

Post-evacuation return of psychiatric hospital inpatients evacuated to hospitals outside the Fukushima prefecture after the nuclear accident: A Retrospective Cohort Study

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Toshihiro Terui¹ , Yasuto Kunii², Hiroshi Hoshino¹,
Takeyasu Kakamu³, Tomoo Hidaka³, Tetsuhito Fukushima³,
Nobuo Anzai⁴, Daisuke Gotoh¹, Itaru Miura¹ and Hirooki Yabe¹

Abstract

Background: Post-evacuation return after mandatory hospital evacuation due to complicated disasters is often overlooked and not well-discussed.

Aims: In this study, we explored the factors which are related to the ease or difficulty of the post-evacuation return to Fukushima prefecture of psychiatric inpatients who had been evacuated to hospitals outside the prefecture because of the Great East Japan Earthquake (GEJE) and subsequent Fukushima Daiichi Nuclear Power Plant (FDNPP) accident.

Method: This retrospective cohort study included evacuated psychiatric hospital inpatients who were registered in the Matching Project for Community Transition (MPCT) and had been traced until July 31, 2019. A total of 531 patients were included for the analyses. Univariable and multivariable analysis were conducted to detect the patients' traits including their psychiatric/physical backgrounds which were associated with their outcome – the time from GEJE to the date of return to Fukushima.

Results: Over half of the patients returned to Fukushima. In the multivariable analysis, the patients' gender (male), age (older), and psychiatric diagnoses of schizophrenia, schizotypal and delusional disorders (ICD-10, F20–29) showed lower hazard ratio (HR) and statistically significant association with the difficulties of post-evacuation return. Meanwhile, disorders of psychological development (F80–89), diseases of the nervous (G00–99, except G40–41) and genitourinary (N00–99) systems showed higher HR and statistically significant association with the ease of return.

Conclusions: The specific characteristics of the psychiatric inpatients including their psychiatric and physical status are associated with their post-evacuation return to their hometown. These results indicated that the evacuated hospitals' practitioners and staffs from the MPCT understood the necessity of the earlier return of inpatients to their hometown. Moreover, clinicians should pay more attention to some symptoms unique to psychiatric patients which contributed to their difficulties in returning safely or expressing their hope to return.

Keywords

Fukushima nuclear disaster, Hospital evacuation, post-evacuation return, psychiatric inpatients

Introduction

Due to the Great East Japan Earthquake (GEJE) and subsequent Fukushima Daiichi Nuclear Power Plant (FDNPP) accident on March 11 2011, hospital inpatients in the Fukushima prefecture, including the Soso area, were mandatorily and immediately evacuated to other hospitals (Okumura & Tokuno, 2015; Tanigawa et al., 2012; Yanagawa et al., 2011). These included over 800 patients who had been admitted to psychiatric hospitals (Gotoh et al., 2021).

Numerous reports about hospital evacuations in response to natural disasters has been conducted, which

¹Department of Neuropsychiatry, Fukushima Medical University School of Medicine, Fukushima, Japan

²Department of Disaster Psychiatry, International Research Institute of Disaster Science, Tohoku University, Aoba-ku, Sendai, Japan

³Department of Hygiene and Preventive Medicine, Fukushima Medical University School of Medicine, Fukushima, Japan

⁴Graduate School of Clinical Psychology, Teikyo Heisei University, Toshima-Ku, Tokyo, Japan

Corresponding author:

Toshihiro Terui, Department of Neuropsychiatry, Fukushima Medical University School of Medicine, Hikarigaoka-1, Fukushima 960-1295, Japan.

Email: toshihiro62823@gmail.com

included evacuations from psychiatric hospitals (Kreinin et al., 2014; Thomas & Lackey, 2008) and even hospital evacuation plans for a secure and prompt evacuation (Bagaria et al., 2009; Hicks & Glick, 2015; Rojek & Little, 2013). Furthermore, previous research discussed possible decision-making processes for evacuation destination (Terui et al., 2021a), post-evacuation mortality, and the effects of evacuation on the evacuees' prognoses (Dosa et al., 2012). Although the consensus has been ambiguous, discussions related to the GEJE and FDNPP accident have been reported (Gotoh et al., 2021; Igarashi et al., 2018; Nomura et al., 2013; Terui et al., 2021b). However, only few reports focused on post-evacuation "return"; hence, it is overlooked. (Hicks & Glick, 2015). Reducing the loss of the residents' health and former lives as much as possible is significant and clearly indicated in the Sendai Framework for Disaster Risk Reduction (2015–2030), which consists of "seven clear targets and four priorities for action to prevent new and reduce existing disaster risks" (United Nations Office for Disaster Risk Reduction, 2015). Therefore, it is necessary to increase the opportunities of describing to inpatients their return to their hometown or original hospitals after the hospital evacuation to allow them to reproduce their "former lives."

Therefore, the Fukushima prefectural government launched the Matching Project for Community Transition (MPCT) in July 2013 to support the evacuated psychiatric inpatients' post-evacuation returns and later community transition (Maeyama, 2017). At project initiation, efforts were made to identify as many evacuation transfer patients as possible; tracking of patients began after registration. Project staff distributed leaflets outlining the project to evacuation destination hospitals, patients, and their families. Once patients or their families confirmed their desire to receive coordination for their return to Fukushima and further community transition, the nominated coordinators visited hospitals where the evacuated patients were hospitalized to interview them and grasp their status and desires for "how to" and "where to" discharge the patients. Moreover, coordinators discussed with the evacuated hospitals' staff to adjust for discharge and further return of the inpatients to Fukushima (Figure 1). Patients who had been evacuated to hospitals both within and outside the prefecture received support from MPCT. Moreover, the return to Fukushima of patients who were evacuated to hospitals outside the prefecture was prioritized. In addition to the lack of reports regarding the evacuated inpatients' post-evacuation return, comprehensive projects, such as the MPCT, which focused on the return of massive psychiatric populations is limited. With regards to both post-evacuation return and social transitional services for psychiatric patients, exploring the traits related to the patients' return to their homelands is important since valuable information and constructive hypotheses may be obtained for future policy proposals for disaster managements and community mental health services.

Therefore, this study aimed to describe the evacuated psychiatric hospital inpatients' post-evacuation return to their former prefecture and detect their backgrounds, including their psychiatric/physical diagnoses, which were related with the eases or difficulties of their return.

Methods

Study design and population

This retrospective cohort study included psychiatric patients who had been registered in the MPCT. Almost all registered patients were in psychiatric hospitals in Fukushima prefecture on March 11, 2011 and were immediately evacuated to other hospitals within/outside the prefecture due to the GEJE and subsequent FDNPP accident. A total of 789 patients were registered. Six patients who had been evacuated from their home to the hospitals, 210 who had been evacuated to hospitals within the Fukushima prefecture, two with uncertain outcomes, and forty whose date of achievement of post-evacuation return were uncertain were excluded. Finally, 531 patients, who were all evacuated to hospitals outside the prefecture, were included in the analysis.

Outcome

The main outcome of this study was the time from March 11, 2011 to the date of achievement of return to Fukushima (survival time). Registered patients were traced from the onset of GEJE until July 31, 2019. The patients' return to their hospitals or other community resources (e.g. "returning home," "group-home, care-house, and social rehabilitation center," and "welfare facilities for elderly people") (Ministry of Health Labour and Welfare [MHLW], 2014) within the Fukushima prefecture was defined as the achievement of post-evacuation return. Other events such as post-evacuation death or discharge to community resources outside the Fukushima prefecture accounted for the censoring.

Covariates

The covariates for the exploratory analysis, which may be associated with post-evacuation return, were the patients' age on 11 March 2011, gender, psychiatric diagnoses, and physical complications. These information had been collected by the MPCT staffs using survey slips since 2012, when the registration of patients started, during visits to destination hospitals and hospitals where the evacuated patients had been admitted during the GEJE. Psychiatric diagnoses and physical complications were classified using the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10), which is the international standard of classification for physical/mental diseases. The psychiatric diagnoses were classified using the F codes in the ICD-10 as

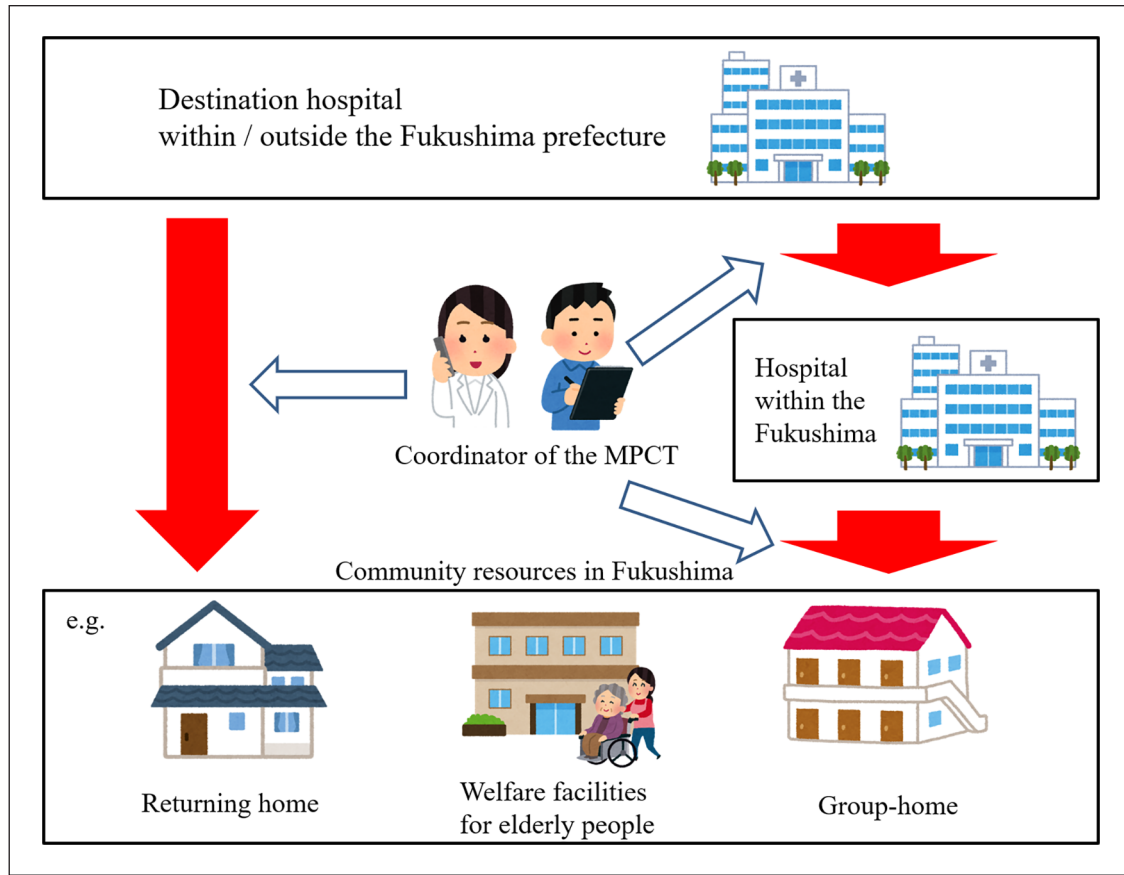


Figure 1. Overview of the Matching Project for Community Transition (MPCT).

follows: organic, including symptomatic and mental disorders (F00–09); mental and behavioral disorders due to psychoactive substance use (F10–19); schizophrenia, schizotypal and delusional disorders (F20–29); mood (affective) disorders (F30–39); neurotic, stress-related, and somatoform disorders (F40–48); behavioral syndromes associated with physiological disturbances and physical factors (F50–59); disorders of adult personality and behavior (F60–69); mental retardation (F70–79); and disorders of psychological development (F80–89). Furthermore, epilepsy (G40–41) was classified as a psychiatric disease since it was assessed and treated not only by neurologists or neurosurgeons but also by psychiatrists in Japan. Physical complications were also classified based on the ICD-10 as follows: certain infectious and parasitic diseases (A00–B99); neoplasms (C00–D48); diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism (D50–89); endocrine, nutritional, and metabolic diseases (E00–90); diseases of the nervous system (G00–99, except for G40–41); diseases of the eye and adnexa (H00–59); diseases of the ear and mastoid process (H60–95); diseases of the circulatory system (I00–95); diseases of the respiratory system (J00–99); diseases of the digestive system (K00–93); diseases of the skin and subcutaneous tissue (L00–99); diseases of the musculoskeletal system and connective tissue (M00–99); diseases of the genitourinary system

(N00–99); and injury, poisoning, and certain other consequences of external causes (S00–T98).

Statistical methods

In the exploratory analysis, the log-rank test was adopted, and univariable analysis was performed to estimate the effects of each covariate on the patients' duration from the onset of the disasters to post-evacuation return. After confirming the factors associated with their outcome, multivariable analysis was performed using these factors in the Cox proportional hazard model. Statistical significance was set at $p < .05$. IBM SPSS Statistics for Windows, version 25 (IBM Corp., Armonk, N.Y., USA) was used for the analyses, and R was used to produce the cumulative Kaplan–Meier curve.

Results

Basic characteristics of the participants and univariable analysis results

The description of the prepared participants' backgrounds and the results of the univariable analysis are shown in Table 1. There is almost no gender deviation in this population. The

Table 1. Basic characteristics of the participants and univariable analysis results (N=531).

| | n (%) or Mean (SD) | p-Value |
|---|--------------------|----------|
| Gender | | |
| Male | 270 (50.8) | .022* |
| Female | 261 (49.2) | |
| Age | | |
| Mean (SD) | 65.4 (14.6) | <.001*** |
| Psychiatric diagnosis | | |
| F00–09. Organic, including symptomatic, mental disorders | 152 (29.1) | .976 |
| F11–19. Mental and behavioral disorders due to psychoactive substance use | 28 (5.4) | .410 |
| F20–29. Schizophrenia, schizotypal and delusional disorders | 312 (59.7) | .036* |
| F30–39. Mood [affective] disorders | 37 (7.1) | .054 |
| F40–48. Neurotic, stress-related and somatoform disorders | 6 (1.1) | .089 |
| F50–59. Behavioral syndromes associated with physiological disturbances and physical factors | 0 (0.0) | |
| F60–69. Disorders of adult personality and behavior | 2 (0.4) | .046* |
| F70–79. Mental retardation | 44 (8.4) | .767 |
| F80–89. Disorders of psychological development | 2 (0.4) | .002** |
| G40–41. Epilepsy | 25 (4.8) | .081 |
| Physical complication | | |
| A00–B99. Certain infectious and parasitic diseases | 12 (2.3) | .046* |
| C00–D48. Neoplasms | 13 (2.4) | .037* |
| D50–89. Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism | 5 (0.9) | .387 |
| E00–90. Endocrine, nutritional and metabolic diseases | 62 (11.7) | .208 |
| G00–99. Diseases of nervous system (except G40–41. Epilepsy) | 40 (7.5) | <.001*** |
| H00–59. Diseases of the eye and adnexa | 10 (1.9) | .280 |
| H60–95. Diseases of the ear and mastoid process | 1 (0.2) | .254 |
| I00–95. Diseases of the circulatory system | 60 (11.3) | .531 |
| J00–99. Diseases of the respiratory system | 17 (3.2) | .096 |
| K00–93. Diseases of the digestive system | 40 (7.5) | .711 |
| L00–99. Diseases of the skin and subcutaneous tissue | 4 (0.8) | .765 |
| M00–99. Diseases of the musculoskeletal system and connective tissue | 8 (1.5) | .133 |
| N00–99. Diseases of genitourinary system | 5 (0.9) | .025* |
| S00–T98. Injury, poisoning and certain other consequences of external causes | 6 (1.1) | .246 |

Note. Log-Rank test was adopted for the analysis. SD: standard deviation.

mean of the patients' age was 65.4 years old, and over half of the patients were diagnosed with F20–29. A total of 305 patients (57.4%) were able to return to Fukushima prefecture. Overall, the mean survival time was 1398.1 days (standard error [SE], 58.5 days) (Figure 2). In the univariable analysis, the patients' gender ($p=.022$), age ($p<.001$), psychiatric diagnoses of F20–29 ($p=.036$), F60–69 ($p=.046$), F80–89 ($p=.002$), physical complications of A00–B99 ($p=.046$), C00–D48 ($p=.037$), G00 to 99 (except G40–41) ($p<.001$), and N00–99 ($p=.025$) were significantly associated with the duration from the onset of the disasters to the post-evacuation return.

Multivariable analysis

Table 2 shows the results of the multivariable analysis. The patients' gender (male) (hazard ratio [HR]=0.698, 95% confidence interval [CI]=0.549–0.886), age (older) (HR=0.984, 95% CI=0.975–0.993), and psychiatric diagnosis of F20–29 (HR=0.663, 95% CI=0.511–0.861)

showed lower HR and were significantly associated with the difficulties of post-evacuation return. In contrast, the psychiatric diagnosis of F80–89 (HR=4.348, 95% CI=1.029–18.366), physical complications of G00 to 99 (except G40–41) (HR=2.809, 95% CI=1.858–4.249), and N00–99 (HR=3.072, 95% CI=1.244–7.589) showed higher HR and were significantly associated with the eases of post-evacuation return.

Discussion

Patients' age

In this study, we confirmed the tendency of elderly evacuees to show lower HR and have difficulties in returning to Fukushima prefecture. Therefore, their physical and social backgrounds must be considered more.

First, the post-evacuation mortality among the elderly evacuees may reflect this tendency. Since the mean age of

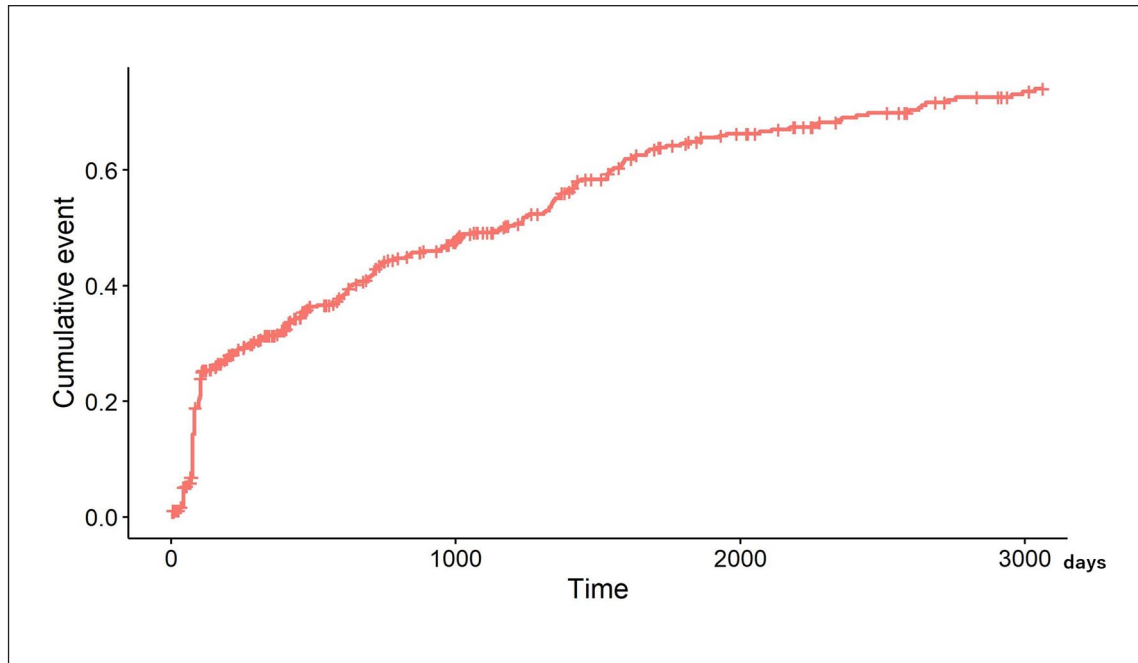


Figure 2. A survival curve describing the cumulative probability of the post-evacuation return to Fukushima prefecture of psychiatric inpatients evacuated to hospitals outside the prefecture.

Table 2. Multivariable analysis of the characteristics of the participants.

| | HR | 95% CI | p-Value |
|--------------------------|-------|--------------|----------|
| Gender (Male) | 0.698 | 0.549–0.886 | .003** |
| Age | 0.984 | 0.975–0.993 | <.001*** |
| Psychiatric diagnosis | | | |
| F20–29. | 0.663 | 0.511–0.861 | .002** |
| F60–69. | 3.799 | 0.930–15.521 | .063 |
| F80–89. | 4.348 | 1.029–18.366 | .046* |
| Physical complication | | | |
| A00–B99. | 0.966 | 0.475–1.961 | .923 |
| C00–D48. | 0.487 | 0.180–1.314 | .155 |
| G00–99. (except G40–41.) | 2.809 | 1.858–4.249 | <.001*** |
| N00–99. | 3.072 | 1.244–7.589 | .015* |

Note. Cox proportional hazards regression model was adopted for the analysis. HR = Hazard ratio; CI = Confidence interval.

* $p < .05$. ** $p < .005$. *** $p < .001$.

Japanese psychiatric hospital inpatients have gradually become older and older, treating their psychiatric symptoms and controlling their physical comorbidities have been required among psychiatric hospital practitioners (MHLW, 2009). Although the severity of the confirmed physical complications among the participants were unknown and the types of diseases were not associated in the difficulties of returning according to the analysis, elderly evacuees may not be able to be safely transported during disasters due to their aging-related complicated physical status.

Second, due to the aging and diminishing of the patients' family relationships, staffs may have difficulties in receiving family supports and collaborating with them for the evacuated inpatients' return to Fukushima. Due to the aging of the psychiatric inpatients with long length of stay (LOS) – over 30% of inpatients hospitalized in private psychiatric hospitals designated by the prefectural government have 5 years or more LOS (MHLW, 2020) – previous relationships between the inpatients and their families have been decreasing. Simultaneously, the psychiatric hospitals' needs of supporting patients' care as palliative medicine has been gradually debated in Japan (Araki et al., 2016; Onaga & Asami, 2018; Urizaki & Araki, 2017). Hence, we could hypothesize that psychiatric hospitals' or nearby healthcare facilities' role in end-of-life caregiving may be reflected in providing terminal care for evacuated inpatients in evacuated areas.

Considering the latter one, there is no obvious evidence that all terminal care cases in psychiatric hospitals has been exactly based on the patients' intention. Moreover, there are several unfavorable social aspects, which may be associated with psychiatric inpatients' difficulties in realizing their wish for their terminal phase (e.g. patients' abilities to show their will to desire palliative care, faded relationship between inpatients and their families, and general hospitals' difficulties in receiving elderly psychiatric patients for their palliative support) (Araki et al., 2016; Onaga & Asami, 2018). Thus, we should consider that there may be latent evacuees who may have hoped to die in their hometowns.

Patients' gender

In this analysis, we revealed that male patients, contrary to their female counterparts, tended to have difficulties in returning to the prefecture. First, although gender differences in clinical procedures and outcomes among the psychiatric patients depended on their diagnoses, which is difficult for us to discuss, we can hypothesize that some of the physical prognoses of the disorders may be associated with the patients' availability in returning to their hometown. Furthermore, when we reviewed the procedure used by the MPCT, the ability of the patients to communicate well with the coordinators about their desires to return to their hometown must also be considered. According to previous reports, some psychiatric diagnoses showed gender differences in their psychological symptoms which seemed to be associated with their capability of expressing their wills. This discrepancy in physical and psychiatric backgrounds may have affected the results of the current analysis.

For instance, in schizophrenia and dementia – most of the population in this study were F00–09 (29.1%) and F20–29 (59.7%) – some researchers reported that male patients with schizophrenia had more negative symptoms and hostility than females (Wei et al., 2020; Xiang et al., 2010). In addition, the general remission outcome in schizophrenia was better in females than in males (Carpiniello et al., 2012), which is consistent with the findings that male patients have more difficulties in talking to health staffs about their hopes.

On the other hand, with regards to dementia – the second largest percentage in this population – a national study revealed that aggressiveness, which is one of the subtypes of the behavioral and psychological symptoms of dementia (BPSD), was more frequent in male patients than in females (Kitamura et al., 2012). They also showed that favorable discharges were less likely in men. Another analysis indicated that male patients with dementia have longer LOS in hospitals than females and discussed male patients' aggressive tendencies or lower cognitive scores due to the results (Kitamura et al., 2013). These behavioral and psychological vulnerabilities may reflect the difficulties of male patients in showing their wills of post-evacuation return. Meanwhile, a previous study focused more on the physical aspects and argued that the risk of falls of patients with dementia in health care facilities was increased more in males (Fernando et al., 2017), which may have contributed to this population's difficulties in subsequent long-distance transportation.

However, one of the limitations of this study is a discussion about this result may not be possible because the general severities and complicated psychiatric symptoms of each patient were unknown.

Physical complication

Contrary to the association between the patients' age and availability to return to Fukushima, some specific physical

complications were detected as factors that had the tendency of easing post-evacuation return. When debating these results, the social situations at that time in each type of diseases must be considered.

G00 to 99. Diseases of nervous system (except G40–41. Epilepsy). After the analysis, over half of the patients classified as G00 to 99 patients were diagnosed with insomnia. The risk factors of post-disaster sleep disturbance among the population in the affected areas of the GEJE (e.g. mental health issues and residing in evacuation centers) has been detected by reports from both within and outside Fukushima (Nakamura et al., 2020; Zhang et al., 2020). Moreover, reports that mentioned that social trusts had been associated with sleep disturbance among victims of the GEJE cannot be ignored (Matsumoto et al., 2014; Sugawara et al., 2020). Former cooperative relationships and trust among inpatients with longer LOS has been reported from the other psychiatric hospitals which suffered from the earthquake (Japan Academy of Psychiatric and Mental Health Nursing, 2015). The current population has two aspects – inpatients with mental disorders and evacuees – and both were revealed as factors that increased the risk of sleep disturbances after disasters. Thus, medical practitioners in the destination hospitals may consider moving patients with insomnia caused by these backgrounds to former environments as soon as possible.

N00–99. Diseases of genitourinary system. We also confirmed that over half of patients complicated with N00–99 were classified into renal failure. In previous reports, we identified that patients with N00–99 tended to be evacuated to hospitals within the Fukushima prefecture since the exacerbation of renal failure forced medical professions to evacuate them to hospitals as near as they could (Terui et al., 2021a). The increased mortality and possibility of exacerbation of chronic renal failure after the earthquakes during the GEJE were already reported (Tsukinoki et al., 2018). Disaster preparedness for patients with renal failure, especially dialysis patients, is important (Kutner et al., 2009). Two hypotheses must be considered. One is that staffs in the destination hospitals had made efforts for the return of patients to their hometown as soon as possible because they might have received medications based on their medical records in their former hospitals. Another hypothesis is that the existing patient registration network (Ando & Yamakawa, 2021) might affect their earlier post-evacuation return, although the medications of these patients were unknown.

Psychiatric diagnosis

F80–89. Disorders of psychological development. Similar to physical complications, patients with disorders of psychological development tended to return to Fukushima earlier.

After the analysis, we confirmed that these patients were relatively younger in age (<40 years old) than the other participants.

Our previous report revealed that patients with F70–79 mental retardation tended to be evacuated to hospitals within the Fukushima prefecture and that their expected or exacerbated challenging behavior (CB) might be associated with this tendency (Terui et al., 2021a). Patients with mental retardation and neurodevelopmental disorders often suffered from their unwanted CB. McGuire and Siegel (2018) also mentioned that youth with autism spectrum disorder (ASD) were commonly hospitalized because of their agitations, tantrums or self-injury behaviors – which had been regarded as CBs. Furthermore, treatments for CB are not mainly based on psychopharmacological therapies and have no prescriptions in general (e.g. behavioral assessment and environmental adjustments) (Davis & Rispoli, 2018; Inoue, 2019). These approaches proceed with staffs who have reliable relationships with patients and were well-oriented in programs. Furthermore, massive and large-scale evacuation forced evacuees with ASD and practitioners to divide into different regions and stop ongoing therapy program among them. Therefore, one of our most considerable hypotheses is that the medical staffs of destination hospitals realized the necessity of the patients' return to their former environment as remedy and to continue their programs that are in-progress.

In addition to the therapeutic aspects mentioned, another concern is the efforts of the parents of these evacuees for their earlier return to their hometown. According to domestic reports, the rates of parents whose positive moods are associated with their children with ASD – joy of parenting or recognition toward their children as treasures – have increased as children grow to adulthood (Japanese Association of Autism Support, 2008). Patients diagnosed with F80–89 were relatively younger (20–30 years old) than the patients with other diagnoses. Thus, the parents of this population would be more likely to be alive and more motivated to contribute to their children's earlier return.

F20–29. Schizophrenia, schizotypal and delusional disorders. Finally, the regression analysis showed that patients with F20–29 tended to have difficulties in returning to their hometown. According to the MPCT, evacuated psychiatric inpatients had been given opportunities to tell whether they want to return to Fukushima every year. Therefore, one important concern is that whether the applicable patients had considered the former hospitals and Fukushima as irreplaceable hometowns that they wanted to return to. Social inactivity and decreasing initiative associated with the long period of hospitalization has been called “institutionalism,” and comprehensive approaches are necessary discuss this (Liberakis, 1981; Verma et al., 2017). Since the mean age of this participants is higher

than the susceptible age of schizophrenia, many patients with schizophrenia might have longer LOS (Maeyama, 2017). The issue of long LOS among psychiatric inpatients in Japan has been debatable (Organisation for Economic Co-operation and Development, 2014).

However, as mentioned previously, the participants' ability to show their will to return was one of the key aspects of whether they could accomplish post-evacuation return to the prefecture in this study. The other hypothesis is that they could not sufficiently express their hope of return due to their own negative symptoms (e.g. emotional withdrawal, blunted affect, and apathy) which developed during their long-term hospitalization.

The other considerable reason of their difficulty in returning to their hometown is the exacerbation or destabilization of psychotic symptoms due to the unintended and unwanted changes in their living environments during or after hospital evacuation. Specifically, temporarily and mandatorily stopping their pharmacotherapy because of evacuation might have effects on their psychiatric conditions. During that time, sharing the evacuated inpatients' information varied and depended on the hospitals. Yabe (2013) mentioned that many inpatients had been evacuated from their former hospitals with no hospital staffs or medical records, whereas the other inpatients' prescribed drugs and records had been prepared by the medical practitioners of their admitted hospitals. Thus, the evacuated patients with schizophrenia, who had reached their destination hospitals with no records and had not been able to receive sufficient remedy that the psychiatrists in their former hospitals had prescribed, may not be able to maintain their psychotic status; therefore, it was difficult for them to return to their hometown stably (Japan Academy of Psychiatric and Mental Health Nursing, 2015).

Considering this unexpected discontinuation of pharmacotherapy, we suggest the sharing of most recent medical records. Therefore, continuous and practical training of medical staffs with assumptions of immediate psychiatric hospital evacuation is essential (International Research Institute of Disaster Science, 2019). Furthermore, recent data-health efforts may enable practitioners in both the affected and evacuation destination hospitals to check patients' health information during massive disasters in the future (Fujii et al., 2021). Another one is the administration routes of the antipsychotic drugs for stable and continuous treatments. Specifically, we recommend the long-acting injection (LAI) of antipsychotics more than their oral drugs since the risk of relapse after the withdrawal of medication is lower; moreover, the period from discontinuation to relapse is longer among patients administered through LAI than orally (Markowitz et al., 2013; Weiden et al., 2017). However, the psychiatric medications of the participants during that time are unknown, which is one of the limitations of this study.

Implications to future clinical practices

To the best of our knowledge, this is the first report that explored the physical and psychiatric backgrounds associated with the post-evacuation return of psychiatric inpatients who experienced hospital evacuation due to massive complex disasters. Through this analysis, we were able to determine that the practitioners of the destination hospitals realized the necessity of returning evacuees to their hometown due to the various – physical, psychological, and social – aspects of their condition, and this awareness had led to the easiness and earliness of the patients' return. On the other hand, we suggest that grasping the patients' future wills more politely is important when targeting such a specific population. Contrary to the general evacuees, some symptoms unique to psychiatric patients may function as barriers from making them express their hopes to return to their hometowns. Perceiving the necessity of an earlier return for the inpatients' physical/mental conditions and providing support during their decision-making process are both essential for the practitioners.

Meanwhile, we assessed the evacuees' post-evacuation return to Fukushima, rather than their discharge to community transition which we consider a more desirable outcome. As we explained earlier, the MPCT project has prioritized returning to hospitals in Fukushima as the primary stage of this step-by-step model for community lives. Although we described the first step in the manuscript, further analysis is required of the discharge factors and comparisons between those outcomes and the current results.

Limitations

Nevertheless, one of the limitations of this study is that the information regarding each evacuee's hopes to return to their home grounds were not included. As discussed previously, many patients' LOS before the evacuation might be very long. Considering that they might have few opportunities to be exposed outside the hospitals before the evacuation, the patients' expected return to their former hospitals may be questionable. This issue makes us debate whether simply returning to their former hospitals and continuing hospitalizations are desirable outcomes for patients. Second, since the participants in this study were all included in the MPCT, this study design did not assess the main effect of the project itself. Third, the detailed types of the patients' psychological symptoms and severities of their psychiatric/physical diseases cannot be measured. Fourth, the patients' socioenvironmental factors were also unidentified. For instance, the existence of cooperative families or community social capitals may accelerate not only the evacuees' return to the hospitals but also subsequent community transitions. Finally, some discussions cannot be made due to the small number of cases among some psychiatric diagnoses and physical complications.

Conclusion

Despite these limitations, this study indicated the evacuated psychiatric inpatients' post-evacuation return and associated backgrounds, particularly their physical/psychiatric status. Vulnerabilities, which are distinct to patients with psychiatric disorders and physical complications, must be considered by the staffs in the destination hospitals. Furthermore, continuous training for certain medical information-sharing during immediate evacuation, providing treatments which have lower risks of inevitable discontinuation due to mandatory hospital evacuation, and politely comprehending the evacuees' hopes of returning are essential for the practitioners.

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Availability of data and materials

We used the data provided by the Fukushima prefectural government. As we have not received permission from the prefecture, we cannot share the materials.

Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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Ethical approval

The Fukushima Medical University general ethics committee approved this research (No. 29389). This study was a joint research collaboration with the Fukushima prefectural government, and the data was provided by the government. All the participants' data were anonymized; therefore, the informed-consent process was waived by the committee.

ORCID iD

Toshihiro Terui  <https://orcid.org/0000-0001-6247-8083>

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