

# Disaster Response Among Hospital Nurses Dispatched To Evacuation Centers In And Beyond The Fukushima Prefecture

Chika Yamamoto (✉ [chika.y.9112@gmail.com](mailto:chika.y.9112@gmail.com))

Minamisoma Municipal General Hospital

**Katsuko Onoda**

Minamisoma Municipal General Hospital

**Arifumi Hasegawa**

Fukushima Medical University School of Medicine

**Tomoyoshi Oikawa**

Minamisoma Municipal General Hospital

**Masaharu Tsubokura**

Fukushima Medical University School of Medicine

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## Research Article

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# Abstract

**Introduction:** Living in a shelter affects resident health, increasing mortality risk, making shelter management a crucial part of disaster response.

Multiple stakeholders are involved in managing evacuation centers. However, little is known about the support needs of medical personnel within a disaster area.

**Methods:** This study aimed to examine the role of nurses in this disaster response, including evacuation to shelters, and the challenges they faced, given the lack of previous training or experience. Semi-structured interviews were conducted with nurses who were affected by the nuclear power plant accident, and qualitative content analysis was conducted.

**Results:** The challenges of shelter activities included the experience of being rebuffed by residents affected in the same area and the need to manage the conflict between the positions of victims and supporters. In addition, it was shown that by building support among staff and relationships between staff and residents, they were able to continue their difficult shelter activities. Many nurses expressed interest in disaster nursing, as their experiences of supporting people in disasters and evacuation centers provided them with hints for their nursing practice, and they applied the lessons learned from their evacuation center activities to their future disaster response.

**Discussion:** To improve staff management of trauma, suitable training should be provided during “normal” times to strengthen staff relationships; in addition, clinical and community nurses should be afforded opportunities to understand each other’s roles to support disaster response.

## Introduction

Disaster response requires complex medical and procedural interventions, including the management of hospitalized patients that are sick and injured, and those requiring emergency care, as well as handling hospital evacuation and transfer to shelters. Optimal disaster response is a public health challenge, as it directly affects survivorship. Living in a shelter affects resident health,<sup>1,2</sup> increasing mortality risk, making shelter management a crucial part of disaster response.

Multiple stakeholders are involved in managing evacuation centers.<sup>3-5</sup> However, shelters tend to be staffed by medical personnel from the disaster-affected area, including public health nurses, and local government officials,<sup>6,7</sup> which contribute knowledge about the area, medical supplies, and population health. These groups require adequate support. Previous reports<sup>8-10</sup> have examined the types of support required by people outside a disaster area; however, little is known about the support needs of medical personnel within a disaster area.

The Great East Japan Earthquake that occurred on March 11, 2011 (earthquake), caused the accident at the Fukushima Daiichi Nuclear Power Plant (NPP). Minamisoma City in the Fukushima Prefecture is

located north of the Fukushima NPP, with a radius of 12–38 km. In addition to the damage caused by the earthquake and tsunami, many citizens of Minamisoma were forced to evacuate due to radiation disasters. The Fukushima NPP accident halted the distribution of goods in the city and resulted in bus evacuation of the residents to shelters within and outside of the Prefecture on March 18. In an unprecedented decision, the Minamisoma Municipal General Hospital (Fig. 1), located within 23 km of the city, dispatched its medical staff to evacuation centers where Minamisoma citizens were placed, depending on staff preference. Although this combination of disasters was historically unique, similar complex disasters are likely to occur in the future, requiring suitable response protocols. This study aimed to examine the role of nurses in this disaster response, including evacuation to shelters, and the challenges they faced, given the lack of previous training or experience.

## **Materials And Methods**

Nurses that worked at the Minamisoma Municipal General Hospital at the time of the disaster and who were involved in evacuation to shelters were enrolled. Semi-structured interviews were conducted using an interview guide with 10 nurses. Study purpose and procedures were explained to the nurses, who provided their consent to participate.

## **Data collection**

Confidential interviews were conducted between March and May 2020 for approximately 60 minutes. The following information was collected during the interview: 1) years of experience as a nurse at the time of the earthquake, 2) details of evacuation support activities, 3) difficulties encountered during evacuation, and associated management strategies; and 4) gains from the experience. Interviews were recorded and transcribed verbatim, and analyzed using descriptive qualitative research methods.<sup>11</sup> Recordings were divided into meaningful segments, and divided into categories and sub-categories, based on the homogeneity and heterogeneity of semantic content.

## **Statement**

The study adhered to the RATS guidelines on qualitative research.

## **Ethics**

This study was approved by the Ethics Committee of the Minamisoma Municipal General Hospital (Approval number: 1-17) and the Ethics Committee of the Fukushima Medical University (Approval number: 2019-330), written informed consent was obtained from all research participants.

## **Results**

This study included 10 nurses (9 women) who were working at the Minamisoma Municipal General Hospital at the time of the earthquake. The median number of nursing experience years at the time of the

disaster was 11 (range: 5–20) years. All participants were new to disaster relief activities, including evacuation shelter support.

## **Challenges in evacuation shelter activities**

One of the most difficult aspects of evacuation shelter support activities was the experience of being rebuked by residents who had experienced the disaster in the same area. The nurses felt that they were not accepted by the residents who were stressed by the disaster and dissatisfied with their shelters. In addition, the nurses felt they were not perceived as victims of the disaster, and that they had to manage the conflict between the positions of victim and supporter (Table 1).

Table1. Challenges in evacuation shelter activities

Categories	Subcategories	Codes
Experiences of not being accepted by residents	Experiences of being hurt by residents' words	Residents expressed their frustration at job loss, saying to the medical staff, "You can work. We've lost our jobs." This became an outlet for the residents' frustration.(3)
	Experiences of being an outlet for residents' dissatisfaction with the government	A nurse reported being shocked to hear residents say, "You are a city employee " (1).  Residents told nurses how stressed they were by the disaster, how dissatisfied they were with the shelters, and how much they wanted to return home (3).
	Sadness at not being seen as a fellow disaster victim	The nurses experienced being seen as "a public servant" rather than a "fellow disaster victim" (4).
Conflicts in multiple positions	-	The nurses "continued to experience conflicts as a mother, nurse, and city employee" in evacuation and shelter activities (1).  The nurses were "seen by the residents as both a nurse and city employee" (2).
	Difficulties of "firsts"	The nurses felt their "lack of knowledge" when confronted with tasks that required a skillset different from that required by routine clinical practice (2).
Difficulties of "firsts"	-	The nurses "had never been involved" in disaster relief it was their first time working in an evacuation center (7).
	Difficulties in making decisions when responding to individual cases	The lack of a procedural manual left the nurses "puzzled" as to whether calling an ambulance may cause trouble for the residents (1).
Working with uncertainty of the future	-	The nurses reported stress as "working with uncertainty about the future" (2).  The nurses focused daily on "dealing with the situation" (1), reporting it was "all [they] could do to spend their days" (1).

## Factors that support the continuation of evacuation shelter support activities

Interviewees were asked how they responded to difficult experiences during evacuation shelter activities. Some factors supported the continuation of these challenging activities. The staff used each other as a support system, which helped them deal with the potentially hostile response of the residents. The staff built relationships with the residents, who offered encouragement, supporting the continuation of evacuation activities (Table 2).

Table 2  
Factors that supported the continuation of evacuation shelter support activities

Categories	Subcategories	Codes
Carrying out the role as a nurse	Challenges	I thought that taking care of the victims' health helped to nurse them (2).
	Taking care of residents' needs	Alleviate the residents' anxiety requires kindness and active listening (2). Residents want to be heard (5).
Words from the residents that helped me feel better	-	Some of the residents told me that they could talk to me because I was from their hometown and that it made them feel at ease.(2) I was happy to speak to a nurse from my hometown because I could understand her language (2).
Strength of Human Connection	Strengths in having a family	My family members were with me, so I felt a little reassured (1).
	Strength in having friends	I was helped by the staff that went with me (1). I felt more distracted when I was with my teammates than when I was alone (2).
	Strength in the support of the evacuation center community	There were events at the evacuation center, and I have many good memories (2). People at the evacuation center did not mind the radiation accident; they accepted us and were kind and concerned about us (2). We were dispatched to the area that was affected by the Chuetsu Earthquake; the residents told us they were victims of the disaster and that we should take care of their hearts (2).
Preparedness as a city employee	-	As a city employee, I was able to accept the difficulties as a part of my job (1).

## Gains from the experience

The following four categories and seven subcategories were extracted from the interviews on evacuation shelter activities: "Increased awareness of disasters," "Growth as a nurse," "Change to a positive attitude," and "Change in relationships with people" (Table 3). Many nurses reported that the experience of supporting people at the disaster and evacuation shelters became a source of inspiration for their nursing practice. They expressed their interest in disaster nursing, including passing on the lessons learned during evacuation center activities and applying them to future disaster responses.

Table 3  
Gains from evacuation shelter activities

Categories	Subcategories	Codes
Increased awareness of disasters	Opportunity for disaster nursing	DMAT is one of the certifications I got after the earthquake (2).
		After the earthquake, I registered as a disaster relief nurse (1).
		I want to be useful to someone (2).
		I want to be a person who can do the same thing as the people in the shelter community supported me.(2)
	Preparation for disaster	I think about how I can help when disaster strikes my location (2).
		I always make sure that my family is prepared for any disaster, and I make use of the lessons I learned from that time, such as not running out of water.(2)
Need to pass on experience	I have been to Kumamoto to help, and my experience is definitely useful (1).	
	I hope we can pass on our experiences to others. We have no choice but to make use of the lessons we have learned (2).	
Growth as a nurse	Renewed awareness of responsibility as a nurse	I must be responsible for my work. I want to do it (3).
	Renewed recognition of the purpose of nursing	I realized nurses serve inpatients as well as local residents in helping maintain health (1). I have a new sense of purpose in working as a nurse (2).
	-	It broadened my perspective as a nurse (1).
Change to a positive attitude	Experience that leads to the present	I am here now because of my various experiences (3). I started to think positively (1).
	Personal growth	Despite difficulties, this experience turned out to be a blessing in disguise (2).
Changes in relationships with people	-	Since the disaster, I have interacted more with people in the community (2).

## Discussion

One of the factors that made evacuation shelter activities difficult was the stress of working in an evacuation shelter while being a disaster victim. Nurses that experienced the earthquake, tsunami, and fear of radiation exposure in the same area were also city employees directly involved with the affected

residents. The initial confusion surrounding the earthquake may have triggered conflicting feelings about the staff's double role as relief workers and victims of the earthquake. In this context, the words of blame from the residents may have caused emotional distress among the nurses.

Previous studies have reported on the experience of first responders feeling hurt by the words of residents affected by the Great East Japan Earthquake.<sup>7,12-14</sup> The condemnation of public officials by residents is among the characteristics of the Fukushima NPP accident. Residents may blame first responders, including nurses, seeing them as representatives of the government that may have been negligent in disaster prevention. Much has been reported about the need for aid worker support during disasters.<sup>10,15-18</sup> Disaster response should include physical and mental health support for the victims as well as for first responders.

During evacuation shelter activities, the nurses have reported difficulties associated with performing "health activities" rather than "clinical activities"; these challenges were associated with the lack of experience in health activities. In disaster response, hospital nurses provide emergency treatment and medical care, while community nurses provide disease prevention interventions. A mismatch between expectations and competencies, and the requirements of a situation may create a sense of helplessness.<sup>19</sup> Clinical nurses may benefit from the experience of community practice in preparation for disaster response; these opportunities may be provided by medical facilities that offer follow-up visits to discharged patients and home nursing services. This approach may help expand nurse competencies and reduce the stress associated with emergency response.

In this study, a factor that helped nurses fulfill their disaster response tasks was their willingness to do this work. Nurses tend to have high emotional intelligence and empathy, which they demonstrate in their job.<sup>20</sup> In evacuation centers, listening to the residents is part of mental healthcare that is required; providing this type of support to disaster victims can provide nurses with job satisfaction, which increases the levels of positive self-evaluation.<sup>21</sup> Confidence in one's own role and competencies may help nurses continue their activities at evacuation centers.

Community and clinical nurses practice in different contexts and their relationships to target populations are different although both groups have nursing responsibilities toward local residents. Clinical nurses may care for residents in home and care home settings. Clinical and community nurses should collaborate to better understand each other's roles, which may help support disaster response where both groups are involved.<sup>22</sup>

The nurses reported that support from residents and fellow staff helped their work. Encouragement from residents, expressed as warm words, helped the nurses feel accepted by the residents. Previous studies have shown that public appreciation of first responders helps them fulfill their duties, leading to recovery.<sup>23,24</sup> The present findings are consistent with those of previous studies.



Trauma-informed care helps trauma victims.<sup>25,26</sup> The present study participants were able to accurately recognize traumatic events, including resident hostility, and discuss among each other the thoughts and feelings these events triggered, accounting for their mood fluctuations. This approach may have helped the nurses persevere and attend to their responsibilities. Disaster relief workers experience stress and trauma, and should be equipped with coping strategies that may be used in disaster response.

The nurses reported gaining professional insight and growth in disaster preparedness. Disaster response places a high burden on first responders that operate under the conditions of stress and chaos, which may also give them a sense of mission. First responders provide emotional support to disaster victims, which may cause stress; these circumstances create challenges that may be an opportunity for growth. Previous studies have shown that post-traumatic growth may help first responders positively view their experience of providing disaster relief.<sup>9,27,28</sup> The present findings are consistent with those of previous studies. The nurses who overcame the hardship of the Great East Japan Earthquake grew as professionals, which may help them maintain staff motivation and morale in response to future disasters.

This study has some limitations, which should be considered when interpreting its findings. First, the interviews were conducted 9 years after the disaster, and some of the subjects failed to remember the disaster at the time of the interviews; therefore, the present findings may be subject to recall bias. In addition, this study did not include all employees of the Minamisoma Municipal General Hospital that were engaged in disaster response. In particular, nurses that retired during or after participating in the evacuation shelter support activities were not included, potentially reducing the generalizability of the present findings.

## **Conclusion**

The present study participants were involved in disaster response, which required facing psychological trauma and gaps in nursing training. To improve staff management of trauma, suitable training should be provided during “normal” times to strengthen staff relationships; in addition, clinical and community nurses should be afforded opportunities to understand each other’s roles to support disaster response.

## **Abbreviations**

NPP: the Fukushima Daiichi Nuclear Power Plant

DMAT: Disaster Medial Assistance Team

## **Declarations**

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#### Authors' contributions

CY was responsible for the conception and design of the study. CY conducted the interviews and was involved in the preparation and revision of the manuscript. KO, AH, TO and MT contributed to supervision in drafting and revising. All authors have approved the submitted version of the manuscript, and agreed to be personally accountable for the author's own contributions and to ensure that questions related to any part of the work are appropriately investigated and resolved.

#### Funding

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#### Availability of data and materials

Not applicable.

#### Ethics approval and consent to participate

The research ethics was approved Minamisoma Municipal General Hospital Ethics Committee and the Ethics Committee of the Fukushima Medical University. The informed consent was obtained from all participants on written forms.

#### Consent for publication

As all the interview data were anonymized, the consent for publication is not applicable for this research

#### Competing interests

The authors declare that they have no competing interests

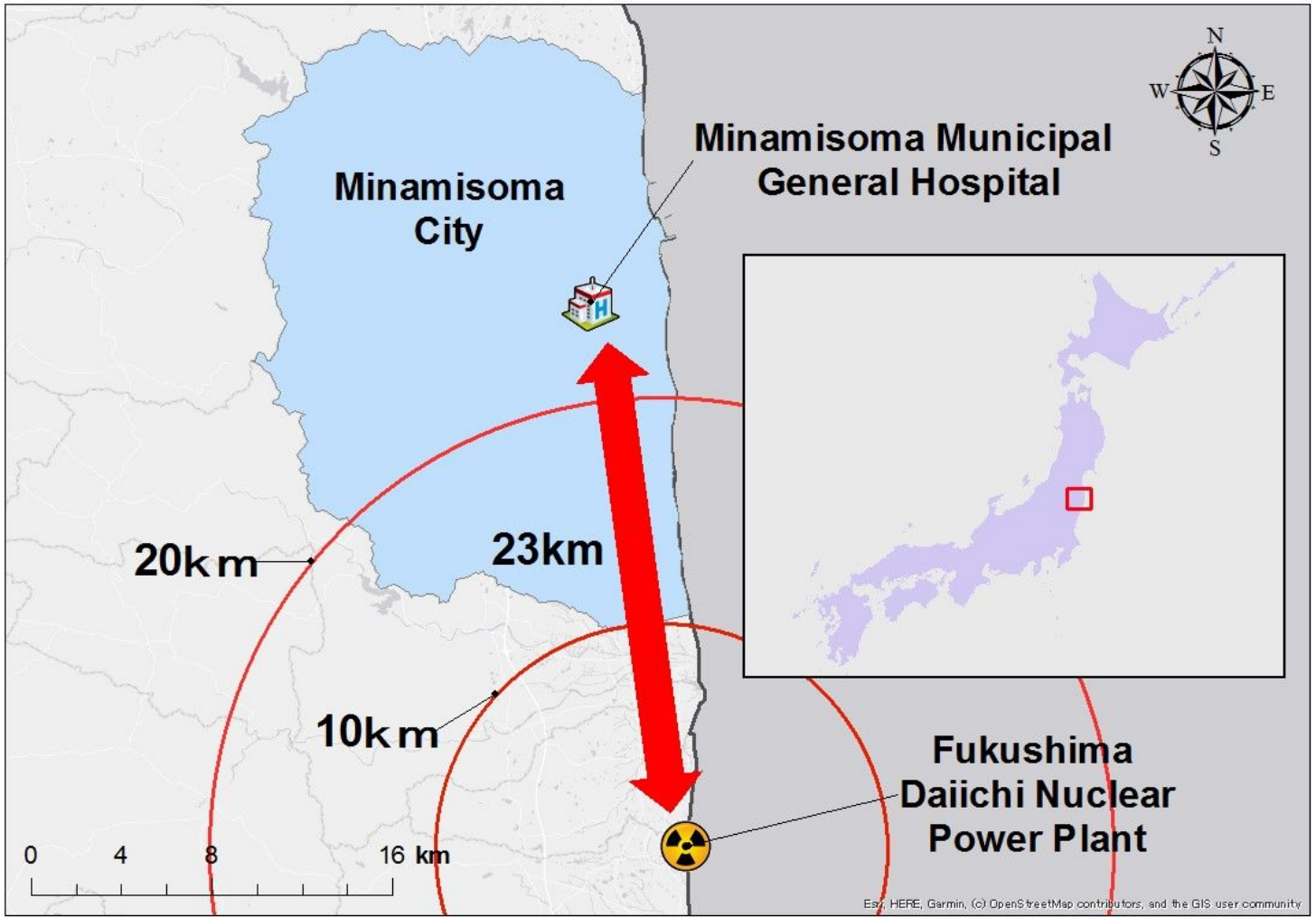
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## Figures



**Figure 1**

On March 12, evacuation orders were issued to residents within a 20-km radius of the Fukushima nuclear power plant. On March 15, indoor evacuation orders were issued to residents within a 20- to 30-km radius.