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Severity of pre-existing psychiatric illness and response to the Great East Japan Earthquake

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ABSTRACT

Reports have described how psychiatric patients respond to disasters. However, previous reports on the response depending on diagnostic categories have provided no clear consensus. Here we analyzed response to the Great East Japan Earthquake of March 11, 2011, among psychiatric patients in light of severity of pre-existing psychiatric illness. We studied psychiatric change among a population of psychiatric outpatients in Tochigi prefecture, located ~160 km (~100 miles) southeast of the Fukushima nuclear power plant, in an area that suffered moderate damage from the earthquake and radiation. A total of 294 psychiatric outpatients was assessed using the Global Assessment of Functioning (GAF-F). A change of ≥10 points in the GAF-F score was counted as a change in symptoms. The data were stratified by disease category, gender, and GAF-F score and analyzed using the Fisher's exact test. In the 2 months after the earthquake, 5.4% of patients showed evidence of a change in symptoms, with 4.1% worsening and 1.4% improving. Compared with patients having a GAF-F score ≤50, significantly more patients with a score >50 showed evidence of worsening symptoms. No significant difference was found with respect to gender or diagnostic category for patients with worsened or improved symptoms. Our findings reveal that a relatively small percent of patients with pre-existing psychiatric diseases showed evidence of a change in symptoms and that patients with mild-to-moderate psychiatric illness are potentially vulnerable to the impacts of a natural disaster.

1. Introduction

On March 11, 2011, a magnitude-9.0 earthquake (termed the Great East Japan Earthquake) occurred near the northeast coast of the main island (Honshu) of Japan. Nearly 20,000 people were killed or missing owing to damage caused by the earthquake and the subsequent massive tsunami, which hit the Fukushima nuclear power plant and caused radioactive contamination across eastern Japan. Tochigi prefecture, where our hospital is located, is in eastern Japan, ~160 km (~100 miles) southeast of the Fukushima nuclear power plant. Of the 2 million people who reside in this prefecture, 4 died and 132 were injured by the earthquake. Although casualties were rare, the damage caused by the earthquake negatively affected the lives of citizens. One in ten houses had some form of damage. Spontaneous blackouts occurred shortly after the earthquake, and scheduled blackouts to conserve energy occurred several times over the first month after the earthquake. Almost all railway transportation was suspended, and all freeways were closed for a month. Gasoline was in short supply, which resulted in long lines of cars waiting hours at filling stations. Strong aftershocks struck the area every day over at least the first month. Even though radioactive contamination was not as severe as in Fukushima prefecture, ground radiation levels reached around 1 mSv per year, the maximum exposure recommended by the International Atomic Energy Agency (http://www.iaea.org/Publications/Booklets/Radiation/radsafe.html#four). Shipments of many farm products and beef were suspended. Radioactive decontamination was conducted and is ongoing in some parts of Tochigi prefecture.

Although a considerable number of psychiatric surveys of the general population has been administered after disasters, only a few reports has described how psychiatric patients respond to disaster (Koegler and Hicks, 1972; Edwards, 1976; Godleski et al., 1994; McMurray and Steiner, 2000; DeLisi et al., 2004). For schizophrenia patients, most reports (Koegler and Hicks, 1972; Edwards, 1976; Godleski et al., 1994; McMurray and Steiner, 2000) indicate a rational reaction or unaffected behavior after a disaster. On the other hand, patients with pre-existing depression are believed to experience a worsening of symptoms (Smith et al., 1990; Shalev et al., 1998; Katz et al., 2002). However, DeLisi et al. (2004) reported evidence of a worsening of symptoms among

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hospitalized patients with schizophrenia spectrum disorder in comparison with mood disorders in response to the United States World Trade Center disaster on September 11, 2001. Therefore, the reaction to disaster among patients with pre-existing psychotic illness is not clearly understood (Katz et al., 2002). How can we explain these controversial results? Several possibilities can be considered. One of them might reflect differences in severity of pre-existing illness within a diagnostic category. Another might reflect the type of disaster—natural or man-made, short- or long-lasting, etc.

Here, we focused on the relationship between the severity of pre-existing psychiatric diseases and evidence of clinical change in response to a disaster. We studied evidence of change in symptoms among 294 psychiatric patients in Tochigi prefecture during the 2-month period after the Great East Japan Earthquake.

2. Methods

Ethical aspects of this study were reviewed and approved by the Ashikaga Red Cross Hospital Human Research Ethics Committee. The psychiatric patients included in this study were outpatients of Ashikaga Red Cross Hospital before the Great East Japan Earthquake. They were all insured because all residents of Japan are required to have health insurance coverage. Some 60% of them were referred from a primary care doctor, and the rest were self-referred (unlike the U.K., there are no gatekeepers and thus Japanese can go to any specialist). Nearly 50% of the patients had been previously hospitalized in our department at least once. Approximately 35% of them were covered by a disability pension, and 25% of them were employed. They were classified as F2 (schizophrenic, schizotypal, and delusional disorders), F3 (mood disorders), or F4 (neurotic, stress-related, and somatoform disorders) using International Classification of Diseases 10 diagnostic criteria. Psychiatric outpatients with other diagnoses were excluded from this study. The diagnoses were made by attending physicians and were confirmed by another physician. The observation period was restricted to the first 2 months after the disaster. Outpatients who did not consult with us in the 2 months after the earthquake were excluded. New outpatients who came to the hospital after the disaster were also excluded.

We administered the Global Assessment of Functioning (GAF-F) to rate patients' severity of illness (Endicott et al., 1976; Aas, 2011). For each patient, a GAF-F score was obtained within a period of 2 months before and 2 months after the disaster. The score for each GAF-F administered prior to the disaster was calculated before the first visit following the disaster. To avoid subjective bias, two physicians independently scored each GAF-F, and the two scores were averaged. A change of $\geq$10 points in the GAF-F score before vs. after the disaster was considered to reflect a change in symptoms. According to Lindström et al. (1994), a change of 10 points is regarded as clinically significant, and their inter-rater reliability test indicated that a change of 10 points could not be attributed to differences between raters. Similarly, Kjellin and Wallsten (2010) also used an increase in GAF-F score of $\geq$10 as a measure of improvement. Basically, the 100-point scales in GAF-F are divided into 10 intervals, each with 10 points (for example 31–40 and 51–60). Patients who score in the same 10-point interval should be relatively homogenous in terms of function, but attempting to differentiate patients based on scores within any given 10-point interval might be challenging and indeed open to subjective judgment (Aas, 2011). In this context, a change of $\geq$10 points always involves a shift to another interval, which clearly indicates a change in symptoms.

Because some patients' symptoms may have changed owing to reasons other than the disaster, two physicians rated the relationship between each change and the disaster as direct, mixed, or not relevant. First, two attending physicians independently asked patients who had a change in symptoms about the triggers and described everything they said. Thereafter, the same two physicians independently looked at each patient's chart and rated the relationship between the disaster and the change in symptoms. "Direct" implies that a patient's symptoms are directly linked with the disaster, such as extreme anxiety toward radiation and depressed mood resulting from severe insomnia owing to frequent earthquake aftershocks. "Not relevant" implies that symptoms are independent of the disaster, such as aggravation of depression following a relative's death before the disaster. "Mixed" refers to symptoms linked with both direct and not relevant causes. Only when both of the two physicians rated the relationship as direct or mixed did we consider the change in a patient's progress to be due to the earthquake. The data were stratified by disease category, gender, and GAF-F score before the disaster and were analyzed using Fisher's exact test and 95% confidence interval (CI) for relative risk (RR).

3. Results

A total of 301 psychiatric outpatients classified as F2, F3, or F4 was scheduled to visit our hospital in the first 2 months after the disaster. Among those outpatients, three (two with F2, and one with F4) did not return to our hospital during that 2-month period. Those three patients finally consulted us within a year after the disaster with no change in symptoms during the period. Therefore, 298 psychiatric outpatients participated in our study. Inter-rater reliability was $r = 0.94$ for the ratings reflecting the relationship between disaster and change in symptoms. Four patients were excluded from the study because their changes in symptoms were not considered to be due to the disaster. As a result, the study group comprised 294 psychiatric patients—128 males and 166 females.

Table 1 presents the gender distribution, average age, and GAF-F score for patients in each of the three diagnostic categories. Males (mean age $\pm$ SD = 51.6 $\pm$ 17.5 years) were significantly younger than females (55.8 $\pm$ 18.0 years; t-test, $P < 0.05$). The F2 patients were significantly younger than the F3 and F4 patients (t-test, $P < 0.01$). Patients within each diagnostic category did not differ significantly with respect to gender or age. GAF-F scores before the disaster differed significantly among any two of the three diagnostic groups (t-test, $P < 0.001$). The GAF-F scores before the disaster did not differ significantly between male and female patients (t-test, $P = 0.11$). Also, the number of male and female patients with a GAF-F score of $>$50 or $\leq$50 before the disaster did not differ significantly ($\chi^2[1.294] = 2.76$, $P = 0.10$).

Sixteen patients (5.4%) showed evidence of a change in symptoms. Of these patients, 12 (4.1%) experienced a worsening of symptoms, and 4 (1.4%) experienced an improvement. The number of male and female patients who experienced a change in symptoms is shown in Table 2. Of the 12 patients whose symptoms worsened, 10 were female and 2 were male. Although the number of female patients was greater, this apparent difference was not statistically significant (Fisher's exact test, $P = 0.074$, 95% CI for RR, 0.84–17.6). No significant difference was found in the gender distribution among patients who had improved symptoms (Fisher's exact test, $P = 0.32$, 95% CI for RR, 0.41–37.0).

Table 1
Study group: characteristics of psychiatric outpatients of Ashikaga Red Cross Hospital.

	Male $n = 128$	Female $n = 166$	Total $n = 294$	Age (mean $\pm$ SD)	GAF before the disaster	GAF after the disaster
F2	61 (47.7%)	66 (39.8%)	127 (43.2%)	49.5 $\pm$ 16.1	43.3 $\pm$ 9.1	42.6 $\pm$ 8.8
F3	31 (24.2%)	56 (33.7%)	87 (29.6%)	57.6 $\pm$ 16.9	57.3 $\pm$ 9.0	56.7 $\pm$ 10.0
F4	36 (28.1%)	44 (26.5%)	80 (27.2%)	57.5 $\pm$ 20.3	65.8 $\pm$ 7.3	65.0 $\pm$ 8.4