

Psychoeducational intervention to prevent critical incident stress among disaster volunteers

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Objective: Citizens participating in relief activities in disaster areas can be greatly affected by critical incident stress (CIS). The present study examined the efficacy of pre-departure psychoeducational intervention (PEI) on alleviating CIS.

Method: Participants in disaster volunteer dispatch organizations were divided into 2 groups: those who had received pre-departure PEI for alleviating CIS, including information on specific symptoms of CIS, coping strategies, and consultation services, and those who had not received such intervention. We subsequently evaluated the between-group differences among the Impact of Event Scale-Revised (IES-R) scores.

Results: The average IES-R score of the PEI group was significantly lower than that of the no-PEI group (3.5 vs. 4.8, $P = 0.02$). Even after controlling for elapsed time since their most recent participation in volunteer activity, the PEI-group score was significantly lower than that of the no-PEI group (3.8 vs. 5.1, $P = 0.02$).

Conclusions: These findings indicate that receiving pre-departure PEI for CIS was significantly related to alleviating CIS after participation in volunteer activities. With the increased numbers of disaster volunteers, comes an increased need for providing PEI.

Key words: disaster volunteer, critical incident stress, psychoeducational intervention, PTSD (posttraumatic stress disorder)

Introduction

Japan has recently experienced many disasters, such as earthquakes, floods, and tsunami, and many citizens and volunteers have gathered in disaster areas for rescue missions and reconstruction support programs. Volunteer efforts were especially prominent after the Great East Japan Earthquake that occurred on March 11, 2011. This magnitude 9.0 earthquake reached a maximum of 6 upper on the Japanese seismic intensity scale. The number of volunteers who helped in relief activities at disaster volunteer centers in Iwate, Miyagi, and Fukushima prefectures reached 1,381,700 at the end of July 2014.¹

Citizen participants in relief activities in disaster areas can be greatly affected by psychological distress.²⁻⁵ Severe psychological stress experienced by those engaged in relief and support of survivors after tragic disasters or accidents is known as critical incident stress (CIS), which

can lead to various symptoms such as hyperarousal, flashbacks, emotional numbness, and sleeplessness, strong feelings of helplessness, and feelings of self-condemnation.⁶ Hagh-Shenas et al.⁷ examined the psychological state of professional rescue workers and college students engaged in volunteer activities after the Bam Earthquake. They found that college students had higher posttraumatic stress disorder (PTSD) scores than did the professional rescue workers, which in 34% of the students were high enough scores to qualify for a PTSD diagnosis.⁷ CIS can be experienced not only by those who have actually engaged in efforts to aid survivors but also by those who have witnessed disaster areas and those who have provided psychological support to disaster survivors by listening to them.⁸

Twenty-six months after the 1995 Great Hanshin Earthquake in Japan, as many as 21.3% of professionals who experienced CIS after having a life-or-death

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experience or witnessing the tragic aftermath were reportedly severely affected, to the extent of qualifying for a diagnosis of PTSD.^{9,10} Since then, public disaster-relief organizations, such as the Fire and Disaster Management Agency, Coast Guard, and Self-Defense Force have increased their efforts to manage CIS.¹¹ However, not much has been done to address CIS in citizens who have voluntarily participated in relief activities in disaster areas.

In the past, we have conducted activities to inform the public of the need for security control measures of citizen volunteers to avoid fatal and injurious accidents and to ensure the safety of disaster volunteers.^{12,13} Furthermore, after the Great East Japan Earthquake, the Japan First Aid Society (JFAS; one author is a member of this society) created disaster volunteer activity guidelines and manuals for the prevention of CIS, and posted these materials to encourage volunteer groups to provide psychoeducational intervention (PEI) for citizen volunteers.¹⁴ However, we have yet to evaluate the effect of these training materials. In the present study, we examined pre-departure PEI on the alleviation of CIS for those who have engaged in disaster rescue activities.

Methods

Participants

Among organized groups that have dispatched volunteers to disaster areas in Japan, we selected 4 organizations (A–D) that, to the best of our knowledge, have been systematically and continuously engaged in disaster-assistance activities.

Organization A solicits volunteers within Mie Prefecture and transports them by bus to Iwate Prefecture. Organization B is a large enterprise that encourages its employees and their families to engage in volunteer activities in the Tohoku area. Organization C is a nongovernmental disaster relief volunteer center that solicits volunteers within Kanagawa Prefecture and sends them to Iwate and Miyagi Prefectures. Organization D consists of employees from various companies, such as steel, shipbuilding, and logistical corporations. We included citizen members of these organizations who agreed to participate in the present study, the period of which was from September 1, 2012 through March 2013.

Procedures

We contacted those in charge of each of these 4 organizations and informed them both verbally and in writing of the study purpose. Once we obtained their consent and cooperation, we asked them to convey the

study purpose and procedure to the members of their organizations. Thus, the members were informed both verbally and in writing that their participation was voluntary and that there would be no negative consequences for nonparticipation. Organizations also conveyed to their members the purpose of this study, obtained their informed consent, and then handed out our demographic questionnaire. After members returned from their volunteer activities, they handed in, sent in, or opted not to send in, their questionnaires to their organizations.

The survey questionnaire clearly stated, apart from the study purpose, that filling out the form would indicate their consent to participate in the study. Anonymous, self-rating questionnaires were used. The study was conducted with the approval of the ethics committee of the Kitasato University School of Allied Health Sciences.

Participants' characteristics

In addition to the demographic characteristics of sex, age, and employment status, the self-rating questionnaire asked whether respondents had experienced a major disaster as an inhabitant (yes or no; if yes, the name of the disaster); activity details (write-in, multiple responses allowed); active period of volunteer activity; whether they had seen terrible scenes during their current activities, such as witnessing a tsunami devastate an entire town, encountering severely wounded survivors or dead bodies, or experiencing unusually large aftershocks (free response, multiple responses allowed); time elapsed since their most recent volunteer activity (free response); and participation in pre-departure PEI (yes or no).

Impact of Event Scale-Revised

We used the Impact of Event Scale-Revised (IES-R) to measure CIS. The IES-R measurement was originally developed by Weiss and Marmar,¹⁵ with the Japanese version created by Asukai,¹⁶ for which validity has been confirmed.

The IES-R has 22 items and 3 subscales (intrusion, avoidance, and hyperarousal). Intrusion indicates a state in which an individual experiences a sudden flashback or flashbacks of scenes witnessed during volunteer activities along with intrusive thoughts and/or nightmares. Avoidance is a state in which an individual avoids anything that reminds him or her of the disaster area, stays away from involved parties, and remains unwilling to talk about their volunteer activities. Hyperarousal is a state in which an individual remains mentally hypersensitive and reports insomnia symptoms, and has difficulty concentrating, a heightened startle response,

and irritability.

Respondents were also asked to specify the severity of these 22 symptoms in the previous week using a 5-point scale (0: not at all; 1: a little; 2: somewhat; 3: fairly; 4: very [severe]), with high scores indicating greater distress. Although 24/25 is the suggested cut-off point for screening those at high risk of PTSD, the IES-R examines severity of conditions at only one point, and its validity has never been confirmed. Therefore, the cut-off point of 24/25 is only suggested as a guide for PTSD screening.

Implementation of CIS prevention training

Organization A mandated participation in CIS prevention training before initiating any volunteer activity. In their briefing session, a regular staff member of the organization conducted a 10-minute PEI session using our informational materials. Organization B provided no PEI for its employees. Organization C mandated participation in a pre-departure meeting in which we conducted a 15-minute PEI session using our informational materials. Organization D provided pre-departure PEI comprising a 30-minute lecture on CIS that we conducted in some cases but not in others.

Informational materials on CIS first explain various physical and emotional changes (stress reactions) caused by participating in activities located in disaster areas. These reactions include continued agitation, flashbacks, avoiding remembrance of past events, physical disorders, and relational conflicts. The materials further explain that these are normal reactions that occur in an abnormal state, and that they are temporary and will disappear with the passage of time. Specific methods to alleviate CIS are also explained, namely: (1) getting enough rest; (2) engaging in regular sports or hobbies; (3) spending time with a familiar person; (4) conversing with others who share the volunteer experience; and (5) receiving counseling from professional counselors if unpleasant feelings resurface or appear later.

Statistical analyses

Participants were divided into 2 groups according to their questionnaire responses: those who had received pre-departure PEI (PEI group) and those who had not (no-PEI group). To test for group differences, we used a *t*-test for interval variables and χ^2 for categorical variables. To examine the relationship between post-activity CIS levels and the presence or absence of pre-departure PEI, we used a generalized estimating equation to determine whether a significant difference in IES-R scores existed across the groups. Due to the influence of

CIS levels and the time elapsed since a respondent was subjected to a stressful situation and since a respondent completed his or her most recent volunteer activity, we controlled for these factors.

When a statistical difference between the 2 groups was observed in a given baseline characteristic of the participants, that characteristic was added to the list of control variables. SPSS 19.0J for Windows (SPSS Inc., Chicago, IL, USA) was used for the analyses.

Results

Organizations A–D had 55, 66, 93, and 339 citizen volunteers, respectively, for a total of 553 citizen volunteers. Among those 553 citizen volunteers, 515 (response rate, 93.1%) of them returned valid responses.

Participants' characteristics

Participants were 70 women (13.6%) and 445 men (86.4%), with an average age of 41.8 years (SD: 12.05; range: 17–78) (Table 1). Among them, 449 (87.2%) had cleared rubble, 61 (11.8%) had engaged in rescue activities at evacuation centers, 396 (76.9%) had listened to survivors' stories, and 14 (2.7%) had helped run volunteer centers. As many as 436 of them (84.7%) answered that they had seen terrible scenes indicative of extraordinary happenings that they had never experienced before or that they had encountered dead bodies.

Among the respondents, 105 (20.4%) had experience as an inhabitant during a major disaster (Table 1). Of those, 32 had experienced the Great East Japan Earthquake, and 38 had experienced the Great Hanshin Earthquake. Another 33 respondents had experienced water disasters (e.g., the Isewan Typhoon and the Tokai Flood), other earthquakes, and/or tsunamis.

The mean active period of engagement in volunteer activities was 6.35 days (Table 1). One day was reported by 39 respondents (7.6%), 3 days for 94 (18.3%), and less than 1 week for 361 (70.1%) respondents. Moreover, as many as 45 (2.1%) respondents had engaged in volunteer activities for more than 10 days.

The elapsed time since the completion of their most recent volunteer activity was less than 24 months for all respondents. Because elapsed time was not normally distributed, we transformed the variable into 3 categorical variables: less than 1 month (135 [26.2%]), more than 1 month but less than 12 months (58 [11.8%]), and more than 12 months but less than 24 months (322 [62.5%]) (Table 1).

As for pre-departure PEI, 255 (49.5%) respondents had received the intervention, and 260 (50.5%) had not.

Table 1. Participants' attributes

	Total N = 515	Psychoeducational Intervention		P-value
		PEI Group n = 255	No-PEI Group n = 260	
Sex (%)				0.516
Female	70 (13.6%)	35 (13.7%)	35 (13.5%)	
Male	445 (86.4%)	220 (86.3%)	225 (86.5%)	
Age (years), mean (SD)	41.8 (12.05)	42.3 (11.81)	41.2 (12.28)	0.231
Employment status, number (%)				0.177
Employed	456 (88.5%)	218 (85.5%)	238 (91.5%)	
Student	3 (6.0%)	2 (0.8%)	1 (0.4%)	
Unemployed/homemaker	52 (10.1%)	32 (12.5%)	20 (7.7%)	
Missing value(s)	4 (0.8%)	3 (1.2%)	1 (0.4%)	
Past experience with a disaster, number (%)				0.423
Yes	105 (20.4%)	56 (22.0%)	49 (18.8%)	
No	396 (76.9%)	194 (76.1%)	202 (77.7%)	
Missing value(s)	14 (2.7%)	5 (2.0%)	9 (3.5%)	
Active period (days), mean (SD)	6.35 (3.56)	6.26 (2.73)	6.43 (4.23)	0.576
Time elapsed since most recent volunteer activity, number of volunteers (%)				0.162
<1 month	135 (26.2%)	63 (24.7%)	72 (27.7%)	
1 month to <12 months	58 (11.8%)	34 (13.3%)	24 (9.2%)	
12 months to <24 months	322 (62.5%)	158 (62.0%)	164 (63.1%)	

Mean (SD) is shown for age and active period, whereas % is shown for other variables. PEI, psychoeducational intervention

Table 2. Group differences in IES-R scores

IES-R	PEI Group (n = 255) Average (95% CI)	No-PEI Group (n = 260) Average (95% CI)	P-value
Unadjusted			
Total	3.5 (2.7–4.3)	4.8 (4.0–5.6)	0.02
Intrusion	2.0 (1.6–2.4)	2.6 (2.2–3.0)	0.04
Avoidance	0.9 (0.6–1.2)	1.3 (1.0–1.6)	0.04
Hyperarousal	0.6 (0.4–0.8)	0.9 (0.7–1.1)	0.06
Adjusted*			
Total	3.8 (2.9–4.8)	5.1 (4.1–6.1)	0.02
Intrusion	2.3 (1.8–2.7)	2.8 (2.3–3.3)	0.04
Avoidance	0.9 (0.5–1.3)	1.3 (1.0–1.7)	0.04
Hyperarousal	0.7 (0.4–0.9)	1.0 (0.7–1.2)	0.05

95% CI, 95% confidence interval; IES-R, Impact of Event Scale-Revised

*We controlled for time elapsed since completion of respondents' most recent volunteer activity (less than 1 month, 1 month to 1 year, and more than 1 year).

Differences in participants' characteristics between the PEI group and the no-PEI group were not significant.

Differences in IES-R scores by the presence and absence of pre-departure PEI

Eleven (2.1%) respondents (4 [0.8%] in the PEI group, and 7 [1.4%] in the no-PEI group) had IES-R scores of 25 or above, implying that they had or might have PTSD (Table 2). The unadjusted average IES-R score for the PEI group was 3.5 (2.7–4.3), which was significantly lower than that for the no-PEI group (4.8, 4.0–5.6 with 95% confidence interval [95% CI]). Average scores (95% CI) on intrusion, avoidance, and hyperarousal for the PEI group were 2.0 (1.6–2.4), 0.9 (0.6–1.2), and 0.6 (0.4–0.8), respectively, and those for the no-PEI group were 2.6 (2.2–3.0), 1.3 (1.0–1.6), and 0.9 (0.7–1.1), respectively. Scores on intrusion and avoidance for the PEI group were significantly lower than those for the no-PEI group. Although the average score of hyperarousal was also lower for the PEI group, it was not statistically significant.

We did not find no any statistically significant between-group differences among any of the participants' characteristics. Therefore, only the time elapsed since the completion of respondents' most recent volunteer activity was included in the generalized estimating equation model for control variables.

After adjusting for time elapsed since the completion of the respondents' latest activities, we found that although the average IES-R total score for the PEI group was 3.8 (2.9–4.8, 95% CI), that for the no-PEI group was significantly higher at 5.1 (4.1–6.1, 95% CI). As for the IES-R subscale scores, scores on intrusion and avoidance for the PEI group were 2.3 (1.8–2.7) and 0.9 (0.5–1.3), respectively, and those for the no-PEI group were 2.8 (2.3–3.3), and 1.3 (1.0–1.7), respectively. These differences were statistically significant. The average score on hyperarousal for the PEI group was 0.7 (0.4–0.9), and that for the no-PEI group was 1.0 (0.7–1.2). These differences in scores were not significant.

Discussion

These results suggest that CIS levels after completion of disaster relief activities in citizens who had received PEI before engaging in these activities were lower than those who had not received PEI. To date, CIS prevention intervention has been provided for professionals who engage in disaster relief activities while on duty.^{17,18} Since the Great Hanshin Earthquake, stress-coping measures for firefighters and maritime safety officers have become

widely implemented in Japan.¹⁹ In the United States, education programs, including counseling sessions to prevent CIS, were provided for nurse volunteers during Hurricane Katrina.²⁰ In 2011, at a time when countermeasures seemed to be more widely available, the Great East Japan Earthquake occurred. During and after the earthquake, many CIS cases among disaster relief supporters were reported, and the need for further implementation of pre-departure CIS intervention has been emphasized.²¹ Presently, measures to prevent and alleviate CIS in citizens heading to disaster areas as disaster relief volunteers are especially inadequate. A study on volunteers 9 months after a disaster at an oil drilling site revealed that 101 of 134 volunteers had not received any pre-departure PEI training.²² After reviewing 448 articles on disaster volunteers, Thormar et al.²³ found that many participating disaster volunteers lacked the necessary training compared to occupational disaster relief personnel.

In the present study, a relatively high percentage of participants (225, 49.5%) had pre-departure PEI. Most likely, many of these participants belonged to volunteer dispatch organizations located far from the disaster areas, which gave them the opportunity to receive pre-departure PEI. Despite the difficulty in setting aside adequate time for this kind of educational intervention, these findings suggest that even a short period of PEI can help alleviate CIS.

Psychoeducation intervention for CIS and preemptive moves after a disaster are important for the prevention of CIS. After the Great Hanshin Earthquake, the Fire and Disaster Management Agency began to provide CIS education for those engaged in disaster relief activities while on duty. The Japan Coast Guard, the Self-Defense Force, and the National Police Agency began to systematically adopt CIS educational programs and preventive measures. CIS prevention training for firefighters has also been provided at each stage of promotion such as during initial and subsequent promotion training.²⁴ When a disaster or a critical incident occurs, they carry out the measures to provide such training. The contents of those measures differ depending on the scale of the disaster and the work site, but they include various methods such as handing out simple leaflets and adopting some preventive intervention techniques, such as group meetings, defusing, and debriefing.¹⁹

One of the authors in this study has developed crisis management programs for volunteers to help them cope with emergency situations, and has created materials for CIS prevention intervention for distribution at many

volunteer organizations. These materials explain: (a) what CIS is, (b) specific symptoms of CIS, and (c) coping measures for CIS in a straightforward manner using simple illustrations and pictures to make it easier for the general public to understand. This information has been compiled into a small A5-sized leaflet so it can be readily carried around. We also have ensured that training can happen during the busy pre-departure period and without computer resources such as slides and PowerPoint. However, the CIS training that we provide still has room for improvement. Although the leaflet is easily carried and read anywhere, due to space constraints, it only includes a list of main points with illustrations and pictures, but no detailed explanations, inevitably resulting in a shortage of information.

In the present study, we were able to facilitate the participants' understanding in the organizations that invited us to conduct the PEI. However, in one organization where staff members merely handed out leaflets and then briefly reviewed its contents, comprehension of CIS and relevant coping measures might have been insufficient.

Although the IES-R scale used in the present study cannot correctly screen for the presence or absence of PTSD, 2.1% of the respondents scored 25 or over, which could indicate severe CIS. We also cannot overlook the fact that some volunteer participants whose experiences were not as severe as those of professional rescue personnel (e.g., firefighters) still exhibited a very intense level of symptoms. Nowadays, more and more people are volunteering to help in disaster activities; therefore, there is now an increasing need for CIS prevention measures for those volunteers.

In the future, we may be able to conduct a more extensive study of citizens who have registered with disaster volunteer centers in disaster areas. We also intend to enhance the validity of the current study as well as to conduct comparative studies to explore more efficient methods to provide even better PEI to combat CIS.

This study has some limitations. First, as a cross-sectional study, it cannot confirm a causal relationship between PEI for CIS and stress reactions after completion of volunteer activities. Second, only members of volunteer dispatch organizations were included in this study; therefore, we had no data on people who went to disaster areas by themselves. Third, because each organization determined PEI content and the allocation of time, we could not evaluate the intervention quality. Fourth, to reduce the respondents' burdens, the number of questionnaire items on outcome or adjustment factors were limited as much as possible. Therefore, we lacked

information on participants' characteristics and confounding factors. Finally, because volunteer participants engaged in a great variety of activities, and many of them engaged in multiple activities, we could not control for type of activity in the statistical analyses.

The results of this study suggested that PEI for CIS provided for citizen volunteers for disaster relief activities before heading to disaster areas might have helped to alleviate their CIS after they completed the activities. With an increasing number of disaster volunteers, the need to provide them with more effective psychoeducational intervention is also increasing.

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