Deployment-related difficulties of Japanese disaster relief workers by mission duration: a cross-sectional study

Norihito NOGUCHI1, Satoshi INOUE2, Chisato SHIMANOE3, Kazuyuki AKINAGA4, Miki UENO1, Haruna TAKAHASHI1 and Koichi SHINCHI4

1Division of Nursing, National Defense Medical College, Saitama, Japan  
2Department of Emergency Medicine, Division of Trauma Surgery and Surgical Critical Care, Faculty of Medicine, Saga University, Saga, Japan  
3Department of Preventive Medicine, Faculty of Medicine, Saga University, Saga, Japan  
4Division of International Health and Nursing, Faculty of Medicine, Saga University, Saga, Japan

Abstract

Aim: This study aimed to identify the experiences and feelings of difficulty during international humanitarian aid of Japanese relief workers based on the length of the mission.

Methods: This cross-sectional study was conducted from August through December 2015. Participants were 167 Japanese healthcare workers who participated in an overseas disaster relief mission and were asked to complete a self-administered questionnaire. Feelings of difficulty during the international humanitarian aid were assessed using the Humanitarian Aid Difficulty Scale. Scores on this instrument were evaluated based on mission duration using analysis of covariance with adjustment for sociodemographic status and disaster relief-related status.

Results: Of the instrument’s five subscales, the highest score for all mission duration was for “Culture and Custom”. Higher “Culture and Custom” scores and “Cooperation” scores were associated with longer mission duration (p trend: 0.02 and 0.004, respectively). Additionally, the “Infrastructure” score for a medium mission duration was higher than that for a long mission duration (p = 0.001), and the “Cooperation” score for a long mission duration was higher than for a short mission duration (p = 0.02).

Conclusions: The mission duration may be independently associated with an increase or decrease in the negative experiences of Japanese relief workers at an overseas disaster site. Results suggest that it is necessary for Japanese relief workers, who participate in international aid, to further enrich their cross-cultural understanding through education. Moreover, relief organizations should provide comprehensive support that addresses difficulty-related feelings depending on the mission duration.

Key words: culture, disasters, relief work, Japan, stress

INTRODUCTION

Immediately following an overseas disaster, many external disaster relief teams, such as foreign medical teams (FMTs), travel to the area to provide affected individuals with health care and rescue services (Brolin, Hawajri, & von Schreeb, 2015; Noguchi et al., 2016a; Peiris, Buenaventura, & Zagaria, 2015). FMTs are categorized into three groups depending on the level of care, size, capacity, and capability to deliver predefined services. For example, type 1 FMTs consist of a group of relief workers that includes three physicians trained in emergency and primary care, in addition to nurses, paramedics, and logistical staff (World Health Organ-
FMT relief workers are expected to be self-sufficient when they arrive at and operate within an affected area. However, relief workers may experience stressful situations while at the disaster site (Mitchell, 2011). Subsequently, the stress experienced by these disaster relief workers (e.g., medical professionals, logisticians) often results in mental health problems (Brooks et al., 2015; Maeda, Ueda, Nagai, Fujii, & Oe, 2016). To date, there is limited data about the difficulties faced by relief workers in these challenging situations of international disaster settings. Because they play a vital role in the relief of many people in disaster-affected areas, assessment of their feelings about difficult experiences during relief activities that could lead to negative mental health outcomes is critical.

In a nursing report about the United Nations Mission in the Republic of South Sudan by the Japan Self-Defense Force, it was reported that dispatched personnel on overseas missions contended with many difficulties associated with the living and working environment (Noguchi et al., 2013). For instance, it was necessary for public health nurses who worked in developing countries to confront challenges related to daily life and cultural adaptation, the local language, relationships with local staff, and cooperative activities. Relief workers in international disaster settings not only contended with day-to-day disaster work-related stress, but also were unable to escape the various experiences associated with the stressful environment. Recently, prolonged time spent and earlier arrival on disaster sites have been shown to significantly increase the risk of mental distress (Brooks, Dunn, Amlot, Greenberg, & Rubin, 2016). Additionally, the specific types of difficulties experienced changed throughout the length of deployment (Sakamoto, Mizutani, & Oji, 2004). Thus, relief workers’ negative experiences are likely to vary according to mission duration. Some studies have indicated that prolonged time spent at a domestic disaster site significantly promoted distress (Berninger et al., 2010; Brackbill et al., 2009), while other studies have found no significant association between the number of days spent at a domestic disaster site and psychological distress (Bowler et al., 2012; Dobashi et al., 2014). However, little is known about the association between the length of the mission on an overseas disaster site and the negative experiences of disaster relief workers.

Unfortunately, until recently, few measures have been developed to assess overseas disaster relief workers’ feelings about these experiences. However, it is notable that the Humanitarian Aid Difficulty Scale (HADS) has now been developed, allowing for easier assessment of dispatched disaster relief workers’ feelings when performing on-site relief and reconstruction (Noguchi, Inoue, Shimanoe, & Shinchi, 2016b). In the HADS, “difficulty” is defined as the negative experience of healthcare workers, and the events or circumstances representing chronic irritations and pressures that occur with respect to disaster relief activities. Despite the creation of this scale, few existing studies have used this instrument to evaluate the quality and content of disaster relief workers’ feelings about their difficulties.

Thus, a study focusing on disaster relief workers’ feelings will be useful, as it can provide insight into effective methods of education and training about challenges that could be faced during an actual mission. To explore the association between the length of the mission and the negative experiences of disaster relief workers, we hypothesized that negative experiences are likely to vary according to length of the mission. To examine this hypothesis, we investigated disaster relief workers’ feelings associated with difficult experiences during overseas recovery support missions, using the HADS.

**METHODS**

**Participants and procedure**

In this study, we used existing data from a HADS development and evaluation study to assess how relief workers felt while providing international disaster relief assistance. The participants and methods used in this HADS study are described in detail in a separate article (Noguchi, Inoue, Shimanoe, & Shinchi, 2016b). In brief, this study implemented a cross-sectional design that involved completion of a self-administered questionnaire between August and December 2015. Participants consisted of relief workers from 44 medical facilities, which included faculties associated with providing international disaster relief or humanitarian aid in Japan. A total of 214 Japanese relief workers, including physicians, registered nurses, and logisticians, who met the inclusion criteria, consented to participate and completed the questionnaire. Eligibility criteria included having previous experience providing disaster relief assistance or humanitarian aid on an overseas mission. In addition to healthcare-specific workers, we included “logisticians” in our study. Logisticians were defined as individuals whose primary responsibilities involved team management, office work, liaison and coordination with international or other relevant organizations, and management of medical and life support equipment. Equipment management included responsibilities such as determining how equipment was locally procured and acquired, as
well as how it was distributed, allocated, and delivered. In this regard, logistics are as indispensable in disaster relief teams as healthcare workers.

**Measurements**

Participants’ sociodemographic data were collected, and included information about age, gender, years of work experience, and job title. Questionnaires also collected disaster relief-related information about the following: mission type (categorized as Japan Disaster Relief Team, United Nations Peacekeeping Operations, or Humanitarian Aid and Other); prior international disaster relief experience; prior disaster training experience; type of disaster (categorized as either natural or man-made); disaster phase (number of weeks from disaster onset to day dispatched to area); and mission duration (in days).

Relief workers’ feelings about difficulties were assessed using the HADS. This scale consisted of five subscales: Culture and Custom, Health Status, Infrastructure, Cooperation, and Supplies and Equipment. The four items in the “Culture and Custom” subscale evaluated aspects associated with differences in lifestyle and culture from those of the local people (e.g., “I had different notions about prevention of disease than local people”). “Health Status” consisted of six items about the need to maintain health (e.g., “I found I had a loss of appetite compared to my appetite prior to departure”). “Infrastructure” consisted of four items related to the infrastructure that was necessary for life (e.g., “I had difficulties getting enough water to fulfill my daily needs”). The “Cooperation” subscale consisted of five items related to cooperation with other people or organizations (e.g., “I had difficulties receiving cooperation from the international relief agency”). Finally, “Supplies and Equipment” consisted of four items related to utilizing and acquiring equipment (e.g., “I found I had trouble with supplies and equipment”).

Overall, the HADS acts as a unidimensional measure that reflects the difficulties faced by healthcare workers performing humanitarian aid. The total scale consists of 23 items that are rated on a five-point scale (1 = strongly disagree to 5 = strongly agree). Responses were summed and divided by the number of answered items to generate a total HADS mean score and a mean score for each subscale that each ranged from 1.0 to 5.0. Higher scores reflect greater difficulty experienced within the living and working environment. The HADS has acceptable psychometric properties, with high internal consistency (Cronbach’s alpha = 0.83), and statistics indicate it is an appropriate scale for evaluating individuals’ feelings associated with difficulties (Root Mean Square Error of Approximation = 0.04, goodness of fit index = 0.92, adjusted goodness of fit index = 0.88, and comparative fit index = 0.96).

**Data analysis**

All statistical procedures were performed using SPSS version 21.0 for Windows (IBM Corp., Tokyo, Japan). Descriptive analysis was conducted for sociodemographic and disaster relief-related data. We used the following categorical variables for disaster relief-related data: “Mission duration” was divided into three categories of short: <31 days, medium: 31–90 days, and long: >90 days based on the tertile cut-points for the distribution of the number of days spent on the disaster site. “Disaster phase” was also divided into three categories: acute phase: <1 week, sub-acute phase: 1–3 weeks, and recovery phase: >3 weeks. The mean HADS score was calculated and compared for each mission duration. An analysis of covariance (ANCOVA), followed by Bonferroni multiple-comparison tests, were conducted to compare the relationships between the least squares means, as HADS scores (total score and subscale scores) were adjusted for gender (male, female), age (continuous values), job title (medical doctor, registered nurse, and logistician), mission type (Japan disaster relief team, United Nations Peacekeeping Operation, and Humanitarian aid and Other), prior international disaster relief experience (none, once, and more than once), prior disaster training (none, once, and more than once), type of disaster (natural disaster, man-made disaster), and disaster phase (less than 1 week, 1–3 weeks, and more than 3 weeks). Trends in the HADS score, depending on mission duration, were analyzed using multiple linear regression analyses with a simultaneous data entry method. Sociodemographic status (age, gender, and job title) and disaster relief-related status (mission type, prior international disaster relief experience, prior disaster training, type of disaster, and disaster phase) were entered as covariates in the regression model to remove their effects on the HADS score. For all comparisons, p values of less than 0.05 were considered statistically significant.

**Ethical considerations**

The study protocol was approved by the Ethics Committee of the Faculty of Medicine of Saga University (approval no. 25-22). To protect participants’ privacy, questionnaires were distributed and collected within each facility by cooperative staff members who then returned them to the researchers. Informed consent was deemed to be established when participants completed and returned the questionnaire.
RESULTS
In total, of the 214 Japanese relief workers, 167 (78%) provided responses to all items and were included in the analysis. A total of 54 physicians, 60 registered nurses, and 53 logisticians participated in the study. Study participants had a mean age of 41.8 (SD = 8.7) years. Table 1 summarizes the sociodemographic and disaster-relief-related data based on mission duration. In the case of the short mission duration, more than 40% of relief workers were in the acute phase, and the majority of workers in the long mission duration category were in the recovery phase.

Characteristics of the HADS score according to mission duration are presented in Table 2. The Cronbach’s alpha for the total score of the HADS was 0.88, which was comparable to 0.83 reported in the original version. The highest total HADS score was for the medium mission duration. The “Culture and Custom” HADS subscale had the highest mean score of the five subscales for all mission duration. Furthermore, an increasing trend in “Culture and Custom” and “Cooperation” mean scores were associated with longer mission duration (p trend: 0.02 and 0.004, respectively). A significant difference was observed in the mean scores for “Infrastructure” subscales and “Cooperation” subscales, based on mission duration (p < 0.001 and 0.02, respectively). Bonferroni post-hoc tests showed that only the mean “Infrastructure” score in the medium mission duration was higher than the score for the long mission duration (p = 0.001). The “Cooperation” score for the long mission duration was higher than for the short mission duration (p = 0.02). These associations remained significant after full adjustment. We also attempted to determine whether the HADS score would change depending on the disaster phase, but the subscales were not significantly associated with the disaster phase.

We further examined if the above association of the HADS score and mission duration was affected by job title. In additional analyses stratified by job title, we noted some difference by job title, in that the “Infrastructure” score in the medium mission duration was higher than in the long mission duration in medical doctors and registered nurses (p = 0.04 and 0.003, respectively). However, no significant interaction between job title and mission duration was detected (P interaction = 0.8)

DISCUSSION
To the best of our knowledge, this is the first study to investigate Japanese relief workers’ feelings about the difficulties associated with disaster recovery support,
Following a large-scale overseas disaster, the study findings suggest that the scores of “Culture and Custom”, “Infrastructure”, and “Cooperation” significantly changed depending on the length of the mission. In particular, the “Culture and Custom” mean score was the highest of the five subscales for all the mission duration. Furthermore, there was a significant trend toward higher “Culture and Custom” and “Cooperation” scores related to longer mission duration.

The hypothesis that relief workers’ experience of difficulties is associated with mission duration was supported. Several studies have focused on the association between disaster phase (i.e., arrival time after disaster) and mental health problems (Chiu et al., 2011; Pietrzak et al., 2012). Conversely, another study has suggested that spending a longer duration on a disaster site generally appeared to be a risk factor for poor mental health (Brooks, Dunn, Amlot, Greenberg, & Rubin, 2016). Similar conclusions were drawn from a review of literature on domestic disaster relief activities, but our observation suggests that even disaster relief activities overseas showed consistent associations between difficulties and mission duration. In addition, no studies have been conducted on this issue, taking into account both the disaster phase and mission duration. It was also notable that mission duration was independently associated with difficulties relating to “Culture and Custom”, “Infrastructure”, and “Cooperation” during disaster relief missions, even after full adjustment. Our results corroborate previous findings (Beminger et al., 2010; Brackbill et al., 2009) suggesting an association between the negative experiences of relief workers and the length of the mission. By providing evidence on the association between the length of the mission and difficulties in disaster relief, our findings suggest that relief organizations should enhance assistance for relief workers, focusing on each HADS subscale depending on mission duration. For example, relief organizations should launch an appropriate systematic intervention for relief workers according to the length of the mission that will establish a comfortable work environment. This could include interviews about mission progress and the living environment, as well as routine medical check-ups. This type of systematic intervention will lead to improvement in relief workers’ experiences with difficult situations and allow them to demonstrate excellent competence when working in a disaster-affected area. In comprehensive support, nurses play an especially important first-provider role in a disaster response, as they make up the largest part of the medical team workforce. Nursing professionals can provide not only emergency nursing care for disaster-affected people in the acute phase, but also long-term support to rebuild their lives in the mid- and long-term phases. To fulfill the expected role, nursing professionals have to be equipped with a wide range of skills and competencies at all stages of the disaster cycle (Sakashita, 2014). We suggest that nurses should manage systematic interventions for disaster responders, including working environment and health status, to reduce the risk of mental and physical health problems throughout the mission duration. Nurses are also expected to play an active role in the relief team by assisting in the handling of difficulties that result from stressful situations.

Our findings that the “Culture and Custom” scores were higher compared to other the four subscales is consistent with previous findings. Specifically, this finding is

### Table 2 Adjusted means and 95% confidence intervals of the Humanitarian Aid Difficulty Scale (HADS) total and subscale scores according to mission duration (N = 167)

| HADS subcategory | Mission duration | p value | p trend |
|------------------|------------------|---------|---------|
|                  | Short (n = 61)   | Medium (n = 60) | Long (n = 46) |         |
| Culture and Custom | 3.1 (2.8–3.4)  | 3.5 (3.3–3.8)  | 3.8 (3.4–4.0)  | 0.05    | 0.02  |
| Health status    | 2.5 (2.2–2.8)   | 2.6 (2.4–2.9)  | 2.5 (2.2–2.9)  | 0.8     | 0.9   |
| Infrastructure   | 2.4 (2.1–2.8)   | 3.0* (2.7–3.2) | 2.1† (1.8–2.5) | <0.001  | 0.1   |
| Cooperation      | 2.0** (1.7–2.3) | 2.4 (2.2–2.6)  | 2.6** (2.4–3.0) | 0.02    | 0.004 |
| Supplies and Equipment | 2.5 (2.2–2.8) | 2.6 (2.3–2.8)  | 2.9 (2.6–3.1)  | 0.2     | 0.1   |
| Total score      | 2.5 (2.3–2.7)   | 2.8 (2.6–3.0)  | 2.7 (2.5–3.0)  | 0.08    | 0.2   |

Note: Data are presented as least squares means (95% confidence intervals). Mission duration was categorized into three groups by length of dispatch to the disaster site (short: <31 days; medium: 31–90 days; long: >90 days).

*Adjusted for sociodemographic status (age, gender, and job title) and disaster relief-related status (mission type, prior international disaster relief experience, prior disaster training, type of disaster, and disaster phase).

†Differences in least squares means representing HADS scores by mission duration were compared using an analysis of covariance (ANCOVA) with the Bonferroni post-hoc test after adjusting for sociodemographic status (age, gender, and job title) and disaster relief-related status (mission type, prior international disaster relief experience, prior disaster training, type of disaster, and disaster phase).

‡A trend in HADS scores by mission duration was evaluated using multiple linear regression analysis adjusting for sociodemographic status (age, gender, and job title) and disaster relief-related status (mission type, prior international disaster relief experience, prior disaster training, type of disaster, and disaster phase).

*p = 0.01 for comparison between medium and long mission duration.

*p = 0.02 for comparison between short and long mission duration.
consistent with the results of a study on the challenges in cultural adaptation contended with by Japanese public health nurses dispatched to international cooperative activities as Japan Overseas Cooperative Volunteers (Sakamoto et al., 2004). Japanese relief workers are required help meet local needs and provide not only medical assistance to the individuals affected by the disaster, but also offer medical facility support and advisement to local medical staff about medical skills, such as technical cooperation (Noguchi et al., 2013). Not surprisingly, the longer these workers provided on-site support, the more work they are assigned. As a result, it is possible that the longer the mission duration, the more frequent the contact with local people and local culture. Thus, it is important that relief workers engaged in long mission duration have the opportunity to fully learn and understand local customs prior to being dispatched to a particular area.

Culture is closely related to beliefs about the determinants of health and perceptions of illness, as well as the extent to which people use health services; thus, different cultures have different practices concerning health and medical treatment (Skolnik, 2012). Because cross-cultural understanding is most likely to enhance health among local people, nurses must consider the patient’s cultural background when planning care, as well as conduct nursing interventions in a manner that respects patients’ cultural differences (Dayer-Berenson, 2010). Therefore, it is essential that disaster relief workers understand the culture and traditions of affected communities (Danna, Pierce, Schaubhut, Billingsley, & Bennett, 2015; Osofsky & Osofsky, 2013). Moreover, it is essential that relief workers have the willingness and ability to accept and adapt to different cultures.

Based on these factors, we suggest several approaches for increasing relief workers’ cross-cultural understanding in international disaster settings. First, it is critical that relief worker training programs be enhanced and strengthened through the inclusion of specific culture-related content to increase cross-cultural understanding. Second, training programs must provide relief workers with more opportunities to practise the provision of medical treatment that reflects a balance of current evidence and on-site patients’ cultural backgrounds. Finally, disaster relief organizations should jointly create electronic databases about medical assistance procedures that account for cultural customs in foreign countries. These should be supported by medical facilities providing medical care for foreign residents in Japan. If created, these electronic databases will likely be a useful tool for relief workers required to provide medical care to patients during actual missions.

The use of electronic learning methods as educational tools in disaster medicine is gradually increasing worldwide. For example, DisasterReady.org (2016) already provides online training courses for humanitarian workers to empower them to more effectively respond to disasters and conflicts. However, the introduction of electronic learning methods as part of disaster medical education in Japan continues to lag in comparison to that implemented at an international level. Thus, if Japanese relief workers could easily access electronic databases pertaining to cultural customs in foreign countries, created jointly by Japanese disaster relief organizations, at any time and from any location, this would increase the use of electronic learning methods as educational tools.

The majority of overseas Japanese disaster medical teams are dispatched to affected areas in low-income countries (Japan International Cooperation Agency, 2016). These countries usually have a chronic shortage of infrastructure for daily living, such as water, food, electricity, and medical supplies. As a result of the impact of a disaster in these areas that already lack daily infrastructure, disasters create more damage to the local infrastructure during the acute phase compared to other phases. However, our findings showed that the “Infrastructure” mean score for the medium mission duration was the highest score among all mission duration. We currently have no definitive explanation for this finding. A possible explanation for this difference is that the participants gradually adjusted to severe disaster situations, resulting in a significantly lower “Infrastructure” score in the long mission duration compared to others. In general, it is difficult for Japanese disaster relief workers to select the mission duration at disaster site themselves. Therefore, healthcare professionals who work in disaster-affected areas must be prepared to adapt to the uncertainty of the situation and cope with symptoms associated with trauma exposure (Giarratano, Orlando, & Savage, 2008). Consequently, it is essential that relief workers are equipped with a wide range of skills relevant to all mission duration and disaster phases during disaster training programs.

This study showed that the difficulties relating to cooperation with relevant organizations and team members significantly increased as the mission duration becomes longer. Our findings are consistent with previous studies showing that poor workplace communication and work-related stressors are associated with mental distress (Ehring, Razik, & Emmelkamp, 2011; Suzuki, Fukasawa, Obara, & Kim, 2014). Consequently, the best way to make disaster relief missions successful
might be to promote collaboration and communication with relief organizations and relief workers. Although we found some differences by job title in the above association between “Infrastructure” score and mission duration in stratified analyses, no significant interaction was observed. The reason for the job-specific association between “Infrastructure” score and mission duration is unclear. However, this result may indicate a need for all individuals involved to develop coping strategies and countermeasures against adversity and stress experienced at a disaster site through disaster training.

Limitations
Several limitations of this study should be acknowledged. First, the cross-sectional study design utilizing retrospective data from Japanese relief workers with prior disaster relief experience could be influenced by recall bias. Second, feelings related to difficulties during disaster relief are likely affected by relief workers’ mental health. Unfortunately, we could not clarify whether their difficulty-related feelings were associated with workers’ mental health condition due to the lack of relevant data. Accordingly, additional research is required to establish relationships between HADS scores and mental health condition. Third, because the sample only included Japanese physicians, nurses, and logisticians with overseas disaster relief experience, the results may not be generalizable to relief workers outside of Japan, at different sites, and in different professions. Finally, the current study utilized a cross-sectional design with a small sample size, which does not allow for strong conclusions regarding causal inference or the directionality of the associations observed. Thus, the results of the current study should be interpreted with caution. Future studies with a prospective design and a larger sample size can validate the results further.

CONCLUSION
The findings from this cross-sectional study deepen the understanding of relief workers’ feelings about difficult experiences that influence international disaster relief assistance. In particular, these results show that the mean HADS scores on the “Culture and Custom”, “Infrastructure”, and “Cooperation” subscales significantly differed depending on mission duration. Mission duration may be an important relative factor compared to disaster phase in the increase or decrease of the difficulties experienced by disaster relief workers. The assessment of HADS scores, according to the length of the mission, provides guidance for the creation of comprehensive support programs for relief workers that can drastically improve their management of difficult experiences in the areas to which they are dispatched. Consequently, relief worker training programs must enable them to develop competencies to contend with potential difficulties and to increase cross-cultural understanding of the particular site.

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AUTHOR CONTRIBUTIONS
Both NN and KS contributed to the conception and design of this study, drafted the questionnaire, participated in data collection, and performed data analysis. CS and KA provided advice about statistical analyses. NN, SI, and CS conducted data interpretation. SI, MU and HT drafted and critically revised the manuscript. All authors read and approved the final manuscript.

DISCLOSURE
The authors have no conflicts of interest to declare.

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