster nurse education and training items. Nevertheless, approximately 70% of them are exclusively available within the borders of the United States, and they are distributed unevenly across the world.

According to disaster rescue nurses in this study, disaster education and training programs should include preservice college education, post-graduation continuing education, and on-the-job training guidance. However, in most countries, disaster preparedness education is not included in nursing curricula [23]. Disaster rescue nurses have high demands, so there are no unified assessment and certification standards. These findings suggest that disaster nursing is still undervalued by the health system and nurse workforce, particularly in resource-constrained regions like Africa, Eastern Europe, and South America [14]. Thus, nurses must be aware of disaster education and training, promote its systematic development, and improve their disaster literacy.

Strengthen disaster simulation and drill

This study's disaster rescue nurses all agreed that simulation training improves disaster literacy due to disasters' suddenness, high risk, and complexity. Simulation can teach learners how to act quickly in difficult situations. However, compared to other nursing fields, disaster nursing scholars focus on simulation research rather than practical application, especially long-term application effects [24]. Existing studies have used a variety of simulation methods, and the findings of this study back up these findings [25]. Virtual simulations using 3D interfaces, for example, can create realistic environments and give participants a strong sense of immersion [26]. Due to their low pressure and resource requirements, tabletop exercises, which set disaster simulation scenarios in an informal setting, are an important strategy for improving emergency response decision-making [27]. Furthermore, research has also shown that tabletop exercises are more appropriate for nurses with a lot of experience, while virtual reality models can help teach nurses who haven't done many emergency drills or experience how to prepare for them [28]. Thus, disaster nursing education and training must increase simulations and flexible application classification. The existing relevant studies, in particular, lack randomized controlled experiments and use different evaluation tools to evaluate the effect of simulation drills, which is precisely the direction to improve nurses' disaster literacy in the next step.

Provide psychosocial support

Another significant finding of this study is that psychosocial support will be an important aspect of future disaster literacy improvement for nurses, which supports previous research findings [29]. The nurses who took part in this study thought that emphasizing and supporting nurses' psychosocial needs and psychosocial satisfaction while assisting with disaster health activities was important. They believe that when nurses experience the organization's and society's care and support, their sense of belonging and responsibility to the organization and society will grow, and nurses will take the initiative to enrich their nursing knowledge and improve their nursing skills. As a result, focusing on nurses' psychological and social health is beneficial to improving their disaster literacy. However, research has shown that existing disaster psychosocial support focuses on the recovery phase, with little attention paid to the preparedness and response phases [30]. As a result, their psychosocial support requirements and tactics must be prioritized throughout the disaster cycle, both in the short and long term.

A recent systematic review found that nurses often feel sadness, helplessness, fear, and obstruction during disasters [31]. Post-traumatic disorder can turn professionals into invisible victims. Self-efficacy is another training effectiveness measure. Thus, disaster education and training must boost disaster nurses' self-efficacy and emotional regulation through short computer-based simulation exercises [32] and psychological first-aid training [33]. Furthermore, female disaster medicine professionals have distinct characteristics. Most nurses are

women. Some of these nurses may be pregnant or raising children, and they need not only to provide optimal and continuous nursing to victims and families in crisis, pain, and grief but also to protect themselves physically and emotionally. As a result, the physical and psychological consequences of disaster events may last a long time. According to a recent Turkish study, the level of disaster core competence in nurses was positively related to mental resilience [34]. As a result, while improving disaster nursing education and training, medical institutions should consider individual nurses' psychological and social needs and develop relevant strategies to improve self-efficacy, resilience, and active coping.

Strengthen nurse/hospital managers roles and leadership

This study shows that nurses need better policy/leadership support, professional identity, and social acceptance for disaster literacy. According to the balanced effort-reward model, a lack of recognition splits the relationship between effort (needed to meet job demands) and reward (income, career opportunities, or self-worth) [35]. During disasters, nurses must work in a high-pressure environment with numerous challenges and uncertainties. As a result, nurses require more recognition and confidence to devote themselves to hard work [36]. In 2020, media and public attention to nursing were unprecedented [37]. However, COVID-19 also presents enormous challenges for nurses, both physically and mentally. Nurses are tired, afraid, and even powerless to perform rescue tasks, and their professional identity is diminished [38]. Thus, managers can use this critical moment to focus on individual nurses, the work environment, and the organizational system to strengthen the nurse team's overall advantages for future disaster rescue support.

Strengthen disaster preparedness

Disasters strike unexpectedly and can last for hours or months. The participating disaster rescue nurses stressed the need for pre-disaster planning to enhance nurses' disaster literacy. It has also been demonstrated that disaster nursing capacity is favorably connected with readiness and desire to respond to disasters [39]. Recent studies have shown that most emergency medical personnel, such as nurses, are not well-prepared for emergencies [22, 40]. As a result, developing, reviewing, and implementing disaster preparation strategies for nurses working in disaster rescue is crucial. Additionally, nurses working in rural and district hospitals promote disaster literacy by encouraging the creation of individual and family disaster plans [41].

Strengthen knowledge transformation

Nurses involved in disaster rescue are required to assume dynamic roles by adjusting strategies according to evolving challenges. For instance, in this research, some disaster rescue nursing professionals emphasized that when shortages of essential resources impede rescue operations, nurses serving as front line responders need to promptly assess crisis scenarios, distribute resources judiciously, and ensure sufficient provisions. However, prior investigations have indicated that nurses encounter difficulties adapting to their constantly changing responsibilities during disasters, resulting in challenges executing intricate and variable rescue missions or even administering fundamental life-saving interventions [42, 43]. Consequently, to bolster the resilience of nursing teams, it is imperative for leaders to promptly organize rescue missions, rationalize nursing schedules, instruct nursing staff on disaster preparedness and public health concerns, and establish adaptable time frames for responding to disasters [44]. Leadership should offer targeted training programs aimed at enhancing nurses' ability to make sound judgments during emergencies.

Limitations

There are limitations to the research. To begin, only Chinese nurses were polled, limiting portability. Thus, more global research is needed. The study only recruited nurses working in tertiary hospitals and did not recruit nurses working in primary hospitals. Thus, nurses in other settings should interpret these findings cautiously. Second, data were collected by telephone in the study. Therefore, participants' gestures and facial expressions could not be included in the analysis. Gestures, facial expressions, and body language are sources that provide important findings in qualitative research. This should be added to the limitations of the study. Furthermore, although the results revealed the multidimensional nature of disaster literacy among nurses, this study did not describe the interrelationships among each category in detail. Future longitudinal quantitative and qualitative studies will explore the changing process of disaster literacy improvement in nurses.

Conclusions

This study examines disaster rescue nurses' views on disaster literacy promotion strategies. The study identifies six ways to enhance disaster literacy of nurses, with a focus on disaster education and training, disaster simulation exercises, and psychosocial support for nurses. Nurse disaster literacy requires multi-level, multi-dimensional support from individuals, organizations, and systems, according to this study. This study provides evidence for developing detailed and feasible nurse disaster literacy intervention programs.

Supplementary Information

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Supplementary Material 1

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Author contributions
ZD and ZLY designed the current study. ZD, ZX, and ZXF collected and analyzed the data. ZD wrote the first manuscript. ZLY and ZX revised the manuscript. All authors read and approved the final manuscript for submission.

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Data availability
Data is provided within the manuscript or supplementary information files.

Declarations

Competing interests
The authors declare no competing interests.

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