Impact of Large-Scale Disasters on Breast Cancer Care: A Qualitative Analysis of Patient Experiences During the 2011 Triple Disaster in Fukushima, Japan

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Research Article

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Abstract

Background

Large-scale disasters can severely affect breast cancer care, leading to treatment disruption and delay. Although few empirical studies have explored these effects, analyzing patients’ narratives can help bridge this gap. This study aimed to explore treatment continuity and medical access among patients with breast cancer during the 2011 triple disaster using qualitative research methods.

Methods

This qualitative study focused on 21 patients with breast cancer diagnosed before the disaster and were affected by it. Upon receiving consent, semi-structured interviews were conducted, lasting between 20 min to 1 h. Inductive thematic analysis was used for data interpretation.

Results

Five key themes emerged in the present study, ranging from immediate response to long-term recovery: medical challenges faced after the disaster, family roles and burdens, information access and communication, mental health effects of disasters, and challenges faced during evacuation. These themes covered a range of challenges, including infrastructure damage, treatment disruptions, substantial constraints arising from familial roles that could overburden the family support, importance of reliable medical and nonmedical information sources, psychological impacts of the disaster, and unique difficulties experienced in evacuation shelters.

Conclusions

This analysis highlights the critical need for ongoing care and addresses the key challenges faced by breast cancer patients during disasters. Future research should aim to develop practical and prompt solutions to address these issues in disaster settings.

Introduction

Breast cancer is the most prevalent cancer in women, with 2.3 million newly diagnosed cases and 685,000 deaths reported in 2020 worldwide. Early detection and diagnosis of breast cancer, as well as continuous treatment, are critical. Treatment disruptions can significantly affect patients’ outcomes; for instance, every 60-day delay in surgery can lead to a 26% increased risk of death in patients with invasive non-metastatic breast cancer. Factors contributing to treatment delays need careful consideration, especially where external events might exacerbate the patients’ challenges.
In this context, the role and impact of disasters are significant. Large-scale events, such as earthquakes, hurricanes, and nuclear accidents, pose severe threats to the continuity of breast cancer care. The disasters can not only compromise the structural facilities dedicated to medical treatment but also lead to broader societal disruptions, including mass evacuation and community fluctuations, interfering with healthcare delivery.\textsuperscript{5, 6} Large-scale disasters, such as the 2011 Japan's Triple Disasters (Earthquake, Tsunami, and Fukushima Daiichi nuclear power plant accident), Hurricane Katrina, the Gorka Earthquake, Typhoon Hagibis, and the nuclear situation in Ukraine following the ongoing Russia-Ukraine war, have underscored the potential immediate and long-term challenges faced by patients with breast cancer.\textsuperscript{7–10} These disasters often lead to treatment interruptions or delays, amplifying the inherent risks associated with breast cancer.\textsuperscript{11} Regular treatment routines are interrupted, and patients are likely to miss critical appointments or lack access to essential medications.\textsuperscript{12–20} Consequently, such disruptions can severely impede the healthcare journey of breast cancer patients, with ramifications for their overall health and well-being.\textsuperscript{6, 10, 13, 19, 21, 22}

Indeed, in the aftermath of Japan's Triple Disaster, many patients with breast cancer experienced these disruptions. Some postponed treatments and others delayed initial diagnoses, intensifying the health risks associated with breast cancer.\textsuperscript{23, 24} While some patients faced barriers in accessing healthcare due to infrastructure damages, others had to navigate the complexities of evacuating without adequate medical support.\textsuperscript{25} Although these disruptions were short-lived for some patients, they persisted in others, leading to prolonged periods without essential care.\textsuperscript{25} Understanding the specific challenges and needs of breast cancer patients who have endured disasters is vital. However, considering that most prior research in this field comprises case studies, cross-sectional analyses, and retrospective studies, there exists a significant gap in evidence required to develop effective strategies to address the issue. Qualitative research that draws on patients' narratives may be instrumental in filling this knowledge gap.

This study aimed to investigate the impact of the 2011 triple disaster on patients with breast cancer, with particular emphasis on treatment continuity, associated challenges, and unique needs, through qualitative interviews.

**Methods**

**Settings and participants**

The study sites, Minamisoma City General Hospital and Watanabe Hospital, are located in Minamisoma City, 23 km and 25 km north of the Fukushima Daiichi Nuclear Power Plant, respectively, which experienced a hydrogen explosion during the 2011 triple disaster (Fig. 1). The target participants included 140 patients with breast cancer who visited these medical institutions from 2006 to 2011 (before the disaster).\textsuperscript{26} These patients were already registered in an established database. Sociodemographic data, such as age, sex, and occupation, and clinical data, such as diagnosis, disease stage, and course of treatment, were extracted from the medical records and utilized in the present
study. Of these, 21 patients diagnosed with breast cancer before the triple disaster were included in this study.

Data Collection

The survey process began by sending an information letter to the patients registered in the database, notifying them of the impending interview. Subsequently, the researchers explained the purpose of the survey via telephone, and upon obtaining their consent, the interview schedule was confirmed. The patients were requested to return the consent forms in the pre-addressed envelopes after signing. The semi-structured interviews were then conducted, with the interview duration ranging from 20 min to 1 h per participant. The participants’ basic demographic and clinical data, such as stage of their breast cancer and treatment were obtained from the interviews. During the interviews, the personal names of the physicians and others (e.g. healthcare professionals) mentioned in the interviews were anonymized.

Data Analysis

After transcribing the audio data from the interviews, we chose inductive thematic analysis and followed the six steps proposed by Braun and Clarke: 1) familiarizing oneself with the data, 2) generating initial codes, 3) searching for themes, 4) reviewing themes, 5) defining and naming themes, and 6) reporting the results.27 First, the lead researcher created a summary of the interviews and requested all participants to confirm the summary content. Subsequently, the second author reviewed the summaries to familiarize themselves with the data and generated the initial codes. The initial codes were created at this point. The entire analysis process was performed manually.

Ethical Approval

The Institutional Review Board of Minamisoma Municipal General Hospital approved this study (5-8) in October 2023, adhering to the guidelines established by the Ministry of Health, Labor, and Welfare (MHLW) and The Ministry of Education, Culture, Sports, Science, and Technology (MEXT), Japan.

Results

Table 1 presents the characteristics of the participants. A total of 98 codes were generated and summarized into five themes and 17 sub-themes spanning the immediate, acute, and long-term aftermath of the disaster. Figure 2 summarizes the themes, subthemes, and their chronological relation to the disaster, which are elaborated in the subsequent sections.

Table 1. Characteristics of Patients with Breast Cancer Diagnosed Before the Earthquake
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**Theme 1: Medical Challenges Faced After the Disaster**

**Challenges among Hospitalized Patients**

Patients hospitalized during the disaster faced challenges associated with the destruction of medical facilities and a lack of basic amenities. In some instances, healthcare providers judged life to be more important than breast cancer treatment.

"When the earthquake happened, I was hospitalized. I think it was on the 15th day that a nurse told me that everyone would have to be discharged from hospital. I had the tubes, maybe the ones for blood flow, attached to my chest, so it was really problematic." (T)

**Physical Barriers to Medical Care**

Many patients faced difficulties commuting to hospitals due to the unavailability of gasoline, disrupted road networks, and the absence of personal vehicles.

"The area east of the Route 6 was completely devastated." (S)

"My uncle lived in Izumi Region, and since we didn't have a car, I remember it being quite a hassle commuting there, having to transfer between trains and buses." (U)

"Since there was no gasoline, I really just secured enough fuel to go and come back and tried as much as possible not to go anywhere else." (S)

However, some areas provided special bus services to assist patients in reaching hospitals.

"They had prepared a bus specifically for those going to the hospital." (J).

**Difficulty in Treatment Continuation**

The disaster affected the continuity of care for several patients, with some experiencing treatment interruptions and others relying on friends for transportation to hospital.

"After getting the chemotherapy, I was a bit worried, so I had friends pick me up and drop me off." (U)

"I couldn't undergo the follow-up observations." (A)

The ability to receive medication at a familiar hospital is important in such cases.
"I was waiting for my appointment when the earthquake struck. However, I only had medicine for that day and did not have any medicine for the following days. So, I asked Dr. Y to write my prescription, and then I got my medication." (D)

**Choosing Healthcare Facilities Amidst Crisis**

Due to scarce resources and information shortages in disaster-affected areas, patients faced tough choices regarding hospital size and location. Some opted for care at larger urban hospitals, whereas others visited the local medical facilities.

"I became somewhat anxious because it was a small clinic. I thought it would be better to go to a larger place and have regular checkups." (K)

These findings reflect the varied and complex medical experiences of patients in the aftermath of a disaster, emphasizing the importance of treatment continuation and associated barriers in disaster-stricken areas. These diverse statements reflect the need for a resilient healthcare system that can adapt to unprecedented challenges.

**Theme 2: Family Roles and Burdens (5)**

**Family Care as Top Priority**

For many individuals affected by the disaster, the immediate priority shifted to taking care of family members, particularly the older adults and children. In some cases, personal health concerns were shelved as the focus shifted to family needs.

"My mother developed dementia around the time we had to evacuate, requiring care." (G)

"To protect my grandchild, I did not think about myself at that time." (A)

Patients also faced difficulties in handling the necessary procedures for relocating older family members to care facilities.

"I had elderly family members in a facility, but because of various procedures, I could not visit them immediately. At that time, the care facility told us to take them home." (R)

**Family Support**

Despite these challenges, family members also played supportive roles during the disaster. Being together with family members provided a sense of security and support during the evacuation.

"During the disaster, I was with my family when we had to evacuate, and we helped each other at the evacuation site, so we did not face many difficulties." (E)
Family members, including spouses, actively coordinated with medical professionals to ensure continuity of care.

"At that time, my husband contacted the doctor and asked him to ensure that I could receive the necessary care." (S)

Theme 2 underscores the complex interplay between personal healthcare and family responsibility during disasters. The presence of family members both enriched and complicated the disaster experience, illustrating the multifaceted nature of human response and adaptation to crises. These findings highlight the importance of considering family dynamics and support systems in disaster preparedness and response, recognizing that individual health needs are often closely intertwined with family responsibilities and concerns.

**Theme 3: Information Access and Communication**

**Insufficient Local Health Information**

Patients experienced a general lack of information on the medical situation after the disaster. Television served as the primary source of disaster-related information.

"When I got a call from the city office saying I got a temporary housing, I returned here. I tried to gather various pieces of information, and I fully assumed that medical services had also been restored. However, they were not as organized as I had thought. So, it was indeed a bit challenging." (Q)

"After some time, I saw on TV that Dr. Z from the obstetrics and gynecology department had come and was providing services. So I went to see the doctor as I needed medication for diabetes and got my prescription from him. This kind of situation continued for a while, and when the big hospitals started operating again, I went to be examined there as well." (B)

**Healthcare Professionals as Key Information Sources**

Since the immediate aftermath of the disaster, healthcare professionals continued to be important sources of information. The patients felt reassured by the presence of their attending physician.

"I really trusted the doctor. Therefore, I believed that everything would be acceptable." (I)

At evacuation sites, professionals, such as public health nurses, became information sources, providing the necessary information and support.

"At the place we evacuated to, the public health nurses were kind and provided us with various information and guidance, so we managed somehow with their help." (K)

Among the patients who received breast cancer treatment, some had reflections that they should have accepted the doctor’s advice.
"I really thought it would be best to listen to the doctors’ advice. At that time, I was told to undergo radiotherapy instead of chemotherapy. No matter how young my child was, I realized that such treatments are essential for survival. However, I did not go to it. I really think it would have been better if I had strictly followed the doctor’s advice." (C)

**Family and Friends as Other Information Sources**

Medical professionals among relatives or family members acted as sources of information. Some patients observed that evacuating to a relative’s house made it difficult to receive information.

"My younger sister works as a nurse in Tokyo, so I reached out to her and got various advice. She mentioned certain tests and said that they should definitely be doing those." (Q)

Information from friends was also shown to be significant.

"It was truly intense. Everyone around us said that we had to evacuate. However, with my condition, I heard from friends that they had to evacuate to unsatisfactory places where it was difficult to use the restroom." (H)

**Need for Medical Consultation Windows**

Some patients thought that a medical consultation window would be helpful during a disaster. The need for connections and support groups among patients was also perceived.

"At that time, it might have been nice if there was a place where I could consult on medical matters." (R)

"There was a time when I thought it would be nice to hear from people who had experienced breast cancer." (P)

Theme 3 emphasized the diversity and importance of information sources and communication during disasters. Trusted physicians, television, family, and friends are important to patients. In addition, the need for medical consultation windows and patient networks has emerged. This thematic aspect highlights the importance of information accessibility and reliability during disasters and provides considerations for disaster management.

**Theme 4: Mental Health Effects of Disaster**

**Mental Anxiety**

During the disaster, many patients reported mental anxiety, including confusion in the immediate aftermath, fear of treatment continuation or recurrence, and concerns about the effects of aftershocks or radiation.

"After the earthquake, everything was such a blur." (A)
"I was really concerned that if I didn't continue taking the medicine, there might be a recurrence. This was my biggest concern." (N)

"During the earthquake, especially while evacuating, I think there was a significant amount of stress. Naturally, such stress manifests itself physically as an illness." (C)

**Stress Caused by Evacuation Life**

Daily difficulties and stress during the evacuation affected patients' psychological health. Factors such as the inability to bathe or hair loss due to breast cancer treatment negatively impacted mental health during evacuation.

"My hair had already started falling out, so I wore a hat when I was evacuating. It was a bit tough for me." (U)

**Managing Anxiety: Breast Cancer vs. Disaster**

The disaster changed the attitudes and concerns about breast cancer in some patients. Some patients were not particularly worried about breast cancer, while others did not evacuate because of the fear of worsening breast cancer.

"I decided not to evacuate because I was really concerned about the potential harm (of the evacuation) to my health." (H)

"I really wasn't too concerned about the breast cancer. Even after the earthquake, when I returned from the evacuation, I was consistent with my regular checkups. They told me to come every six months or so, and I have always kept up with that, so I was not particularly worried." (Q)

Theme 4 focused on mental health issues during a disaster, highlighting the various emotions and reactions experienced by patients with breast cancer. Anxiety about treatment continuation, difficulties in evacuation, and changes in concerns paint a complex intersection between the chaos of the disaster and the battle with breast cancer. This thematic aspect provides insights for deepening the understanding of psychological care and the specific needs of patients with breast cancer during disasters.

**Theme 5: Challenges Faced during Evacuation (5)**

**Medical Appointments at Evacuation Shelters**

Life in evacuation shelters presented many challenges and difficulties. Anxiety was experienced regarding the continuation of treatment at the evacuation site.

"Since I was in an unfamiliar place, I had to ask about everything. I did not know which hospitals were good or bad. I was definitely anxious until I found the cancer center." (K)

Some patients underwent medical procedures (such as suture removal) at the shelters.
"I had a relative in Nasu who took me to their local clinic, and that's where I had my stitches removed." (T)

Some patients regularly underwent checkups at the evacuation site, while others continued treatment at nearby hospitals.

"Over here, I had check-ups once a month or every two months. So, I returned every time for these examinations." (H)

"At that big hospital, they did various tests and even provided physical therapy and rehabilitation for me." (J)

However, some faced difficulties, such as the refusal of medical appointments at the evacuation site.

"I was told that I needed a referral letter, and without it, I couldn't get any treatment. So, I could not even get any medication during that time." (L)

**Medication Procurement During Evacuation**

Procuring medication at evacuation sites was a significant challenge. Some patients could not obtain the necessary medication and either returned home while waiting or stopped taking it because of depletion.

"I ran out of medicine at some point, so I had to stop taking it." (C)

However, some patients received medication as they carried medicine notebooks or obtained them at nearby hospitals at the evacuation site.

"I think it was Bange Kosei Hospital. That is where I got the medication. I had my medication booklet in my bag, so they knew and gave me medication." (J)

**Connections at the Evacuation Site**

Feelings of isolation and a lack of connection with the community at the evacuation site were noted.

"I didn't know anyone there." (E)

Conversely, connections within the shelters and collaboration with local residents were reported.

"My daughter stayed at the evacuation center all along. Fortunately, there were some kind-hearted neighbors, and they offered to look after my daughter, so I could leave her with them." (I)

**Risks and Impressions of Evacuation**

Risks and difficulties associated with evacuation were also reported.

"Just when we were heading to Sendai, our car slipped after the tsunami." (L)
Their impressions of life at the evacuation site varied, with some patients finding daily life challenging, whereas others felt uplifted by their experience.

"Every day, it was hectic. When I went to the hospital in Yokohama, the doctor who was seeing me there seemed puzzled because they did not know anything about my situation, and that left a strong impression on me." (D)

"Tokyo is completely different from the other cities. I felt that there was no sign of disaster at all. I walked all the way to Kichijoji and took strolls at Inokashira Park. It was like a dream. It is surprising how quickly things can change, and I am really grateful for that." (H)

Theme 5 focused on the experiences of patients with breast cancer who were forced to live in evacuation shelters during a disaster. Challenges related to the continuation of treatment, medication procurement, feelings of isolation, and connections with local communities emerged. These experiences highlight the need for special considerations in evacuating people during disasters and provide useful insights for future disaster preparedness.

**Discussion**

This study elucidated the multifaceted experiences and challenges faced by patients with breast cancer during the 2011 triple disaster. The themes uncovered in this study revealed multiple factors related to medical experience, the presence of family members, information sources and communication, mental health issues, and experiences at evacuation sites. Specifically, this study highlights the unique impact of a nuclear disaster, including radiation exposure anxiety and the isolating effects of prolonged evacuation, while underscoring the importance of community and family support in mitigating these challenges.

The ability to continue treatment and access medical care following a disaster has emerged as a key concern, particularly when patients are forced to evacuate. The study revealed the challenges faced by patients in obtaining referral letters and prescriptions. In addition, the flexible and appropriate responses from medical institutions that limited the overall impact on patients have been highlighted. Of note, disasters are highly individualized events, influenced not only by their type and scale but also by the affected areas' cultural, societal, and demographic backgrounds. Indeed, in a study conducted in Puerto Rico, exploring experiences in cancer care and disruption after the aftermath of Hurricanes Irma and Maria—a context distinct from Japan—stress factors directly related to the disasters were reported. These included challenges in treatment experiences and access to care during and after the hurricanes, as well as household limitations due to electricity and water shortages, all of which were identified as particularly difficult to cope with. Therefore, our results suggest that fostering collaboration between medical institutions, both within and outside the affected regions, is essential to ensure continued medical access for patients during disasters.
Our findings also revealed that the availability of family members can have both positive and negative impacts during disasters. While family support and care can be a source of strength and stability, the presence of family members in some situations might exert negative influences, as we reported in a previous case report. In addition, isolation due to evacuation has been linked to a decrease in health priorities, emphasizing the importance of preventing such isolation. Enhancing communication and collaboration between healthcare providers and family members is vital in addressing these complexities and can help provide comprehensive care during a crisis. These insights emphasize the need for nuanced strategies that consider the multifaceted role of family and community connections in disaster response.

The difficulty in obtaining accurate information was underscored as a critical issue, emphasizing the importance of establishing means of information dissemination, even before a disaster strikes. Particularly, the types of information required by breast cancer patients in the aftermath of a disaster are extensive and varied, and thus patients should be aware of the effective channels of communication. In this regard, our previous study indicated that people in affected areas obtain information from various sources, including trusted physicians, television, and family, all of which play vital roles. Understanding what resources people turn to for information and ensuring the clarity and accessibility of those resources are essential. The need for medical consultation services and patient networks was also evident, pointing to the necessity of a well-coordinated response that considers the unique information needs of the affected population. This comprehensive approach should consider the cultural, societal, and demographic backgrounds of the affected populations to ensure that information reaches those who need it the most in a form they can readily use.

Mental health challenges, ranging from anxiety about continuing treatment to changes in attitudes toward breast cancer, emphasize the need for psychological support. The experiences at the evacuation site triggered mental distress in many patients, revealing the complexities of continuing treatment, procuring medication, and maintaining connections with the community. These challenges are interconnected and exacerbate the feelings of isolation and stress that many patients face during a disaster. Reducing feelings of isolation through dialogue and mental health support appears essential in enhancing the well-being of cancer patients. Furthermore, the present study findings suggest the need for a well-coordinated response that considers the unique needs and challenges of patients in evacuation settings, ensuring that mental health care and practical support are readily accessible.

The present study has several limitations. The survey was conducted over ten years after the disaster and targeted patients with breast cancer who were at a relatively early stage of cancer at diagnosis. Consequently, this may have introduced limitations related to the timing of the survey, possibly underestimating the impact of the disaster. Specifically, the potential influence of disasters on the deterioration of patients diagnosed with advanced cancer has not been evaluated. As this survey might underestimate the impact of a disaster, careful consideration of the timing of the survey is needed when
conducting interview studies in anticipation of possible future disasters to accurately reflect the varied experiences and consequences of such events.

**Conclusion**

This study provides vital insights into disaster management in healthcare settings, particularly for patients requiring ongoing treatment. It emphasizes the importance of the continuity of care, psychosocial support, clear communication, family involvement, and tailored strategies for different stages of the disaster. These findings underscore the necessity for a comprehensive and flexible healthcare approach that considers individualized needs and contexts to enhance the quality of care for patients with cancer during disasters. Further research is necessary to develop and test strategies to address these challenges.

**Declarations**

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**Authors’ contributions:**

Conceptualization: all authors; Methodology: Yudai Kaneda, Akihiko Ozaki, Michio Murakami; Formal analysis and investigation: Yudai Kaneda and Akihiko Ozaki; Writing - original draft preparation: Yudai Kaneda; Writing - review and editing: all authors; Funding acquisition: Akihiko Ozaki; Resources: Akihiko Ozaki; Supervision: Michio Murakami.

**References**


Figures
Figure 1

Map of the study sites, including all locations mentioned in patient narratives.
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<td>Selection Dilemma of Medical Institutions</td>
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<td><strong>Theme 3. Information Access and Communication</strong></td>
<td>Insufficient Local Health Information</td>
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<td>Healthcare Professionals as Key Information Sources</td>
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<td>Family and Friends as Other Information Sources</td>
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<td>Mental Anxieties</td>
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<td>Stress Caused by Evacuation Life</td>
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<td>Managing Anxiety: Breast Cancer vs. Disaster</td>
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<td><strong>Theme 5. Challenges Faced during Evacuation</strong></td>
<td>Treatment Barriers During Evacuation</td>
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<td>Connections at the Evacuation Site</td>
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<td>Risks and Impressions of Evacuation</td>
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**Figure 2**

Themes, subthemes, and their chronological relation to the disaster