

Public Health Nurses' Experiences in Caring for the Fukushima Community in the Wake of the 2011 Fukushima Nuclear Accident

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ABSTRACT *Objective:* This study described public health nurses (PHNs) experiences in caring for people in their communities during the recovery stage of the Fukushima nuclear accident. *Design and Sample:* Forty-four PHNs responded to an open-ended questionnaire administered before a radiation protection workshop and participated in interviews after the workshop. Data were qualitatively analyzed. *Results:* Two major themes were identified: (1) profound powerlessness and (2) compelling sense of mission. The participants cared for people driven by their compelling sense of mission, despite not having the correct information or sufficient knowledge. They spoke of being heart-broken and barely able to face the reality of the impact of the accident. *Conclusions:* PHNs supported people because of a compelling sense of mission yet it was a great burden. Education about radiation and radiation protection for nursing students and PHNs, two-way communication between PHNs and radiation specialists, long-term support by specialists, and the opportunity for PHNs to share their feelings and experiences is necessary.

Key words: Fukushima nuclear accident, public health nurse, qualitative research, radiological protection culture.

Background

In Japan, public health nurses (PHNs) employed by local governments care for residents of all ages with health problems and formulate health policy. These nurses work to meet people's health needs, particularly when people have risks and restrictions in their daily life. PHNs are also expected to support people and communities as professionals and civil servants immediately after an accident at a nuclear plant. To obtain the national PHN qualification, it is necessary to study basic nursing as well as public health nursing. However, education on radiation and radiation protection has not been included in the educational programs.

The nuclear plant accident resulting from a massive earthquake in March 2011 had a major influence on people living near the nuclear plant. Many people were evacuated from the communities where they had lived for years. They lost their houses and were forced to live in shelters or migrate to other cities because of high dose radiation. As a result of the forced change in lifestyle and anxiety about radiation, their health also began to deteriorate. In addition, the massive earthquake, tsunami and nuclear accidents influenced the PHNs' own life, but they had to give priority to helping other people.

While there are several studies on the nuclear accident in Fukushima, they are mainly about the

impact on people's physical and mental health. Kayama et al. (2014) examined PHNs' experiences in supporting people after the nuclear accident. They found that early dilemmas and challenges centered around obtaining reliable and trustworthy information on the nuclear accident, with no correct information available for the affected community. Despite those dilemmas the PHNs were able to attain a sense of personal and professional achievement in a challenging context. There is minimal research describing what PHNs observed about the changes in people and the communities that were required to support a return to a healthy life. The purpose of this study was to qualitatively describe the experiences and needs of PHNs as they supported people to regain their previous lifestyle during the recovery stage 21 months after the 2011 Fukushima nuclear accident. Understanding PHNs' experiences was also needed to explore how to build what Boehler (1996) described as a 'radiation protection culture' in the communities for the future. Hence, we initiated an action research project that included the experiences of PHNs.

Methods

Design and setting

We wanted to create an account of PHNs experiences that were as close to their own expression as possible provide a comprehensive summary of the phenomenon. Therefore, we chose a qualitative descriptive research design (Gregg et al. 2007) to describe PHNs' experience in supporting people in a city in Fukushima prefecture during the recovery period after the 2011 Fukushima nuclear accident.

We selected a city to investigate PHN activities for supporting residents that had suffered the massive earthquake, tsunami, and nuclear accident. In this city, there were no restricted areas with high-dose radiation, although there were many places that needed decontamination.

The local governmental public health headquarters from which we obtained the agreement to conduct the study announced a workshop for PHNs who were working directly with the people in the city. A purposive sample of 44 local government employed PHNs agreed to participate and attend the workshop. Data were collected December 2011 and January 2012.

Prior to the workshop we asked the PHNs to complete and return an open-ended questionnaire. The radiation protection workshop was a 50-min lecture presented by radiation professionals. Following the workshops were two-hour focus group discussions to understand the situation of the people in the community and the feelings of PHNs. This workshop and focus group also had an aim to build a partnership between PHNs and researchers as the basis of an action research project to build a culture of radiation protection with PHNs in this city. A radiation protection culture is one where people living in the community under the influence of a nuclear accident receive radiation protection information for use in their daily life and adapt their lifestyle accordingly (Boehler, 1996).

Instruments and data collection

We provided participants with an open-ended questionnaire that described the experiences supporting people after the nuclear accident. The questionnaire contained the following items: (1) Describe what change in people's lives or awareness about radiation did you recognize while supporting people? (2) Describe what kind of difficulties did you feel? (3) Describe your feelings as an individual living in the community.

We held nine focus groups to discuss the experiences and to build trust and partnership between the PHNs who were working in the various communities within the city. Each focus group of five to six PHNs was adjusted so that PHNs did not belong to the same work affiliation. Investigators conducting the interviews were professionals in radiation nursing or public health nursing and had experience in assisting after the radiation accident, as well as experience conducting focus group interviews. The interview guide focused on the PHNs' experiences while caring for people, and experiences as a PHN, public officer, or sufferer. PHNs were asked to talk freely about their feelings, behavior, and interactions with people in the communities. With permission of the participants we recorded the data of focus group interviews with an IC recorder and then transcribed the contents.

Data analysis

Data analysis was conducted using a qualitative descriptive method (Gregg et al., 2007) to analyze responses to the open-ended questionnaires and

the transcribed focus group discussion. Contents of each sentence were coded based on our research question and staying close to the each participant's expression and continually comparing content across the questionnaires and transcripts looking for similarities and differences. We focused on PHNs' perspective where they noticed changes in people and their communities through altered activities, and also their feelings or thoughts when they were supporting people to regain or retain their former lifestyle.

Next, we classified the codes into subcategories based on the meanings, similarities, and relationships between codes and subcategories. We repeatedly considered the contents and construction of the codes, subcategories, and categories until we were able to fully describe the experiences of PHNs.

The participants were informed of the study objectives and analysis strategy, including confidentiality and anonymity of data. Signed agreement was obtained. All data were transformed into anonymous data. The ethical committee at our institution approved the study.

Results

Two major themes were identified: "profound powerlessness" and "a compelling sense of mission that was not affected by powerlessness". As shown in Table 1, the "profound powerlessness" included five categories, and the "sense of mission" three categories. These two themes were two sides of the same coin. Even though PHNs experienced profound powerlessness accompanied by a loss of

desire to work and their loss of hope for the future, their "compelling sense of mission" enabled them to confront the difficulties inherent in supporting people.

Profound powerlessness experienced by the PHNs

PHNs perceived deep psychological damage and pain in people, but they could not support them adequately with their insufficient knowledge and information. They also could not face the problems about radiation by themselves or actively make an effort toward learning about the problems of radiation. As a result, PHNs experienced profound powerlessness after nuclear accident. Their powerless feeling was related to their inability to: assist the people in reconstructing people's prior lifestyle that had evolved over the years; heal the deep psychological damage and pain that the residents had experienced; stop the breakdown of the communities; obtain knowledge and correct information and come to terms with problems related to radiation with PHNs' concerns.

An inability to help people reconstruct their prior lifestyle that had evolved over the years in their communities. PHNs recognized people who had restrictions in their daily life and behavior (lifestyle) because of anxiety about radiation. These included:

- We cannot see children play outside.
- There are many elderly people who buy bottled water because of anxiety about tap and well water.

TABLE 1. *The Experiences of PHNs Caring for the Fukushima Community*

Categories and subcategories

First Category: Profound powerlessness experienced by the PHNs

An inability to help residents reconstruct their prior lifestyle that had evolve over the years in their communities. PHNs realized they could not heal the deep psychological damage and pain that the residents had experienced.

Inability to stop the breakdown of the communities.

Unable to obtain knowledge and correct information on radiation and radiation protection required by the residents.

Inability to face problems about radiation with PHNs' concern.

Second Category: A compelling sense of mission of the PHNs that was unaffected by profound powerlessness

Never give up providing relief and safety to residents, while looking at the anxiety which spread in the communities.

The PHNs sensed the depth of the resident's anguish seen in the diversity of their reactions to radiation, and worried that they had to do something.

Exploring what they can do for people in the communities.

- Some elderly people say they don't breathe deeply outside to escape danger being exposed to radiation because life is very dear to them.

In addition, PHNs recognized there were many people who were living aside from other family members as they had been forced to move away from their hometowns because of the disaster or had lost their houses because of the earthquakes and tsunami. As a result, they lost their role in their life and their reason for being.

- They lost daily activities such as gardening or working in the fields they had enjoyed for years because their grandchildren do not eat products from Fukushima.
- Some people lost purpose in their life.
- There are many elderly people who became alienated from their children and grandchildren, and lost the role in their families, became demotivated, and have stayed in their home for months.

PHNs also recognized people who had no perspective for the future because the foundation of their daily life had crumbled and they could imagine recovering their prior lifestyle.

- There are many people who have never rebuilt the perspective of their life, and their economic and mental problems have persisted.
- People have not been able to get perspective of their future, because there have not been progress even time passed.

PHNs realized they could not heal the deep psychological damage and pain that the residents had experienced. PHNs recognized people who had been haunted by a lack of trust in the information and consequently experienced a vague anxiety. Many people had access to information about the correct radiation dosage, air dose-rate, or food radioactivity. However, they still did not feel free from anxiety about radiation, especially mothers who tended to blame themselves.

- Some say they cannot believe what government officers say You are a liar.
- Everybody has had anxiety about radiation They cannot disregard this uneasiness.
- It is almost the same dose-rate as that of other prefectures, but they say they feel relieved to live outside of Fukushima.

- Some mothers cannot help thinking that it is a result of their choice to live in Fukushima if their children suffer from cancer.
- All I could do for people with psychological damage was listen carefully and refer them to psychiatrists or psychologist.

PHNs recognized the deeply felt wounds that appeared and disappeared. Outwardly, consultations decreased and people seemed to recover their prior lifestyle despite their wounds not being healed. The PHNs perception was that most of the people settled their feelings by giving up and compromising. Inwardly, psychological healing had become difficult and psychological wounds had increased. PHNs recognized that a number of people could not express their anxiety or organize their feelings and needed encouragement to do so.

- Most people are still skeptical They do not feel refreshed.
- People seem to have settled down, but they never feel relieved Everyone has vague anxiety.
- People with anxiety and doubt cannot show their feelings because there is an atmosphere that we should not speak out.

PHNs recognized the loss of family ties and relationship discord, especially in families who had young children evacuated to other prefectures because of anxiety about radiation. As a result, families broke up and people developed a sense of isolation. This resulted in differences in understanding and ways of coping with radiation, and a degree of anxiety resulting in family relationship discord.

- [People say that] if they express anxiety or doubt to their families, the answer will be, "what are you talking about"? And the conversation will be finished.
- Quarrels broke out among family members between those who were not concerned about the impact of radiation and those who were concerned.
- Family makeup changed and family ties were broken.

Inability to stop the breakdown of the communities

Most of the people in the disaster area had lived there for decades, building friendships and social support on which they could rely. After the disaster,

there were changes in their communities. People migrated to other communities or outside of Fukushima because of anxiety and loss of their houses or jobs. Some had taken shelter from other towns decided to migrate to the city. Others who had taken shelter outside of Fukushima returned. Differences in the amount of compensation for the nuclear accident resulted in variation in the resettlement speed. The PHNs observed that feuds and strains developed between people with different situations living in the same communities. PHNs recognized people who had lost the ties they had built and communities breaking down.

- Both aged and single households have social ties with neighbors or their children. But now they do not have ties with neighbors who help them.
- It is difficult to keep company with one another, because people came from various places.
- Many people complain about the differences in the amount of compensation for the radiation and tsunami disasters adversely affecting their life, and speak badly about people who suffered from high radiation dose.
- People with various backgrounds live together in the same communities, so I catch the nervous feelings of people.

Unable to obtain knowledge and correct information on radiation and radiation protection required by the residents. Some information about the air dose-rate and dose of radioactivity in foods was available to the public during the recovery stage. However, PHNs could not answer residents' questions about radiation and radiation protection. PHNs tried to support people but felt stymied because they could not get correct information relevant to the daily life in the community.

- There are too many things we do not know to provide solutions to the problems of residents.
- We need but cannot get information relevant to anxieties about daily life.
- I cannot convey how to cope with radiation in our daily life.
- I feel anxiety whether I have enough knowledge to support people to make a decision.
- I feel so worthless, so ashamed ("fugainai") because I do not have answers.

- It makes me irritated because I cannot answer residents' questions with confidence.

Inability to face problems about radiation with PHNs' concerns. PHNs also suffered from the massive earthquake and therefore had an inveterate uneasiness and distrust of radiation. They wanted to look away from problems of radiation, so it was difficult to face peoples' concerns about radiation exposure. They recognized these feelings but could not disregard people in the communities. This resulted in feelings of inadequacy and impatience and an increase in powerless feelings.

- I have vague uneasiness although I have to support people I cannot say I am also scared, and there is nothing but vague fear in my mind.
- I found myself avoiding the problem of radiation.

The anger of residents against the nuclear plant was a major concern, and with the psychological burden of providing support for residents as well, was exhausting. PHNs did not have the opportunity to share their feelings or deeply felt but buried concerns. These concerns made it difficult to support residents.

- I am tired because of having experienced the anger and dissatisfaction of residents as victims.
- I want to escape from this atmosphere of anxiety. When I go outside of the city, my feelings are released and I feel at ease.
- I have been too tired to study radiation.
- It has been hard for me to support people, but I have had no opportunity to talk to anyone I wanted to talk about my feelings.
- I have not yet handled my own heart-break.

A compelling sense of mission of the PHNs that was unaffected by profound powerlessness

PHNs experienced powerless and futile feelings during the recovery stage, but tried to support people by adopting a posture of never giving up and providing relief and safety to residents, despite the anxiety that spread in the communities. Their sense of mission provided strength.

PHNs faced new problems by recognizing the depth of the residents' anguish, and saw a diversity of reactions to radiation. To solve this new prob-

lem, PHNs explored what they could do for people by adopting a sense of mission.

Never give up and providing relief and safety to residents, while observing the anxiety that spread in the communities. Even though the PHNs had feelings of powerlessness, they could not stop caring for the people. Nurses found it difficult to reduce anxiety and change people's attitudes or unhealthy behaviors. They recognized that it was difficult to support people to choose better health behavior by getting correct information on radiation relevant to their daily lifestyle. PHNs also recognized the importance of listening carefully and tried to be as close as possible to them in the community.

- It is difficult to change a person's attitude when they are highly anxious
- All I can do is to try to understand their feelings on all possible occasions
- I was worried that it would be hard for them to live for years with matters still pending
- I tried to become secure by recognizing uneasy feelings of people in the communities
- I feel I have been running since the nuclear plant accident happened

The PHNs sensed the depth of the resident's anguish seen in the diversity of their reactions to radiation, and worried that they had to do something. PHNs recognized the difficulties although they could not provide uniform support because of the diversity of people's reactions and way of coping with radiation. Time passed; people expressed their experiences differently and handled the matters and their feelings in different ways. Consultations decreased, making it difficult to objectively assess, understand their needs and find ways of supporting them. PHNs tackled the hidden needs of support.

- The reaction to radiation is extremely different among people Some do not mind and do not change their life at all.
- I do not know how to handle their consultation and what direction to indicate when I am consulted.
- Many people seem to lead an ordinary life at a glance without showing their true feelings because they are tired and do not see an end to

the solution And so we do not know their true needs now.

Exploring what they can do for people in the communities. PHNs explored what they could do for people. They struggled with the dilemma that they could not take care of them sufficiently, given the concerns and anxiety about radiation and living in Fukushima. The PHNs continued to work with people while feeling discord because of the sense of mission that they had to do something as professional PHNs and civil servants who needed to protect the residents' health. This compelling sense of mission made it impossible to leave people.

- I myself think it is better to leave Fukushima I am afraid whether I can really be healthy in the future.
- When I am consulted whether or not it is good to continue to live in Fukushima, I cannot give a clear answer because I understand their anxiety.
- I have anxiety about radiation, but I think I have to consult and accompany people in the communities.
- PHNs have a role to accompany residents and hear serious stories, and respond to these needs as a professional.
- I cannot handle my own heart-felt concerns, but have to work with people to obtain relief.

Discussion

The city in which we conducted this study was not in a high radiation dosage area, but people in the community lost much and had deep psychological pain and damage. We found it difficult for PHNs to support people, obtain relief, and return to a healthy life because the nurses had similar feelings of loss and conflict caused by their own anxiety and doubts about radiation.

During the recovery stage, PHNs had difficulty in recognizing the diversity of reactions to radiation by people in the community. This was a specific problem in a city with no restricted living area and had accepted a large number of refugees and migrants from "difficult-to-return" areas in other cities. The differences in situations and ways of coping with radiation problems expanded widely as

time passed. Some people tried not to care about radiation by controlling their apprehension, some tried not to think about it, some chose to leave Fukushima and then return, and some had trouble coping with daily life. People with such various backgrounds living in the same community, were sensitive about these differences, and became too anxious to ask questions about radiation. This made it difficult to develop a solution that could have evolved by sharing their experiences and thus caused anxiety among people in the community. PHNs were intimately acquainted with the sufferings and different situations, so it became difficult to even mention the subject of radiation.

The city accepted refugees and migrants from "difficult-to-return" areas, with resultant community breakdown. In fact, PHNs recognized the symptoms of crisis when social ties and family ties broke off, relationships between people became strained, and conflict increased among people with different opportunities. The impact of the radiation disaster on the communities was not limited to difficult-to-return areas. Reconstruction of the new communities with people who had different circumstances was a big issue for PHNs during the recovery stage.

After the 1986 Chernobyl nuclear plant accident, health professionals built a "radiation protection culture" that promotes health in the community by providing suitable information that changed over time, and through conversations with residents. Health professionals were educated and a system built that allowed residents could get information (Omori, 2014). By comparison, in the city for this study, people had not solved their problems over time. For this nuclear accident, time had not help people get back to their previous lifestyle; it was necessary to provide continuous support for people by PHNs who know their communities and the lives of people.

The PHNs, consumed by their sense of mission, tried to support people despite their continuing personal concerns. However, it became clear that there was little support for PHNs after the nuclear plant accident in Fukushima. From a deeper understanding of the profound impact of this tragedy on key supporters in the community, the PHNs, we offer the following recommendations.

Even though currently there are no educational programs about radiation and radiation protection

in the basic education of PHNs, such information is greatly needed to strengthen PHNs' supporting skills. Another study, on the related factor of anxiety of PHNs working in two prefectures with nuclear plants as civil servants, reported PHNs lacked knowledge, and insufficient preparation for a radiation disaster (Kitamiya, 2011). In our study, participants needed basic knowledge of radiation and radiation protection, and a way to convey this information and knowledge.

PHNs help people understand the risks and choose appropriate health behavior and empower people, while considering environmental factors. The communication skills needed to care for people suffering from a radiation disaster are similar to skills for caring for people with other health problems, and also for building a radiation protection culture: (1) convey information and knowledge, (2) promote people's understanding risk, and (3) help people to choose their health behavior and life style. The influence of the disaster will continue for decades. We highly recommend ongoing education about radiation disaster for PHNs working in the local governments in Japan.

We also recommend a system be constructed for long-term support for PHNs by specialists. PHNs are required to acquire considerable special knowledge because they target all the people in the community. However, it is difficult to obtain advanced expertise under the current educational programs. To solve the residents' complicated and varied needs during the recovery period, PHNs need a timely system of long-term support to get advice from radiation specialists (Orita, 2014).

Radiation specialists and the media transmitted considerable information after the accident, although there was no two-way communication with either people living in the area affected by the disaster or with PHNs who had a role in health risk management. The information was transmitted one-way and had no relationship with the residents' lives. Better results would be obtained if PHNs who knew their communities and the lives of people and specialist of radiation exchanged information about the residents' needs. Therefore, a system for two-way communication between PHNs and specialists of radiation is also necessary. The influence of radiation disasters continues for long periods; a long-term point of view protects the health and dignity of people living in the community.

Opportunities for PHNs to openly share experiences and feelings are needed. PHNs became dislocated, often changing the department they worked for and therefore changed their activities and colleagues with whom they had shared experiences. As a result they had not been able to openly express their feelings, nor were there opportunities to talk and share their experiences. This type of social and emotional isolation combined with their feelings of powerlessness made it difficult for PHNs to resolve their experiences, concerns and problems. When PHNs shared their stories with the researchers they did so in a manner that was uncharacteristically uninhibited and emotional, indicating to us that they had not yet had the opportunity to express their opinions.

We suggest that opportunities to openly share experiences, feelings, and sufferings about radiation safety may lessen concerns and problems. This should be reflected in the quality of support they provide for people. It is also important that people who support PHNs continue taking a coherent stance to think how to support, listen, and understand their feelings as much as possible. Only if the stance is maintained, then PHNs should be able to express their concerns and reduce their burden.

Our study is the first that systematically describes PHNs recognition of the changes in people their needs as residents in the communities, and the needs of PHNs such as education about radiation and radiation protection, long-term supports by specialists in radiation, and opportunities to disclose their experiences and feelings. Based on these results, a multidisciplinary research team (Kawasaki et al., 2015; Konishi et al., 2014) developed the action research. We need to conduct additional research to clarify the contents of basic radiation education for both PHNs' student and PHNs working in the communities.

The PHNs supported people in their communities driven by their compelling sense of mission even in the absence of correct information and sufficient

knowledge. It was difficult for them given their own ongoing problems and they continued to feel challenged as time went on. In addition to education on radiation and radiation protection PHNs, it is necessary to have long-term support systems by specialists, a two-way communication system between PHNs and radiation specialists, and opportunities for PHNs to openly share their feelings and experiences at convenient times.

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