

## Section II

### Research Reports & Other Contributed Manuscripts



## Research Report

Tohoku University Graduate School of Medicine, Endowed Department of Preventive Psychiatry  
Associate Professor – Kazunori Matsumoto

At the Endowed Department of Preventive Psychiatry, as an arm of the Tohoku University Department of Psychiatry and alongside the Tohoku University Department of Psychoneurology and the Tohoku University Hospital Department of Psychiatry, we engage in support and research activities that will be of use to disaster survivors. In FY 2012, we collaborated with the MDMHCC and affiliated organizations on research activities whose results we report below.

### 1. Research on Occupational Mental Health in Disaster-Affected Regions

After large-scale disasters, a variety of supporters from inside and outside disaster-affected areas engage earnestly in aid, recovery, and reconstruction. In particular, in disaster-affected regions, the members of public institutions like administrative agencies, medical institutions, firefighters, police, and the Japan Self-Defense Forces, despite being disaster survivors themselves, have served as supporters, and have continued to carry out grueling work for months on end. Furthermore, nearly all the individuals who have carried out direct support for residents of disaster-affected areas, including visitations, are themselves disaster survivors, and continue to serve as bridges between residents and administrative agencies.

In this sense, interest in the mental health of supporters and workers in the wake of large-scale disasters has recently grown, both inside and outside Japan; however, the amount of research in this area has been inadequate. For this reason, it is unclear which factors give rise to mental distress among supporters in disaster-affected areas, which factors maintain it, and what sorts of countermeasures are most effective. Thus, in an effort to address this problem, we have collaborated with the MDMHCC to provide support and conduct surveys among people of several occupations in disaster-affected areas. We will present the results of that work here; however, because some of our data have not been analyzed and some require further consideration before publication, we can only present them in part.

#### (1) Research on the Health Status of Municipal Personnel and Others in Areas Affected by the Great East Japan Earthquake

In place of their usual work, public agency employees, including the staff of disaster-affected municipalities, continue to work toward recovery and reconstruction despite having been affected by the disaster themselves. In addition, a great number of transfer employees have been dispatched to these disaster-affected regions from other places throughout the nation, and measures to ensure their health are also necessary. However, workplace mental health measures in rural municipalities were somewhat insufficient even before the disaster; unfortunately, under current circumstances, proposing and implementing new measures has proven somewhat difficult.

In this study, after discussions with human resource managers from various occupations, we implemented mental health training workshops for regular employees and managerial personnel, conducted a health survey of these individuals, and carried out post-survey health counseling. Health surveys sought information on social background factors, degree of general stress, depressive symptoms, and PTSD symptoms. Survey items included the following: background information, health status, general stress evaluation (K6), evaluation of depressive symptoms: Mind and Body Questionnaire (Patient Health Questionnaire, PHQ-9) (Matsumura et al., 2008), and an evaluation of PTSD symptoms (PTSD Checklist, PCL). This study was conducted with the approval of the Tohoku University Graduate School of Medicine Ethics Committee. Finally, this study was a part of the following Ministry of Health, Labour, and Welfare Grant-in-Aid for Scientific Research Project: “Research Involving Epidemiological Surveys to Determine the Status of Mental Illness and to Develop Effective Interventional Methods after the Great East Japan Earthquake” (Principal Investigator: Hiroo Matsuoka).

Here, we will present the breakdown of K6 scores obtained from the 967 individuals who provided valid responses (taken from the results of the 1,294 municipal personnel and others from disaster-affected areas we have already analyzed (720 men, 574 women). Research by Kawakami et al. (2007) has established baseline epidemiological data for K6 scores among general community

residents, and because the scale was used in health surveys conducted in temporary housing in the wake of the disaster, it provides a useful frame of reference for comparisons of general stress. K6 scores >10 points indicate “mood/anxiety disorders” and those >13 indicate “severe mental illness.” According to the national survey conducted by Kawakami et al., 8% and 3% of the population fall into these categories, respectively (Kawakami et al., 2007). Further, according to the results of the FY 2011 health survey conducted by Miyagi Prefecture among tenants of private chartered housing (aged 18 or older), 19.1% and 9.6%, respectively, fell into these categories. In comparison to these figures, 27.1% and 13.4% of the municipal employees and others surveyed in this study scored  $\geq 10$  and  $\geq 13$ , respectively, on the K6 scale; these figures are higher than those of both the nation at large and of private chartered housing tenants. It is, therefore, clear that an exceedingly high percentage of municipal employees and others in disaster-affected areas are subjectively aware of their high stress levels.

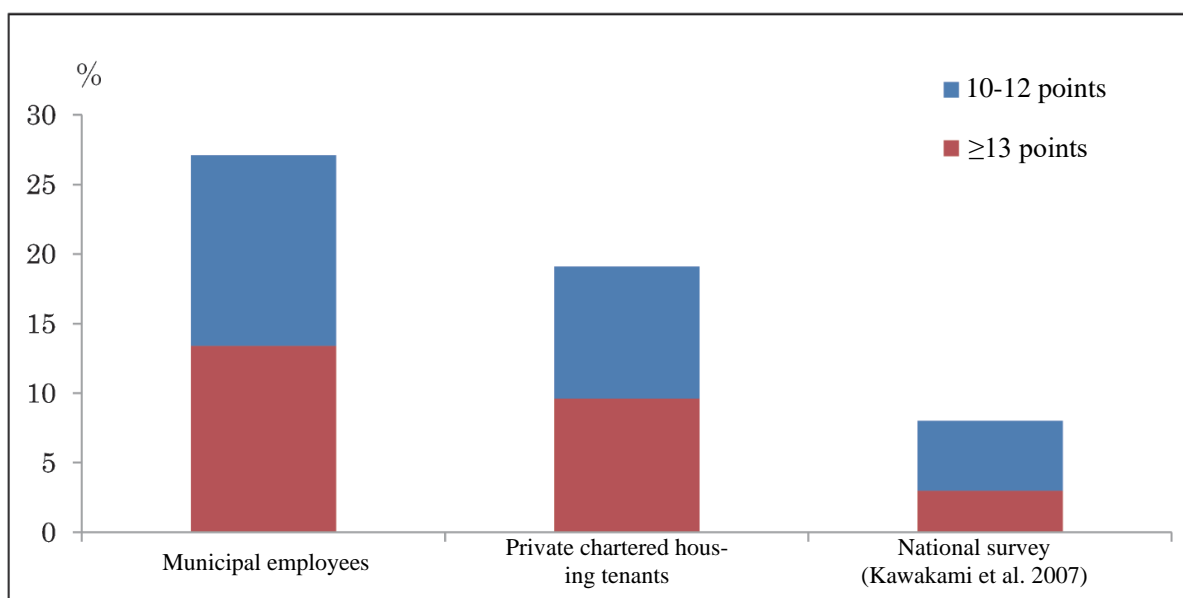


Figure 1: Percentage of Municipal Employees in Disaster-Affected Regions with K6 scores of 10–12 and  $\geq 13$

At present, we are analyzing tabulated data on PHQ-9 and PCL scores and are also conducting an analysis of which factors are linked to various psychological symptoms. Our analyses to date suggest that appropriate rest, workplace communication, and other post-disaster workplace measures affected subsequent mental health. In the future, we plan to conduct longitudinal surveys to both determine the factors associated with recovery and provide continuous support.

## (2) Research on Nurses’ Mental Health After the Great East Japan Earthquake

During the Great East Japan Earthquake, several hospitals in coastal areas were damaged by tsunami floodwaters. Nurses working at hospitals that were completely destroyed and in jeopardy of never being rebuilt not only had to deal with the traumatic experiences of the disaster itself but also the significant stress associated with repeated changes in workplace environments and roles. Similarly, nurses in undamaged hospitals saw their caseloads balloon owing to the destruction of nearby facilities. Perhaps for these reasons, the number of individuals who either left their job altogether or took an extended leave of absence has increased. Thus, health measures for nursing staff are of critical importance in terms of the need to preserve the quality of medical care in disaster-affected regions as well.

We received requests for health surveys and post-survey support related to the mental health of nursing staff from several hospitals in these sorts of circumstances, and we have worked to provide them with continuous support. In this study, we analyzed data from health surveys conducted in each of these hospitals. We aimed to determine what factors affect the mental health of staff, and to put this knowledge to use in the development of post-disaster mental health measures for nursing staff.

We targeted nurses working in several hospitals in disaster-affected areas with health surveys that sought information on social background factors, degree of general stress, depressive symptoms, and PTSD symptoms. Survey items included the following: background information, health status, general stress evaluation (K6), evaluation of depressive symptoms: Mind and Body Questionnaire (PHQ-9) (Matsumura et al., 2008), evaluation of PTSD symptoms (PCL), and the Simple Occupational Stress Questionnaire (excerpted), which uses 28 question items to evaluate occupational stress and social support. This study was conducted with the approval of the Tohoku University Graduate School of Medicine Ethics Committee. Finally, this study was a part of the following Ministry of Education, Culture, Sports, Science and Technology Grant-in-Aid for Scientific Research: “FY 2011 Mental Health Status Survey and Psychological Support for Nurses Affected by the Great East Japan Earthquake” (Principal Investigator: Yoko Takahashi).

In the survey conducted in FY 2012, 424 nurses (men:women=8:381, no answer=35, mean age=41.75±9.70) belonging to five hospitals in disaster-affected areas provided us with valid answers. The PHQ-9, which evaluates depressive symptoms, is designed such that a score of ≥10 points indicates elevated risk of depression; 24.3% of the nurses who responded were in this high-risk group. Further, a score of ≥44 points on the PCL is evaluated as a high risk of PTSD, and 11.8% of surveyed nurses fell into this category (Fig. 2).

We separated respondents into three categories based on the extent of the damage suffered by their hospital—totally destroyed and unable to continue care practices, totally destroyed but care practices shifted elsewhere, and partially damaged with care practices continuing—and evaluated the PHQ-9 and PCL scores in each of these groups (Fig. 3). We found no significant difference with respect to PHQ-9 scores, but did find significant differences for PCL scores [ $F(2,394)=10.25, p<0.01$ ]. Later tests (Bonferroni) revealed that the PCL scores of the “totally destroyed and unable to continue care practices” group were significantly higher than those of the “partially damaged with care practices continuing” group ( $p<0.05$ ).

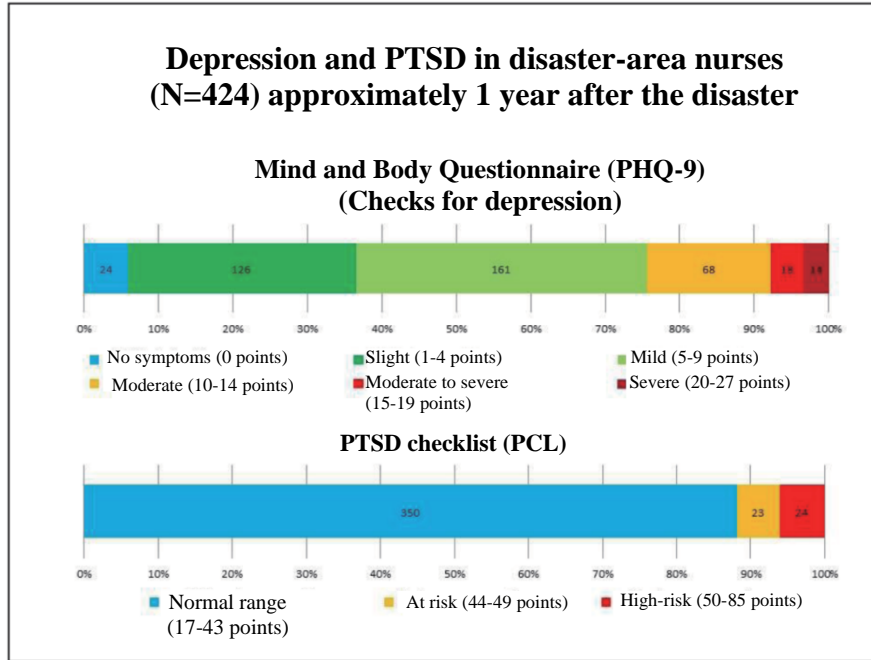


Figure 2: Relationship Between Disaster Damage and PTSD/Depression

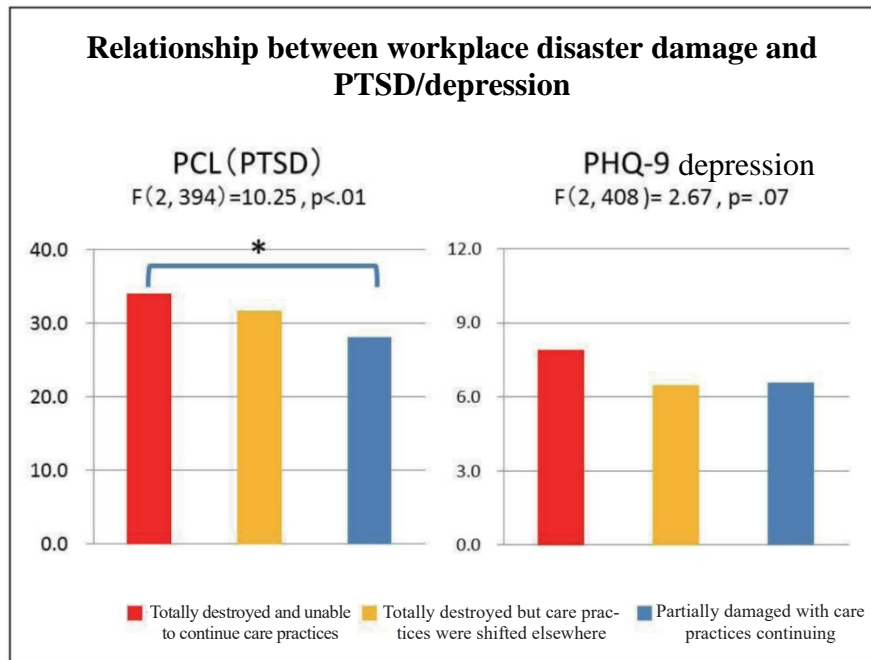


Figure 3: Depressive Symptoms and PTSD Symptoms in Disaster-Affected Area Nurses Approximately One Year After the Disaster

At present, we are exploring the relationship between current status, current health status, and the various indices we surveyed, including the Simple Occupational Stress Questionnaire. Further, in the future, we plan to conduct longitudinal health surveys at some of the facilities surveyed here.

(3) Research on the Health Status of SWC Workers After the Great East Japan Earthquake  
 SWCs in disaster-affected areas have been involved in survivor support since immediately after the disaster. Some have hired residents of areas affected by the Great East Japan Earthquake, and these residents are now at work providing support to residents of temporary housing developments. In this sense, the members of SWCs in disaster-affected areas are both disaster survivors and supporters, and frequently find themselves caught between residents and administrative agencies. For this

reason, mental health measures for SWC members are of critical importance, but traditional measures of that sort are somewhat incomplete. Thus, we have worked with the MDMHCC and Tohoku University to provide health surveys, training sessions, health counseling, and other support.

This study is an analysis of health survey results collected from the members of six SWCs in disaster-affected areas. Health surveys administered in FY 2012 sought information on social background factors, degree of general stress, depressive symptoms, and PTSD symptoms. Survey items included the following: background information, health status, general stress evaluation (K6), evaluation of depressive symptoms: Mind and Body Questionnaire (PHQ-9) (Matsumura et al., 2008), and evaluation of PTSD symptoms (PCL). This study was conducted with the approval of the Tohoku University Graduate School of Medicine Ethics Committee. Finally, this study was a part of the following Ministry of Health, Labour, and Welfare Grant-in-Aid for Scientific Research: “Research Involving Epidemiological Surveys to Determine the Status of Mental Illness and to Develop Effective Interventional Methods after the Great East Japan Earthquake” (Principal Investigator: Hiroo Matsuoka).

The results we will present here are findings from preliminary analyses conducted on 578 individuals’ responses. We examined K6 scores, which reflect general distress levels, and analyzed whether or not a difference existed between the scores of those who had been working prior to the Great East Japan Earthquake (216 individuals) and those who began working after it (362 individuals).

In terms of background information, 10.2% of participants had experienced a family member dying or going missing and 38.2% had experienced large-scale damage or worse to their house. Further, 53.1% subjectively felt that they had not been able to take time off work, and 80.5% subjectively felt that reconstruction had not progressed very much. A higher percentage of new hires relative to individuals working since before the disaster had experienced large-scale damage or worse to their house and/or being forced to move.

In terms of K6 results, 10.5% of respondents scored between 10 and 12 points, and 9.1% scored  $\geq 13$ . These figures are higher than the national figures collected by Kawakami et al. (2007) and are around the same level as those measured by Miyagi Prefecture in private chartered housing among individuals 18 years and older (9.5% and 9.6%, respectively). From this result, we can conclude both that the staff of SWCs in disaster-affected areas are under similar stress conditions as residents and that the percentage of individuals subjectively identifying themselves as being in a state of high stress does not significantly differ between staff that began working before and after the disaster.

In the future, we plan to continue our analyses of PHQ-9 and PCL data, and to identify the various factors linked with psychological symptoms.

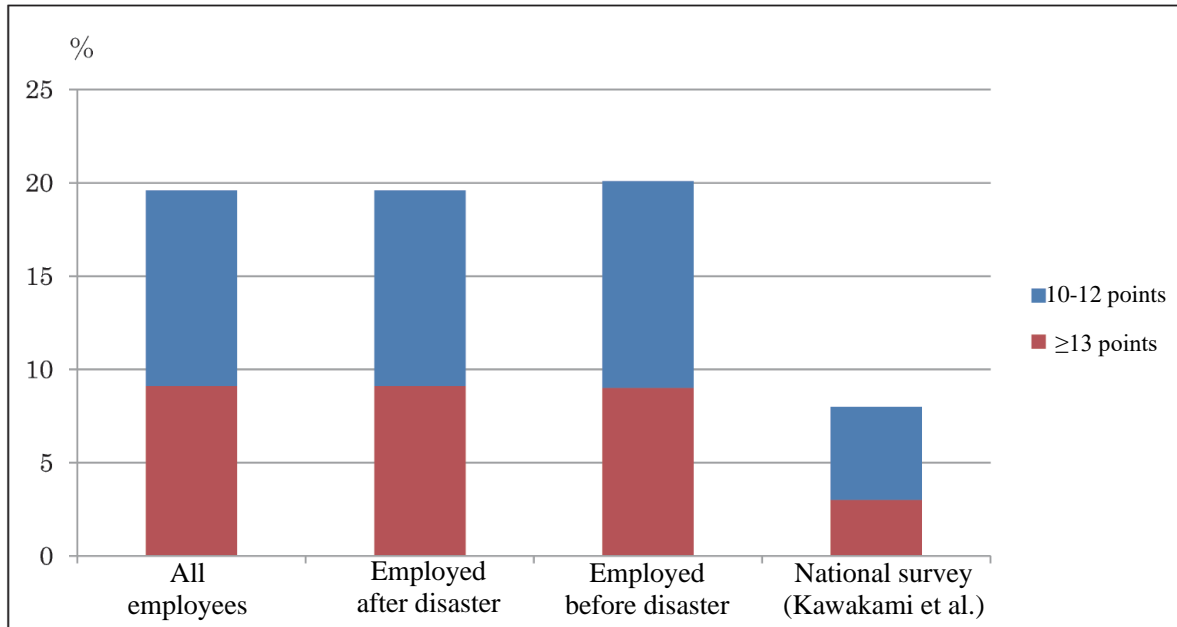


Figure 4: Percentage of Municipal Employees and Others in Disaster-Affected Areas with K6 scores of 10–12 and  $\geq 13$

## 2. Research on Psychological Support Methods in Disaster Areas

Stressful conditions are often predicted to continue into the long term in the wake of large-scale disasters, and it is a worry that these conditions will cause an increase in the number of individuals with mental and physical illness. Depression, anxiety, grief, and symptoms of psychological trauma are no doubt present in individuals with symptoms at a level that could be considered mental illness, but are also quite common among individuals with symptoms just below the “mental illness” threshold. Reducing the symptoms of these sub-threshold individuals will not only relieve the pain experienced by disaster survivors but also contribute to the prevention of mental illness (Matsumoto et al., in press). Thus, we report here on our initiatives to develop and disseminate psychological support methods usable for disaster-area residents and employees who are likely not visiting medical institutions.

### (1) Research on “Exercise for the Mind and Heart” Training Workshops for Residents and Supporters, Aimed at Raising Public Awareness About CBT in Disaster-Affected Areas

CBT is a psychological therapy method that uses approaches from both cognitive and behavioral angles to heighten self-control in an effort to improve problems in social interactions and resolve latent issues. CBT is indicated for depression, anxiety disorders, and a variety of other mental illnesses and its effectiveness has been widely reported. In addition, it is effective against depressive symptoms that do not quite approach the level of a mental illness and has been shown to prevent mental illness. As a result, it has been applied broadly to non-medical settings as well. Awareness of CBT in Japan has lagged behind that in other developed countries; to broadly spread it throughout society, it is necessary that we establish effective training methods.

In this study, in an effort to achieve primary prevention, we implemented “Exercise for the Mind and Heart” training workshops for residents and supporters in areas affected by the Great East Japan Earthquake; these sessions were aimed at teaching attendees the basic ideologies and skills of CBT and helping them learn about stress care in daily life situations. We used surveys and questionnaires to achieve a qualitative analysis of these sessions and thereby clarify the utility and challenges of this training program.

With the assistance of Dr. Yutaka Ono and Dr. Miyuki Tajima of the National Center of Neurology and Psychiatry, we developed a training program for community residents. The structure of this program is given below; sessions were held a total of six times between February 8 and March 15,



2013. This study was conducted with the approval of the Tohoku University Graduate School of Medicine Ethics Committee.

<Session 1: The Fundamentals of CBT>

<Session 2: What Comes First, Motivation or Action? How to Enjoy What You Do>

<Session 3: Communication Skill-Up Training>

<Session 4: How to Properly Communicate Your Thoughts and Feelings>

<Session 5: Pulling the Wool from Your Eyes! The Trick to a Paradigm Shift>

<Session 6: You Can Lift a Boulder If You Break It Into Pieces First: How to Skillfully Solve Problems>

Thirty-one people registered in advance for these training sessions, and the following actual attendance figures were recorded at sessions 1–6, in order: 25, 24, 20, 14, 19, and 16 attendees. Attendees were primarily public health nurses and care supporters, with more than 65% of them aged between 20 and 30. More than 80% were women. In terms of the difficulty of the material presented, more than 80% of attendees at each session said it was “just right”; likewise, nearly all attendees consistently stated that sessions were “just the right length.” Finally, more than 90% of attendees stated that they “would be able to use” or “would probably be able to use” what they had learned in future.

As part of the preparation for this study, one of the study members, Ueda, traveled during this FY to the National Center of Neurology and Psychiatry’s National Center for Cognitive Behavioral Therapy and Research and the NTT Medical Center Tokyo to observe group CBT practice, among other activities, all in an effort to receive technical guidance on interventional methodology. Further, in terms of program implementation in disaster-affected areas, we received assistance from the Health Promotion Division of the Iwanuma City Hall Health and Welfare Department, enabling us to train public health nurses and supporters. Based on the results of our surveys, while some adjustments need to be made to the difficulty and progression of the program, we believe it can be used nearly intact among the public at large. In the next FY, we plan to develop a more hands-on CBT-based methodology that is appropriate for use among community residents.

## (2) Research on SPR Training Workshops for Mental Health Care Workers in the Wake of the Great East Japan Earthquake

SPR is a psychological support method for disaster recovery-phase use developed in 2010 by the American National PTSD Center and the American National Child Traumatic Stress Network. In June 2011, the Research Team of the Hyogo Disaster Mental Health Care Center translated and published a Japanese-language version of this method. While SPR has been implemented in a variety of post-disaster situations in many countries, it has yet to be put to full use in Japan. It would be of great practical significance to mental health countermeasures in areas affected by the Great East Japan Earthquake if mental health specialists involved in actual support therein were trained in SPR and able to use it with disaster survivors. However, in Japan, methodologies for teaching specialized skills used in psychological support are not well established.

In this study, we trained specialists involved in mental health care in disaster-affected areas in SPR. We aim to employ questionnaires and qualitative surveys to clarify the utility and challenges associated with SPR training and its use in Japan.

With the help of Dr. Hiroshi Kato and Tomoko Osawa of the Hyogo Disaster Mental Health Care Center, we held basic training courses twice in Sendai (two-day courses) and once in Ishinomaki (three-day course). We then conducted follow-up courses for interested individuals in Sendai and Ishinomaki. Our targets were primarily psychologists active in Miyagi, MDMHCC staff, public health nurses, and other disaster support personnel. This study was conducted with the approval of the Tohoku University Graduate School of Medicine Ethics Committee. Finally, this study was a part of the following Ministry of Health, Labour, and Welfare Grant-in-Aid for Scientific Research: “Research Involving Epidemiological Surveys to Determine the Status of Mental Illness and to Develop Effective Interventional Methods after the Great East Japan Earthquake” (Principal Investigator: Hiroo Matsuoka).

The following numbers of individuals attended training sessions—first basic training session: 30 people (25 people completed the course); second training session: 25 people (20 completed); third session: 26 people (13 completed). Thus, a total of 81 individuals attended all sessions (with 58 completing them). Eighteen and 13 people attended the first and second follow-up training sessions, respectively, for a total of 31 attendees. Their basic attributes were as follows: men:women=19:52, 35% psychologists, 21% psychiatric social workers, 17% public health nurses, 14% nurses, 7% psychiatrists, and 6% other professions.

Based on the results of our post-training questionnaire (Fig. 5), 88.5% of individuals stated that they either “strongly agreed” or “somewhat agreed” that the content of the training session was related to their current line of work. However, while 83.6% stated they “strongly agreed” or “somewhat agreed” that they had the desire to implement these skills in their practice, only 32.8% stated that they “strongly agreed” or “somewhat agreed” that they had the confidence to actually do so. In terms of factors related to this confidence, individuals who felt they had undergone more disaster/traumatic experiences had significantly higher confidence in their ability to apply SPR techniques.

After carrying out a tracing survey among individuals who attended both the basic and follow-up training (N=23), the mean score of responses related to SPR confidence and so on rose after the follow-up training; among these, responses indicating the ease of comprehension of the training rose significantly. Further, after the follow-up training, the proportion of individuals who provided cases for discussion (N=6), indicating that they would try to use SPR in their work, was significantly larger than the proportion among individuals who did not.

The results revealed that while interest in and the desire to use SPR were high, confidence to do so was low. Further, while attendees’ level of understanding and desire to provide cases for consideration rose, these changes did not lead to an increase in confidence. These results suggest that while SPR training is important and can be beneficial, a format involving just one basic training module and one follow-up training module is subject to limitations, and as was expressed during group discussions, repeated case studies and a retooled supervision system are necessary. Further, while it appears that SPR can be used in a variety of support settings, it is important for training and education to highlight how the structured approaches presented in a training manual can be flexibly applied to real-world situations.

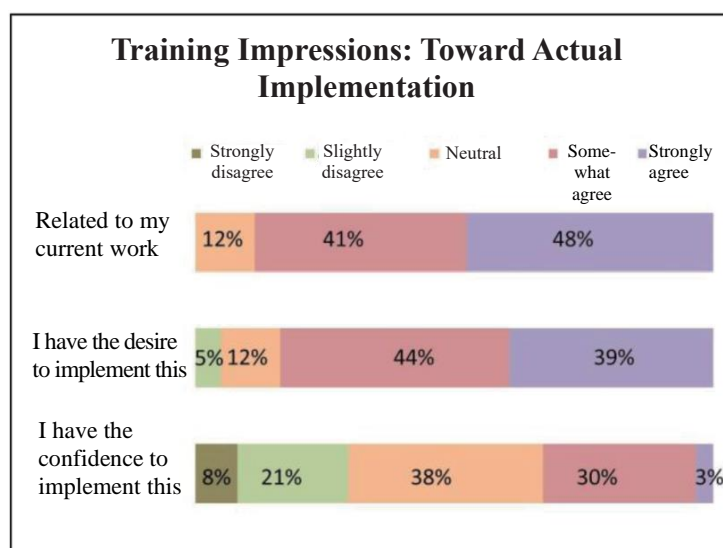


Figure 5: Training Impressions: Relatedness to Current Work, Desire to Implement, and Confidence

3. Survey of the Effects of Disaster Damage on the Field of Mental Health Care
  - (1) Status Survey of Psychiatric Care in Psychiatric Institutions in Miyagi Following the Great East Japan Earthquake (Matsumoto et al., 2013)

The Great East Japan Earthquake caused massive damage throughout the prefecture of Miyagi, particularly in coastal areas. Psychiatric facilities, again primarily in coastal areas, also sustained severe damage, and the effects thereof have reached far and wide. In the wake of the disaster, some hospitals have become unable to continue providing care because of the destruction of their facilities, and at the same time, hospitals that sustained comparatively little damage and were still able to function have been met by a veritable deluge of patients. Each facility is currently facing its own problems. Nevertheless, the state of psychiatric care throughout Miyagi and the specific troubles that have arisen in each psychiatric facility are not entirely known, and thus the whole picture remains unclear.

Further, while mental health care teams gathered in the prefecture in the wake of the disaster, and a great deal of attention was focused on mental health care activities in disaster-affected regions, the institutions that actually oversaw mental health care amidst the crisis were local psychiatric hospitals and clinics. It remains unclear what kind of patients were seen at these psychiatric institutions throughout Miyagi, how often they were seen, and what sort of effects the disaster had on patients who were already visiting psychiatric hospitals when it occurred.

In this study, we explore the dynamics of patient movement through psychiatric care facilities in the wake of a large-scale disaster. By surveying the damage done to psychiatric hospitals, we aim to clarify the effects of the Great East Japan Earthquake on psychiatric care in Miyagi Prefecture and to contribute to countermeasures against future large-scale disasters.

Our targets were psychiatric institutions (psychiatric hospitals, psychiatric departments in general hospitals, clinics, etc.) in Miyagi Prefecture; we requested consent to participate in our survey and distributed the survey forms via post. The survey asked about the following: status of outpatients in the two months after the disaster, status of hospitalized patients in the two months after the disaster, and the status of discharged patients (including hospital transfers, death, discharges to home and other facilities, etc.) immediately before and after the disaster, among other things. This study was conducted with the approval of the Tohoku University Graduate School of Medicine Ethics Committee. Finally, this study was conducted as part of the following Senshin Medical Research Foundation Grant-in-Aid for Disaster Area Support Research: "Status Survey of Psychiatric Care in Psychiatric Institutions in Miyagi Following the Great East Japan Earthquake."

In Miyagi, tsunami damage caused two hospitals to become unable to continue care operations, and their admitted patients had to be transferred to other hospitals. In addition, four hospitals were only able to operate at significantly reduced capacity and were unable to care for outpatients or new hospitalized patients (Fig. 6). Some of the hospitals that were able to continue providing care experienced a large increase in new patients in March, immediately after the disaster (Fig. 7). A large number of patients without mental illnesses were seen in psychiatry wards and so on because of their proximity to these facilities (Fig. 8). However, one year after the disaster, only a small number of patients were being seen at psychiatric hospitals for PTSD treatment (Fig. 9). While the change in the number of patients who returned to hospitals after the disaster varied from facility to facility, and we were unable to determine a unilateral increase or decrease (Fig. 10), the number of psychiatric patients admitted immediately after the disaster (in March) increased. These findings suggest that the immediate impacts of the disaster (earthquakes, tsunamis, and evacuation) affected psychiatric patients, a vulnerable population, more strongly than it did others.

The results of this study indicate that immediately after the disaster, numerous patients without any psychiatric symptoms visited psychiatric hospitals that were able to continue operating. This reveals that many psychiatric hospitals were forced to provide care that went beyond the borders of psychiatry, which we believe is a critically important finding for the determination of countermeasures against future disasters. A variety of factors including local disaster damage, reconstruction status, and changes in hospital admittance affected patient dynamics, and we found it difficult to identify unilateral increases or decreases in the number of psychiatric patients. We aim to carry out a follow-up survey that builds on these results, and we hope that the resulting research will contribute to the future development of disaster countermeasures for psychiatric institutions.

## Disaster Damage to Psychiatric Hospitals

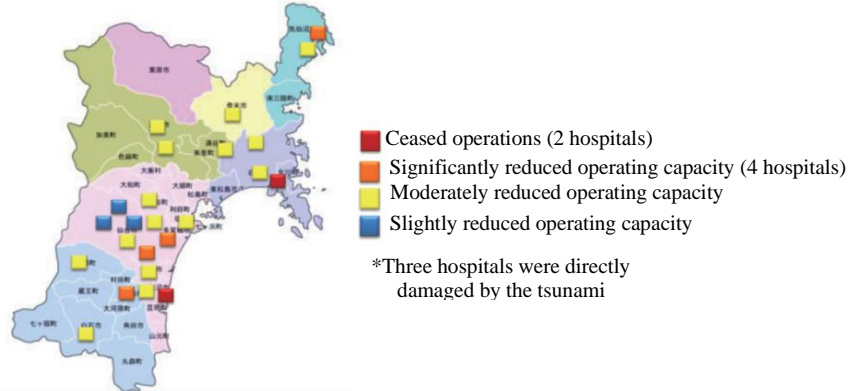


Figure 6: Disaster Damage to Psychiatric Hospitals in Miyagi Prefecture

## Total Number of New Patients Before and After the Disaster

(in 5 psychiatric hospitals)

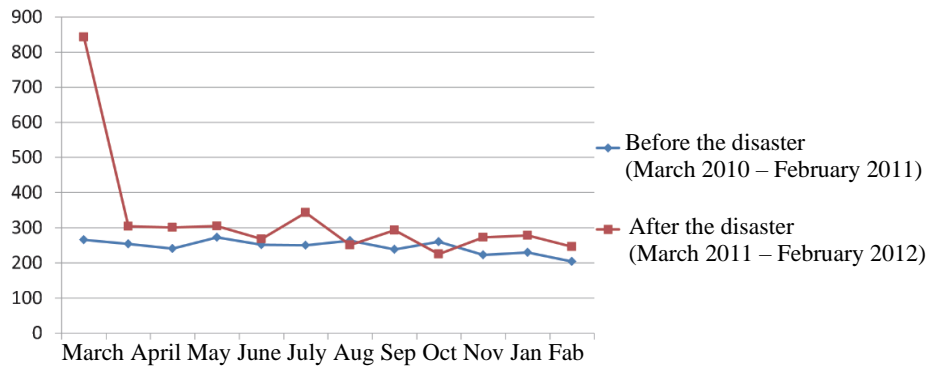


Figure 7: Total Number of New Patients Before and After the Disaster

## New Patients by Illness Type (ICD-10 Categorization)

(March 2011, 5 psychiatric hospitals, N = 843)

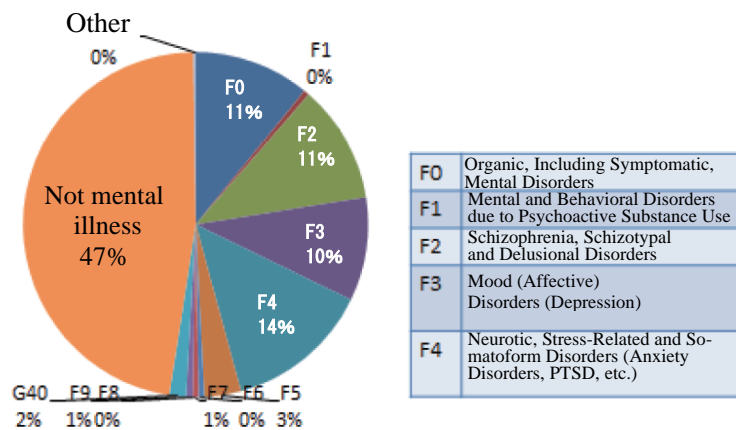


Figure 8: New Patients by Illness Type (ICD-10 Categorization)

**Monthly New PTSD Patients Related to the Disaster  
(April 2011 – March 2012, 8 psychiatric hospitals)**

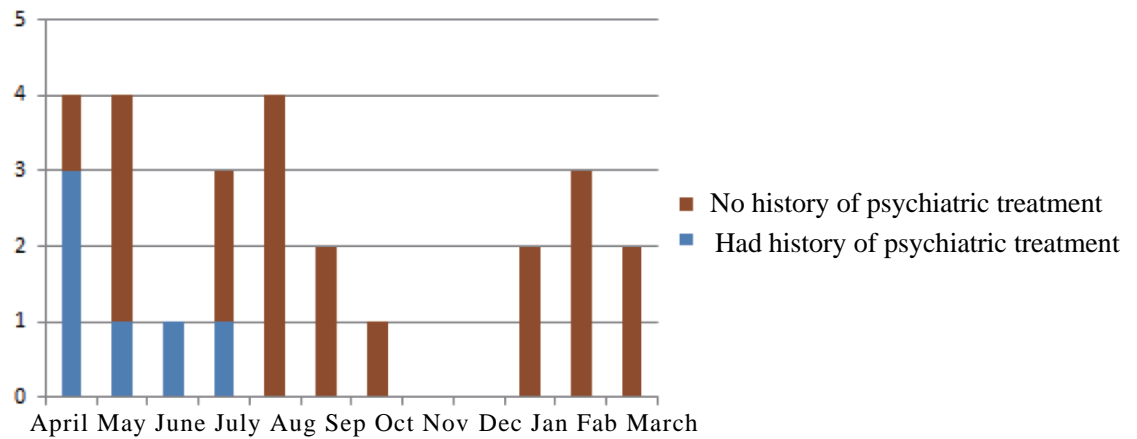


Figure 9: Monthly New Patients with PTSD Related to the Disaster

**Number of Returning Patients Before and After the Disaster**

(14 psychiatric hospitals, 8 clinics)

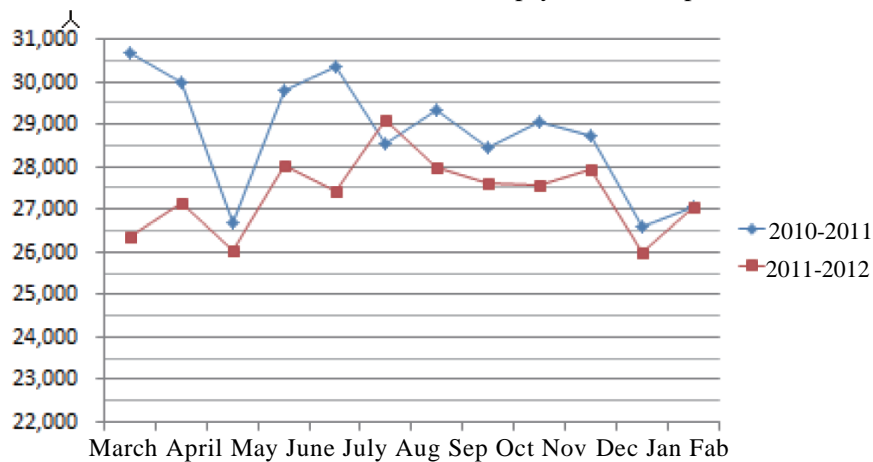


Figure 10: Number of Returning Patients Before and After the Disaster

References

- Muramatsu K., Miyaoka H., Kamijima K., Muramatsu Y. An Evaluative Tool Useful for Depression Screening in Primary Care – Patient Health Questionnaire (PHQ-9). *Psychiatric Therapy*, 23(11), 1299–1306. (2008).
- Kawakami N., Furukawa Y. Distribution of Mental Health States and Related Factors as Given by a National K6 Survey: Understanding Statistical Data on Citizen Health at the Household Level – Research Report on an Examination of Analysis Systems – General Report for FY 2005-2006 – FY 2006 Wrap-Up – Partial Research Report, 13–21. (2007).
- Matsumoto K., Takahashi Y., Osawa T. Support in the Wake of a Large-Scale Disaster: Disaster Damage and Initiatives to Spread Cognitive-Behavioral Psychological Support. *Cognitive Therapy Research*. In press.
- Matsumoto K., Shirasawa H., Iwadate T, Hara K., Kodama M., Rengi S., Shinkai T., Kodaka A., Miura N., Obara S., Hayashi M., Ueda I., Sakuma A., Matsuoka H. The Status of Psychiatric Care in Miyagi Prefecture after the Disaster: One Year Later. *Journal of Psychoneurology*. 115(2013). In press.