Stress responses of caregiving staff in the 2007 Niigata-Ken Chuetsu-oki Earthquake

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Abstract

The aim of this study is to discuss the facts (difficulties throughout the disaster and Acute Stress Response) which influences the seriousness of the stress response of the caregiving staff who suffered from the earthquake. Niigata-ken Chuetsu-oki Earthquake occurred in 2007. 172 caregiving staff suffered and the authors of this paper proceeded to give out written questionnaires to them, one month after the said quake. According to the analysis, the staff felt uncomfortable when they couldn't provide proper care for their patients for lack of water. They were anxious and felt uneasy whether they could protect their patients when there were aftershocks. As for their daily life, they felt it difficult to maintain enough food and water, they felt frustrated not having the household belongings such as things that were broken or destroyed, and they had trouble finding a place to sleep. If they had the above hardships throughout the disaster, so their Acute Stress Response level was higher, and also their stress response a month later became more serious.

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Key words : Critical Incident Stress, Post Traumatic Stress Disorder(PTSD), Impact of Event Scale-Revised(IES-R), Disaster worker

Ⅰ Introduction

2007 Niigata-ken Chuetsu-oki Earthquake (Chuetsu-oki Earthquake) occurred in the morning on July 16th, with the magnitude 6.8. Niigata-ken suffered from an earthquake in 2004, Niigata-ken Chuetsu Earthquake. It was reported that when the latter quake struck the prefecture, the disaster teams in Niigata-ken could help with relief operations using the experience acquired from their former quake experience[1)]. However, the said residents were still suffering from the added stress due to the reoccurring aftershocks over three years.

In this paper, we reveal the conditions and state of stress responses which caregivers had one month after the Chuetsu-oki quake, and the facts of that.

Ⅱ Problems and aims

This study aims to grasp Critical Incident Stress of caregiving staff after the extensive disaster through the questionnaire. First, we tried to find the troubles they had related to their everyday life / work, home etc. which could be the stressor for PTSD. Secondly, record their stress levels. Finally, discuss the relationship between each stressor and stress response. Refer to Yamazaki and Tanno's paper [2)], examine the relations between ages and stress factors, Acute Stress Response right after the disaster, and stress response afterwards. Through this study, we discussed how to manage stress care for the disaster teams affected by the disaster.

Ⅲ Method

1. Participants

Intended for caregivers who work at elderly's care centers or mental patients care facilities (total of 4 facilities) at the stricken area in the Chuetsu-oki Earthquake. Active answers were 172 (30 male, 135 female, 7 unknown).

2. Time frame

From August 16th to September 14th in 2007

3. Contents

We submitted questionnaires to groups or individuals by mail.

1) Attributes

In order to examine the attributes which could influence the stress reaction, we asked about their sex and age(scale ranging from under 19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, over 60).

2) Difficulty throughout the disaster

To examine the facts of the stress levels, we asked about the difficulties related to care giving and troubles in daily life. As for care giving, respondents were assessed by the following questions. "Please indicate what made you feel uncomfortable regarding the patients' care after a week preceding the disaster (Table 1)." As for their daily lives, "Did you have any difficulties in your daily life a week after the disaster? Please indicate any of which applies to you (Table 2)."

3) Acute Stress Response (CS-ASR)

In order to measure the levels of Acute Stress Response (ASR) right after the disaster, we referred to the scale which Yamazaki and Tanno [2)] made, and created Caregiving Staff ASR scale : CS-ASR) and examined the answers. It is comprised from 18 items (Table 3) related to stress response right after the disaster. Participants were asked if there were any of the following stress symptoms over a week after the quake. They were required to answer with yes or no.

Table 1. Difficulties with patient care in the event of a disaster

Contents	%
I couldn't provide proper care for the patients for lack of water.	92.7
I was anxious and felt uneasy whether they could protect their patients when aftershocks occurred.	33.3
Emergency aid was not adequate.	24.8
Because of frequent aftershocks, patients were highly stressed.	18.8
Patients' family couldn't come to see them.	9.1
Shock from the earthquake caused a loss of appetite.	7.9
I couldn't contact the patients' family in a timely manner.	5.5
The number of patients who had high blood pressure had increased.	3.0
Others.	23.6
No difficulties at all	0.0

Table 2. Difficulties related to daily essentials and living arrangements

Contents	%
I had trouble finding and maintaining water and food stocks	68.9
The households and belongings were destroyed	51.8
The house was destroyed or half damaged	14.6
I had trouble finding a place to sleep	14.6
I felt it hard to maintain the safety of my family and pets	5.5
I couldn't be understood concerning my job when interacting with my family	4.3
Others	20.7
No difficulties at all	1.2

Table 3. Principal component analysis of CS-ASR 18

Items	Factor loading	%
I felt lethargic.	.493	83.1
Hard to concentrate on things.	.489	64.1
I couldn't think of anything else other than present problems	.523	47.4

Unable to appreciate daily life as one would before	.435	47.2
The work place was in chaos and felt under pressure	.463	39.4
I sometimes had lost a sense of time	.447	33.5
I cried without any reason	.440	27.8
I couldn't believe in my judgment calls	.592	24.8
I had palpitations.	.412	21.5
I sometimes cannot remember things	.502	18.4
It became difficult to judge what is really important in my job.	.572	17.6
I felt unease talking to others	.603	17.1
Being pointed out by my family or friends for being irritable.	.480	17.1
Anger erupts without any reason	.486	16.5
I was confused and excited so I couldn't make logical decisions.	.544	10.7
I had difficulty in trusting others.	.499	4.5
I had tremors and convulsions.	.406	4.5
I felt meaningless in my job.	.471	4.1
Proportion 26.9%		

4) Impact of Event Scale Revised (IES-R)

To measure the levels of stress response one month after the disaster, we used Impact of Event Scale Revised ;(IES-R), the scale was created by Weiss & Marmar [4] and Asukai [3] translated it into Japanese. Respondents were asked to indicate how much they were distressed or bothered during the past seven days from each difficulty listed, items are rated on a 5-point scale ranging from 1 (not at all), 2 (a little bit) , 3 (moderately), 4 (quite a bit), to 5 (extremely).

5) General Health Questionnaire (GHQ-12)

In order to measure the mental health condition of respondents, we applied the results to the 12-items on the General Health Questionnaire (GHQ-12) [5]. The higher their scaled scored, the less healthy their mental conditions were. Respondents were shown instructions for the following. "Please indicate which items affected you the most during the past couple of weeks." Items were rated using a 4-point scale from 0 to 3.

4 . Ethical concerns

All answer sheets were filled out anonymously and collected in hospital facilities, so researchers were unable to identify the said individuals. Each item on the survey was carefully constructed so as not to put extreme pressure on participants in the PTSD studies. We made it clear that even if the participants couldn't cooperate with the research or quitted halfway, their identities wouldn't be in any way divulged. We guaranteed the secrecy of the answers, they would not be used outside of this research study, destroying the answer sheets instantly after the study, and having obtained the participants' consent. We had the approval of the ethical committee of University of Tsukuba, Graduate School of Comprehensive Human Science, and proceeded with the survey. We set up a troubleshooting counter after that, but there were no complaints or criticism at all.

Ⅳ Results

To begin with, we examined the difficulties that were happening throughout the disaster. Next, we discussed the mental state of caregivers who worked in the devastated facilities. Finally, we discussed the relationship between each fact such as the attributes and difficulties and stress responses.

16 of active replies were from nurses, and 156 of them were from caregiving staff. Their age groups were 36.6% of under twenties, 36.4% of thirties, 27.0% of over forties.

1. Difficulties throughout the disaster

We listed the answers concerning the difficulties with patient care in the event of a disaster (Table 1). There was nobody who answered "no difficulties at all", and all the

caregivers had at least some difficulties in their job over the week from when the disaster struck. Regarding the difficulties with patient care, "We couldn't provide proper care for the patients due to the lack of water (92.7%)" occupied the highest percentage. Other three answers ; "We were anxious and felt uneasy whether we could protect our patients when aftershocks occurred (33.3 %) " , " Emergency aid was not adequate (24.8 %) " ," Because of frequent aftershocks, patients were highly stressed (18.8 %) " , all held over 10 percent.

Next, Table 2 is from the results related to the difficulties concerning daily essentials and living arrangements. There were 1.2 percent of respondents who had no difficulties, and the rest all had some troubles. "We had trouble finding and maintaining water and food stocks (68.9 %) " and "The households and belongings were destroyed (51.8 %) " accounted for a higher rate. Following that, "The house was destroyed or half damaged (14.6 %) " and " We had trouble finding a place to sleep (14.6 %) " were over 10 percent.

2. Subscale of CS-ASR

To check out the one-dimensional nature of CS-ASR based on Yamazaki and Tanno's study [2] , we provided the principal component analysis (Table 3). As a result, factor loadings were below .40 of 18 out of all the 24 items. So we deleted the said 6 items, and provided new analysis. Factor loadings of 18 items were over .40, so we comprised them as CS-ASR 18 (Caregiving Staff ASR scale 18). And yet, Cronbach's coefficient alpha of CS-ASR was .83.

3. IES-R score

We provided one-way analysis of variance and t-test in order to examine whether there was anti disaster drills at the work places or not, and the participants' ages made a difference to the IES-R score. The result of variance analysis by age groups (under twenties, thirties, and forties) showed marginal significance in the subscale of re-experience and intrusion (Table 4). We provided multiple comparison (Tukey method) to the said subscales, the score of it was significantly higher in the forties than other groups. We couldn't see significant differences whether there was or wasn't anti disaster drills at work. Desire for early retirement between nurses and caregivers didn't differ significantly.

Referring to Asukai's [3] cut off point, we classified the respondents who scored above 25 points as a high risk group, and those who scored below 24 points as a low risk group. As a result, the risk rate of the high risk group one month after the disaster was 19.5 percent.

Table 4 IES-R scores by age

		under twenties	thirties	forties	analysis of variance
re-experiencing,	Average	4.51	6.39	6.35	F (2,153) = 2.318 ＋
intrusion	standard deviation	4.21	4.95	6.19	twenties, thirties＜forties
avoidance	Average	3.51	4.29	3.74	F (2,153) = 0.482
	standard deviation	4.78	4.53	3.91	*n.s.*
hyperarousal	Average	4.61	5.32	4.00	F (2,153) = 1.127
	standard deviation	4.41	4.26	4.07	*n.s.*
IES-R total	Average	12.63	16.00	14.10	F (2,153) = 1.125
	standard deviation	11.61	12.56	12.72	*n.s.*

＋p＜.10

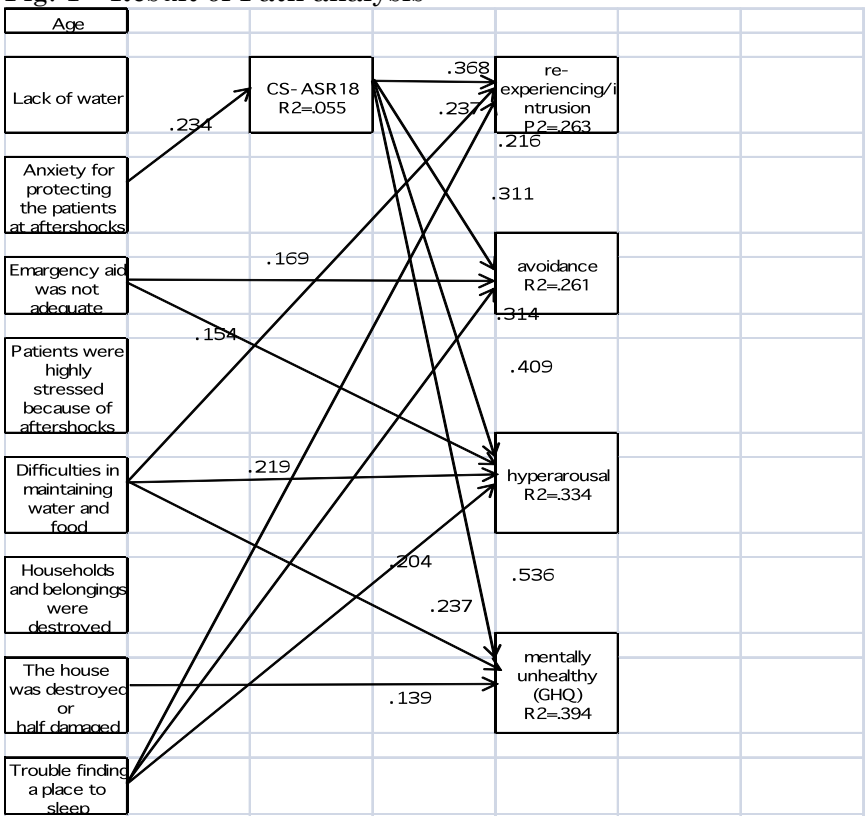
4. Comparison of GHQ-12 score

According to Narita (2001), calculating the GHQ-12 score using 0011 grading system as a basis, we sorted the score over 4 as a high risk group and below 3 as a low risk group. The risk rate of the high score group was 52.1 percent. In order to examine whether there was anti disaster drills at the work place or not, and the participants' ages made a difference to the GHQ score, we provided one-way analysis of variance and t-test though, they didn't differ significantly, nor the desire of early retirement between nurses and caregivers.

5. Path analysis of attributes, stressors, and stress responses

To consider the respondents' attributes and the difficulties throughout the disasters influence on the stress responses, we used path analysis combined with multiple regression analysis. In the path analysis, we applied the following contents for the first level; ages, the difficulties with patient care (We couldn't provide proper care for the patients for a lack of water. / We were anxious and felt uneasy whether we could protect our patients when aftershocks occurred. / Emergency aid was not adequate. / Because of frequent aftershocks, patients were highly stressed.) , and the difficulties related to daily essentials and living arrangements (I had trouble finding and maintaining water and food stocks. / The households and belongings were destroyed. / The house was destroyed or half damaged.). For the second level, we applied CS-ASR 18 which is a guideline for the Acute Stress Response, and for the third level, we applied the GHQ-12, and IES-R subscales for re-experiencing and intrusion, avoidance, and hyperarousal as an index of the stress responses one month after the disaster. We treated the upper levels explanatory variable and repeated the multiple regression analysis (Fig. 1).

Fig. 1 Result of Path analysis



Within the analysis, we used a step-up procedure, we stopped to add the data at significance level of 5% in partial coefficient regression. From the said analysis, there wasn't a significant difference between nurses and caregivers, we put in their data together and analyzed it again.

According to the analysis, the higher the Acute Stress Response level is, the more serious the symptoms of IES-R, which are re-experiencing / intrusion, avoidance, and hyperarousal, and the worse their mental health became. If they were anxious and felt uneasy whether they could protect their patients when aftershocks occurred, the Acute Stress Response levels became higher. If they thought emergency aid was not adequate, avoidance and hyperarousal subscales raised their levels higher. If they had difficulty finding and maintaining water and food stocks, the level of re-experiencing / intrusion, avoidance, hyperarousal became higher and their mental health state became worse. If they had their households and belongings destroyed or half damaged, their mental health state became worse. If they had difficulties finding a safe place to sleep, they had higher marks in subscales of re-experiencing / intrusion, avoidance,

hyperarousal,, and mentally were unhealthy.

IES-R was created by Weiss & Marmar, and translated in to the Japanese by Asukai. IES-R comprised of 22 items covering 3 symptomatic categories including re-experiencing / intrusion, avoidance, and hyperarousal.. It shows that the higher their score is, the higher their stress response levels are. Respondents were assessed by the following questions. "Please indicate the level of importance of each item. For example how much you were distressed or bothered right after the Niigata Chuetsu Earthquake." They were asked to rate using a scale ranging from 1(not at all), 2(a little bit), 3(moderately), 4(considerably), to 5(extremely).

V Consideration

Recently, mental and physical anomalies during a disaster crisis period became a subject of discussion. It is called Critical Incident Stress. It is stress connected with nurses, fire fighters, and caregiving staff who work under severe and terrible circumstances [6]. Laube [7] carried out an unstructured interview with 27 nurses who continued nursing care work in hurricane Celia and analyzed their stress conditions. As a result of qualitative analysis, too many physical burdens and other anxieties throughout the disaster increased their stress. Shih, Liao, Chan & Gau [8] carried out an unstructured interview with 46 nurses who had been involved in nursing activities during the Taiwan Earthquake of 1999. They reported that many nurses who suffered in the disaster couldn't forget their experience and that caused problems such as nervous disorders. Matsui [6] pointed out that the many of the disaster teams suffered from not only acute stress response, but also post-traumatic stress disorder one month after the disaster.

In our country, Yamazaki and Tanno [2] provided a questionnaire to 842 nurses who suffered in the Chuetsu Earthquake, and studied the symptoms of PTSD after the disaster and the factors related to the seriousness of PTSD symptoms. They used IES-R translated by Asukai [3] and searched for symptoms of PTSD in nurses one year and ten months after. Nurses in the high risk groups, IES-R scored above 25 equaling, 7.5 percent. Likewise, Hyogo Institute for Traumatic Stress [9] used IES-R items and researched the PTSD symptoms five years after, as for the firefighters who worked in the 1995 Hanshin Awaji Earthquake. The results for the amount of firefighters who had PTSD symptoms and who were in a high risk group was 16.3%. Kawamura, Goto, and Matsuda [10] checked the PTSD symptoms 10 years after the disaster for 458 nurses who contributed in the said quake. Nurses who had PTSD symptoms and who were at a high risk came to 15 percent. From the research of the nurses and firefighters in our country, it is clear that some of the rescuers who worked in the disaster still have PTSD symptoms even some years after the incident.

Yamazaki and Tanno [2] examined the relationship between the nurses' attributes (age, work positions), Acute Stress Response, and seriousness of PTSD. From the analysis, the higher their ages were, the more serious their PTSD symptoms of re-experiencing / intrusion, and avoidance became. Also the higher the level of Acute Stress Response right after the disaster was, stronger in all their PTSD symptoms. The tendency that elder people have more serious PTSD is agreed within this study targeted at the firefighters by Hatanaka, Matsui, and Maruyama [11]. Their study made it obvious that age difference has a significant relationship with stress levels. And in other study, Matsui [6] insisted on the importance of stress care for PTSD right after the disaster. Putting his theory and Yamazaki and Tanno's [2] results together, stress care is significant for controling PTSD symptoms afterwards. Put all the knowledge and research of Yamazaki and Tanno's [2], Hatanaka, Matsui, and Maruyama's [11], and Matsui's [6] together, rescuers' age and the seriousness of Acute Stress Response right after the disaster influences stress levels.

Kawamura, Goto, and Matsuda [10] researched the circumstances when the Hanshin Awaji Earthquake occurred. Relevant answers from the nurses who suffered were as following: 6.5 % was destroyed or burned down, 17.0 % was half destroyed and half burned, 40.0% was partly damaged, and more than 60 % of them had at least some damage to their houses. Concerning care activities throughout the disaster, 37.7 % of active responders said they strongly felt that they couldn't follow through with all their duties, and 50.8 % slightly felt the

same. More than 80 % of all nurses who suffered in the disaster had at least some difficulties in their jobs. These results showed that problems at home and difficulties in work caused stress for them. Ootsuka and Matsumoto [12] made a general survey of the studies and reported on the stress of rescuers who suffered throughout, and picked up 21 stress factors. They were categorized into two factor groups. One is related to circumstances at work (they had never worked in such conditions before, they experienced miserable conditions, they felt in danger of their lives, their teams were on bad terms, etc) , and the other is related to their own lives and families (they couldn't find out whether their families were safe or not, they had their own homes, families, friends and acquaintances who were suffering, such as troubles not related to the disaster, irregular life style, and so on). As from the above, these studies of Kawamura, Goto, and Matsuda's [10], and Ootsuka and Matsumoto's [12], showed the difficulties in rescue operations and their respective lives caused stress to rescuers. Regardless of these difficulties, which caused the stress reactions they still have not been studied yet.

Judging from the studies and information of the CIS regarding nurses and firefighters, the caregiving staff who helped their patients at the care center also suffered from acute stress reaction or PTSD caused by various stressors throughout the disaster. Therefore, we believe that we need to examine how to manage the caregivers' stress in order to avoid problems with their health in order to give them more stability in their jobs so they would not leave or retire early.

Caregivers at the Chuetsu-oki Earthquake had a lot of difficulties taking care their patients and with their own private lives, so it was obvious that they had various stress factors. It became clear that the difficulties and seriousness of Acute Stress Response made a difference on the stress conditions one month after the quake.

The caregivers in their forties tended to have higher scores in re-experiencing / intrusion of ISE-R score. Yamazaki and Tanno's [2] research on nurses who suffered in the Chuetsu Earthquake revealed that the older they were, the higher level of PTSD symptoms (re-experiencing / intrusion, and avoidance) , and a lower rate of them thought about early retirement. The researchers [2] pointed out that many nurses had economical reasons which stopped them from leaving their jobs. The researchers estimated from the results of their survey that elder nurses had more stress responses compared to the younger ones, but since they were the main income earners for their families, they had the tendency not to retire. From the above, they suggested a need for stress care for elder rescuers who suffered from serious stress but couldn't leave their work place.

The path analysis showed that the higher the mental and physical stress response levels were, the more stress responses caregiving staff had after a month. Yamazaki and Tanno [2] said in their study, the higher the nurses ' Acute Stress Response level right after the disaster , the stronger PTSD symptoms they had one year and ten months after the said quake. From the results of this study and said study by Yamazaki and Tanno's, the level of Acute Stress Responses right after the disaster could be a key factor to estimate the condition of stress responses one month after or a year after. It is considered right after the disaster very important to maintain the rescuers' health conditions.

And the path analysis showed if caregiving staff felt anxiety about whether they could protect their patients in the aftershocks, stress responses right after the quake became higher. Laube's [7] survey revealed that when nurses suffered and worked through the hurricane, too much physical stress and anxiety within their patients and their own safety were a main source of their stress. The result of this study made it clear that anxiety occurred when they couldn't care enough for their patients was a big stressor for them, and it became a main factor of stress responses.

What is more, the result of path analysis made it evident that if caregivers thought emergency aid wasn't adequate and had difficulties finding and maintaining water, food, and a place to sleep, and they had their home destroyed or half damaged, their stress responses after a month became higher. Kawamura, Goto, and Matsuda's [10] research results showed 60 % of nurses who suffered in the Hanshin Awaji Earthquake had their home destroyed or damaged, and 80 % of them had at least some difficulties when they continued in nursing care. Ootsuka and Matsumoto [12] pointed out not only the rescuers' difficulties in their jobs, but also in their

daily lives is one stressor. From the result of this study, of the caregiving staff who suffered, not only difficulties with patient care but also with their own lives were a stressor, and they became the factors that promoted PTSD symptoms later. It is expected that supplying adequate emergency aid and rationing for the damaged facilities will be a guide to help in stress care for the staff indirectly. Besides, we should think of a way to alleviate the daily problems for the staff who suffered and had difficulties with water, food, and housing problems, and this could be important in the rescues' stress care.

From the result of this study, it became clear that the caregiving staff who were in places where rescue operations were in progress, the patients throughout the disaster also showed serious stress symptoms from difficulties with patient care and troubles in their daily lives. The rescuers like caregiving staff had difficulties both with their relief operations and their own lives. Compared to other disaster victims, they experienced more stress and it is considered that their serious stress responses remained even longer.

From our knowledge and information obtained from this study, we suggest the ideas below concerning stress care for caregivers. First, examine the way to lighten the stressful conditions right after the disaster and find a way to secure a food supply and a place to sleep. Second, we need to discuss countermeasures focusing on stress conditions of elder caregivers. The third and last factor, there is a need to make a study on affective disaster training in providing stress care.

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