

Brief Report

Cite this article: Hori A, Sawano T, Nonaka S, Tsubokura M. How to deal with the risk of evacuation of psychiatric hospital in nuclear disaster: A case study. *Disaster Med Public Health Prep.* 17(e332), 1–4. doi: <https://doi.org/10.1017/dmp.2022.298>.


Keywords:

Disasters; Fukushima Nuclear Accident; Emergency Services; Psychiatric; Earthquakes

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How to Deal With the Risk of Evacuation of Psychiatric Hospital in Nuclear Disaster: A Case Study

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Abstract

Objective: People with psychiatric disorders are one of the most vulnerable populations in disasters, and the 2011 Great East Japan Earthquake reported higher post-evacuation mortality rates among psychiatric inpatients. A psychiatric hospital evacuated after the nuclear accident was surveyed to gain valuable insights for future disaster preparedness.

Methods: The authors interviewed two Odaka Akasaka Hospital (a private psychiatric hospital) staff responsible for evacuation due to the nuclear accident.

Results: At the time of the earthquake, 104 patients had been admitted to the hospital. They were instructed to evacuate on the grounds that they existed within a 20 km radius of Fukushima Daiichi Nuclear Power Station. Although the evacuation process was extraordinarily demanding, the staff acted professionally, and no patient experienced a significant deterioration in health during the evacuation.

Conclusion: It was reasonable to follow the evacuation order because of the difficulty of obtaining accurate information about radiation exposure and staff availability in high-risk situations. The staff's knowledgeable and attentive care of the patients was one of the factors that enabled them to successfully carry out this severe evacuation. However, this may be related to the high mortality rate after the evacuation of patients who were separated from such caregivers.

Introduction

People with mental disorders are among the most vulnerable populations in disasters, along with the elderly and children,¹ and this population was also severely affected by the 2011 Great East Japan Earthquake and nuclear accident. Only a few case studies have focused on the evacuation of psychiatric inpatients during disasters.^{2,3} Detailed reports have been made on the evacuation of 2 hospitals, which were located within 5 km of the nuclear power plant, mainly describing the elderly.^{4,5}

Gotoh, *et al.*⁶ reported that the mortality rate of psychiatric inpatients who were evacuated at the Great East Japan Earthquake was higher than if they had continued to be hospitalized in the same hospital. The authors attributed this to several factors, including the high average age of the inpatients, the burden of evacuation itself, the separation from their home communities, and the vulnerability of people with mental disorders.⁶ Of these factors, the previous reports,^{4,5} confirm that the 'high average age' and 'burden of evacuation itself' contributed to the high mortality rate during and immediately after evacuation. However, this alone does not explain the persistence of high mortality ratios.

Based on the above, the authors had 2 research questions (RQs):

RQ1: What is the nature of mass evacuation of psychiatric patients in a complex disaster involving a nuclear power plant accident?

RQ2: What factors contribute to the long-term increase in mortality among psychiatric patients after evacuation?

In this study, we investigated the evacuation of Odaka Akasaka Hospital, a private psychiatric hospital located approximately 18 km north-northwest of the Fukushima Daiichi Nuclear Power Station. A detailed study of this case will shed light on the measures needed to evacuate people with mental disorders.

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Methods

Odaka Akasaka Hospital was a psychiatric hospital having operated for years in the area affected by the Great East Japan Earthquake. At the time of the earthquake, 104 patients were admitted to Odaka Akasaka Hospital, with a staff strength of 32. 34 beds were reserved for elderly demented patients, of whom about 10 were bedridden and required intravenous fluids. In addition, 2 schizophrenic patients were disturbed and used isolation rooms. The hospital was closed following the evacuation order due to the nuclear power plant accident.

The former hospital director was interviewed and the authors tried to address the actual situation of the evacuation. Authors also interviewed another staff member in charge of crisis management at Odaka Akasaka Hospital in 2011. The results of these 2 interviews were almost identical, and the interviews with these 2 personnel saturated the information needed to answer the initial 2 RQs. These results provided a clue to construct a hypothesis explaining why the mortality rate of psychiatric patients after the evacuation was high. The evacuation process was reconstructed and summarized in writing, and the 2 interviewees were asked to review the content and approve its accuracy.

The authors referred to SRQR guidelines,⁷ in conducting this study.

The interviewees gave the authors written consent to publish.

This study was approved by the Institutional Review Boards of Minamisoma Municipal General Hospital (approval number: 2–07) and Fukushima Medical University (approval number: 2019–269).

Results

None of 104 inpatients and 32 staff in Odaka Akasaka Hospital died or seriously deteriorated until completing the evacuation on March 18. The details of the process are as follows.

March 11

After the earthquake, there were no human casualties, and the building sustained some minor damages. Infrastructure such as electricity and water were maintained, but telephone and other communications became difficult. Frequent aftershocks of the earthquake occurred.

March 12

In the afternoon, the television repeated the tsunami images and the hydrogen explosion at Fukushima Daiichi Nuclear Power Station. Considering the effects of possible radiation exposure, measures were taken to stop the opening of doors and use of ventilation fans. The people of Odaka Akasaka Hospital became aware that their hospital was under evacuation orders after 6 PM, from television. At around 8.30 PM, 48 young patients (Group 1) with 12 staff moved to a general evacuation center (Figure 1).

March 13

Of the 48 patients who moved the previous day, 10 returned early in the morning because they could not adapt to the evacuation center.

The other 38 patients and staff members were moved to another evacuation center in the distant city (Fukushima City). The following day, these patients were transferred to 5 other psychiatric hospitals.

Within a 20 km radius, the evacuation of the general public and city hall was completed before that of the inpatients at Odaka Akasaka Hospital. This caused problems due to inadequate communication; for example, some staff trying to go to the hospital were stopped by the police.

On March 13, the staff made name tags for patients. They cut sheets into appropriate sizes and wrote patients' names, contact telephone number, and the hospital name. They sewed them to the back of the clothes for some patients. They also prepared medical records, prescription medicines, and food items. The police initially informed the hospital staff that a bus for evacuation would arrive at noon, but it did not arrive until the evening of March 14.

March 14

It snowed on March 14. Police had asked hospital staff to prepare for an immediate evacuation, so they lined the patients up outside, but 7 tourist buses did not arrive until 6 PM. 66 patients and staff (Group 2) left at nearly 9 PM but were not told where they were going. The staff had decided the arrangement of patients on the bus. For example, they considered that 'a bedridden elderly person would need 2 seats, and a staff member should be placed beside him or her,' and that 'an experienced male nurse should also be allocated to patients with psychiatric symptoms.' The 2 unsettled schizophrenic patients were attended to by several male staff at all times during the evacuation, but their behavior was much calmer than expected. A screening test for radiation exposure was carried out, and no one was estimated as positive.

When they stopped to use a public toilet on the way, a car pulled into the car park and the driver started to shout: 'What are you doing here? I am from the nuclear power plant. Get out of here!' Fortunately, no patients were disturbed. The evacuation took more than 9 hours.

March 15

The high school gymnasium where the evacuation center was located, posed a questionable safety situation. It was severely chilly in mid-March. Psychiatric patients might approach hot air warmers and suffer burns. General evacuees were so concerned about radiation exposure that every time someone moved to use the toilet outside the gymnasium, there were shouts of 'Close the door soon!' There was a folding screen on which 5 or 6 bodies had been left in 1 corner of the gymnasium. They later came to know that these people were patients who had been transferred from another severely damaged hospital.⁴ Over 100 elderly evacuees were sleeping wrapped in blankets. Even under these circumstances, intravenous procedures for some patients were carried out.

The hospital staff found it challenging to keep the patients safe there. A doctor who had volunteered to work at the shelter, examined patients evacuated from Odaka Akasaka Hospital. Through the mediation of this doctor, a policy was finalized to admit 10 serious patients to another local hospital in Minamiaizu Town. Another local welfare facility decided to accept the other 56 patients and staff members. During the journey, 1 patient, over 90 years old, said: 'Please leave me. I will slow you down.' On arrival, both patients and staff were comforted by the warm bedding and food prepared. The nurses slept with the patients to prevent them from becoming hypothermic at that night.

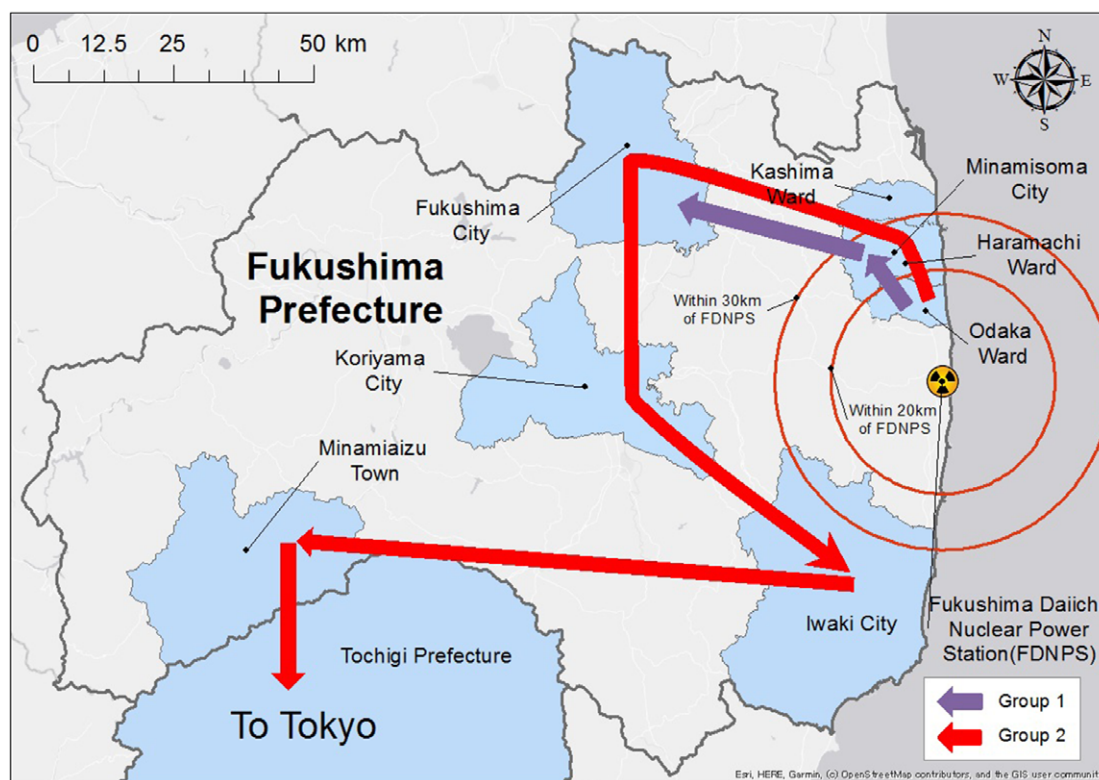


Figure 1. Evacuation schedule and routes of Odaka Akasaka Hospital.

March 16

It had been snowing since the morning, and the staff from Odaka Akasaka Hospital had taken the initiative to shovel the snow. They got prescriptions from a pharmacy in Minamiaizu Town. All patients and staff were able to shower and bathe.

March 17

Another hospital in Tokyo was decided to be the primary destination for the patients. Most of the staff decided to accompany the patients to Tokyo, while other staff chose to stay or volunteer at other shelters in Fukushima prefecture.

March 18

3 buses left at 7.20 AM and arrived at the hospital in Tokyo before noon. The whole hospital welcomed them.

Discussion

The current study revealed that the evacuation of psychiatric patients following the nuclear power plant accident was extraordinarily severe. The inpatients evacuated later than the general population. In addition, the evacuation center was inappropriate for people with psychiatric disorders.

However, the hospital staff maintained high morale and commitment to patient care and no deaths occurred. In order to address the possible behavioral abnormalities, the hospital staff had some experienced male nurses sit next to the patients with active symptoms. In case of Hurricane Katrina, similar considerations were made.³ Before departure, the hospital staff decided to place staff beside the bedridden elderly patients. They also

recognized the dangers of the hot air machines installed in the evacuation center.

Schultz, *et al.*⁸ studied hospital evacuations following the January 1994 earthquake in California, USA. Out of 91 health care facilities, 6 evacuated immediately after the earthquake, and 2 evacuated several days after building damage was noted. Of the 6 hospitals which evacuated immediately, only 1 evacuation was due to building damage, while the remaining 5 were due to the inability to have a stable supply of water, electricity, or other services. In comparison, at Odaka Akasaka Hospital, building damage was minor, and water and power supplies, were maintained. The basis for the evacuation was a governmental order issued after the nuclear accident.

According to the study by Schultz, *et al.*,⁸ 5 of the 6 immediately evacuated hospitals prioritized the evacuation of critically severe patients. On the other hand, in the remaining hospital, priority was given to evacuating those with minor illnesses. The reason was that the hospital manager determined that imminent danger continued to exist and prioritized patients who could evacuate. This means that when immediate evacuation of the entire hospital was possible, priority was given to the seriously ill. However, if this was not possible and the director anticipated that the situation would continue to be difficult, priority was given to those with minor illnesses. The same was true at Odaka Akasaka Hospital. At the earliest stage, the evacuation of 48 patients with minor illnesses was initiated first, due to concerns about the health risks from radiation exposure. On the other hand, in the evacuation on March 15 from an inadequate shelter, priority was given to seriously ill people.

The strength of Odaka Akasaka Hospital was the intense attachment between staff and patients. Psychiatric hospitals in Japan are often known for their lengthy hospital stays.^{9,10} It leads to the close

and intense relationship between the patients and the hospital staff. However, the strength of this firm attachment quickly converts to an opposite weakness when it is lost. This could be related to the higher mortality rate of psychiatric inpatients in Japan over the long term after evacuation.⁶ For example, Sonoda, *et al.*⁹ reported on a psychiatric patient of Takano Hospital who died after evacuation, suggesting that the patient's death may have been related to a lack of appropriate communication about the use of a particular laxative.⁹ Another weakness of this evacuation process was the moderately enthusiastic involvement of the government issuing the evacuation order, but this was compensated for by the strength of the personal relationships available between the director of Odaka Akasaka Hospital and other medical institutions, the welfare community and volunteers.

Limitations

The present study reports on a single facility that experienced a combination of rare factors: hospital evacuation, psychiatric facility, and radiation disaster. Therefore, the findings are mainly descriptive.

Conclusions

This paper reported on the evacuation process at Odaka Akasaka Hospital following the 2011 earthquake, tsunami, and nuclear power plant accident. The early stages of the evacuation were completed without major incidents due to the dedicated efforts of the hospital staff. However, the strength of that firm rapport could have been linked to higher mortality rates among inpatients during the long evacuation process after separation.

Despite the increasing frequency of disasters worldwide, a systematic body of knowledge on hospital evacuation has not yet been established. In addition, there are few reports specifically targeting psychiatric inpatients. In the near future, it is expected that guidelines will be developed to indicate what preparations are required during normal times and to support decision-making by personnel responsible for hospital evacuation in the event of a disaster. Since experiments are difficult to conduct in this field, case reports such as the present study might make some contribution to the development of such guidelines.

Acknowledgements. The authors express their sincere gratitude to all of the patients and the staff of Odaka Akasaka Hospital including the director Dr Mizuya Watanabe, who was in charge of the evacuation during the disaster

and the subsequent measures; he also provided useful feedback and guidance for the writing of this paper.

Conflict of interest. The authors declare no competing interests with regard to this work.

Funding statement. This work was supported by the Radiation Safety Research Promotion Fund on the risk–benefit of protective actions during nuclear emergencies organized by the Nuclear Regulation Authority, Japan.

Abbreviations. RQ, Research Question

References

1. Mace SE, Doyle CJ, Askew K, *et al.* Planning considerations for persons with access and functional needs in a disaster-Part 2: evacuation and sheltering. *Am J Disaster Med. Summer* 2018;13(3):195-206. doi: [10.5055/ajdm.2018.300](https://doi.org/10.5055/ajdm.2018.300)
2. Sporty L, Breslin L, Lizza P. The emergency evacuation of a psychiatric hospital. *J Soc Psychol.* 1979;107(First Half):117-23. doi: [10.1080/00224545.1979.9922680](https://doi.org/10.1080/00224545.1979.9922680)
3. Thomas J, Lackey N. How to evacuate a psychiatric hospital: a Hurricane Katrina success story. *J Psychosoc Nurs Ment Health Serv.* 2008;46(1):35-40. doi: [10.3928/02793695-20080101-13](https://doi.org/10.3928/02793695-20080101-13)
4. Sawano T, Senoo Y, Yoshida I, *et al.* Emergency hospital evacuation from a hospital within 5 km radius of Fukushima Daiichi Nuclear Power Plant: a retrospective analysis of disaster preparedness for hospitalized patients. *Disaster Med Public Health Prep.* 2021;1-4. doi: [10.1017/dmp.2021.265](https://doi.org/10.1017/dmp.2021.265)
5. Sawano T, Shigetomi S, Ozaki A, *et al.* Successful emergency evacuation from a hospital within a 5-km radius of Fukushima Daiichi Nuclear Power Plant: the importance of cooperation with an external body. *J Radiat Res.* 2021;62(Supplement_1):i122-i128. doi: [10.1093/jrr/rraa122](https://doi.org/10.1093/jrr/rraa122)
6. Gotoh D, Kunii Y, Terui T, *et al.* Markedly higher mortality among psychiatric inpatients mandatorily evacuated after the Fukushima Daiichi Nuclear Power Plant accident. *Psychiatry Clin Neurosci.* 2021;75(1):29-30. doi: [10.1111/pcn.13158](https://doi.org/10.1111/pcn.13158)
7. O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for reporting qualitative research: a synthesis of recommendations. *Acad Med.* 2014;89(9):1245-51. doi: [10.1097/ACM.0000000000000388](https://doi.org/10.1097/ACM.0000000000000388)
8. Schultz CH, Koenig KL, Lewis RJ. Implications of hospital evacuation after the Northridge, California, earthquake. *N Engl J Med.* 2003;348(14):1349-55. doi: [10.1056/NEJMsa021807](https://doi.org/10.1056/NEJMsa021807)
9. Sonoda Y, Ozaki A, Hori A, *et al.* Premature Death of a schizophrenic patient due to evacuation after a nuclear disaster in Fukushima. *Case Rep Psychiatry.* 2019;2019:3284153. doi: [10.1155/2019/3284153](https://doi.org/10.1155/2019/3284153)
10. Imai H, Hosomi J, Nakao H, *et al.* Characteristics of psychiatric hospitals associated with length of stay in Japan. *Health Policy.* 2005;74(2):115-21. doi: [10.1016/j.healthpol.2004.12.018](https://doi.org/10.1016/j.healthpol.2004.12.018)