福島県立医科大学 学術機関リポジトリ

FUKUSHIMA MEDICAL UNIVERSITY

Title	Evacuation effect on excess mortality among institutionalized elderly after the fukushima daiichi nuclear power plant accident
Author(s)	Yasumura, Seiji
Citation	Fukushima Journal of Medical Science. 60(2): 192-195
Issue Date	2014
URL	http://ir.fmu.ac.jp/dspace/handle/123456789/436
Rights	© 2014 The Fukushima Society of Medical Science
DOI	10.5387/fms.2014-13
Text Version	publisher

This document is downloaded at: 2024-04-27T03:58:47Z

Fukushima Medical University

Fukushima J. Med. Sci.,
Vol. 60, No. 2, 2014

[Fukushima Symposium 2013]

EVACUATION EFFECT ON EXCESS MORTALITY AMONG INSTITUTIONALIZED ELDERLY AFTER THE FUKUSHIMA DAIICHI NUCLEAR POWER PLANT ACCIDENT

SEIJI YASUMURA

Department of Public Health, Fukushima Medical University School of Medicine, Radiation Medical Science Center for the Fukushima Health Management Survey, Fukushima Medical University

(Received May 27, 2014, accepted May 29, 2014)

Abstract : The Great East Japan Earthquake hit Fukushima Prefecture on March 11, 2011, just over 3 years ago and it continues to affect our lives. In Fukushima, many people are confirmed dead or still missing due to the earthquake and/or tsunami. Additional "disaster-related deaths" have been attributed to the Fukushima Daiichi Nuclear Power Plant (NPP) accident. Mortality among the institutionalized elderly rates after the NPP accident were exceptionally high during the first 3 months, and persisted at a lower level for 9 months, in comparison with similar periods before the accident. This study demonstrates the great impact of evacuation on mortality of institutionalized elderly, excluding inpatients. We need to pay special attention to evacuation of the elderly, regardless of whether voluntary or forced.

Key words : relocation, transfer, Fukushima Health Management Survey, Public Health

INTRODUCTION

The Great East Japan Earthquake was quickly followed by a nuclear accident at Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Plant (NPP). The Japanese government decided that all residents within a 20 km radius of the NPP needed to evacuate from their houses just after the accident in order to minimize radiation effect on their health. Within a 20 km radius of the NPP, there were 7 hospitals and 34 institutions for the elderly with 1,240 and 1,770 people staying there, respectively[1,2]. They were also forced to move to other places regardless of their own will.

It is well known that relocation after disaster is harmful to vulnerable people, for example, patients and the elderly[4-6]. To my knowledge, there are no reports from Japan on long-term mortality change among elderly residents following transfer to other places in response to disasters. We investigated excess mortality among relocated institutionalized elderly and found that it persisted for 8 months post-disaster[2].

The purpose of this report is to explore whether excess mortality still continued or not after 1 year of evacuation among institutionalized elderly in Fukushima.

SUBJECTS AND METHODS

We previously reported excess mortality for 8 months among relocated institutionalized elderly after the Fukushima nuclear disaster[2]. As data collection of the subjects and analytical methods for the data were previously described, they are summarized briefly here. The subjects were 1,770 institutionalized elderly persons who were staying at 34 community facilities including special nursing homes, general nursing homes, geriatric health service facilities and group homes in the evacuation area when the disaster occurred.

Fukushima prefecture had been routinely collecting mortality data for each facility. Age and mortality data on those elderly who transferred outside the prefecture after the disaster were also collected. Age, gender and location of death were in-

Corresponding author : Seiji Yasumura, MD, DMSc E-mail : yasumura@fmu.ac.jp
https://www.jstage.jst.go.jp/browse/fms http://www.fmu.ac.jp/home/lib/F-igaku/

cluded in the reports from the facilities. As a member of the "Promotion Committee for Health and Welfare Policy for the Elderly in Fukushima Prefecture", I could access and analyze data of March 2011 to February 2012 in order to advance local policy in a meaningful way.

In this paper, mortality data per month and the quarterly mortality ratio of 1 year were calculated. Quarterly mortality ratios after Fukushima NPP accident were compared with corresponding periods before the accident.

RESULTS

Total number of deaths over 1 year before the Fukushima NPP accident was 141 and increased by a factor of 2.5 to 349 after the accident. Changes of mortality rates for each month among the institutionalized elderly between before Fukushima NPP accident and after the accident appear in Fig. 1. Mortality for each month sharply increased just after the accident compared with that before the accident and continued almost one year.

Table 1 shows monthly average quarterly mortality rates (/1,000) and quarterly mortality ratios before and after the disaster. The quarterly mortality ratio for the first 3 months after the disaster was 3.1, followed by 1.8 for next 3 months, and 1.4 for 6 months.

Females accounted for 71% of deaths after the disaster, and 94.9% of deaths occurred in people aged ≥75 years (but with age unknown in 33 cases). Comparing death reports by facility type, those from special nursing homes were 170 before the accident versus 207 after ; those from geriatric service facilities were 17 before and 108 after.

DISCUSSION

In Japan, "persons in need of assistance on occasions of disaster" include the elderly, the handicapped, babies and infants, pregnant women and foreigners. Among the elderly, those living in institutions are thought to be more frail than those living in the community. Prior knowledge about all persons in need of assistance on occasions of disaster is an essential element of Japanese social policy that facilitates prompt action, such as evacuation to shelters.

In Iwate, 4,671 people have been confirmed dead and 1,688 people remain missing, in Miyagi, 9,512 are dead and 1,688 are missing ; in Fukushima, 1,605 are dead and 214 are missing as a direct consequence of the Great East Japan Earthquake and tsunami (as of March 11, 2012). In Fukushima, 761 casualties have been designated as "Disaster-related death caused by the Great East Japan Earthquake" (disaster-related death). Likewise, 193 in Iwate and 636 in Miyagi have been designated as disaster-related deaths. These numbers are small in comparison with direct earthquake or tsunami deaths, but point to matters of serious concern.

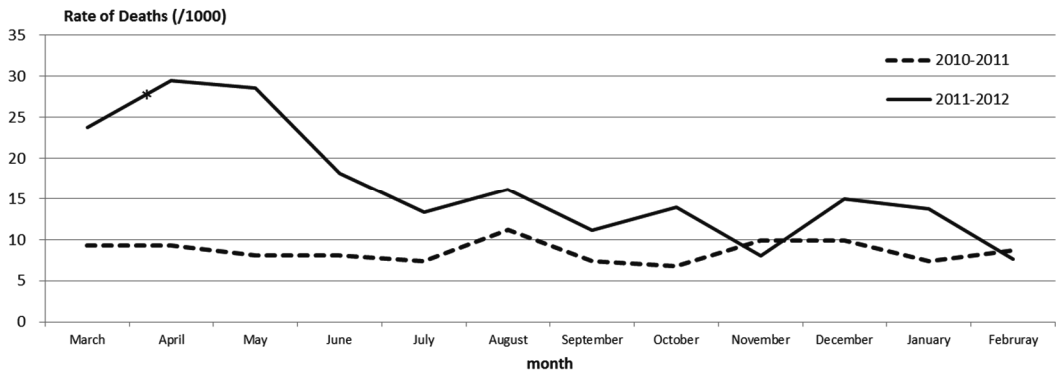

Fig. 1. Changes of mortality rates among the institutionalized elderly before and after the Fukushima NPP accident.

Table 1. Comparison of quarterly mortality ratios before and after the disaster

	March to May	June to Aug.	Sep. to Nov.	Dec. to Feb.
2010-2011(a) #	8.87	8.87	8.04	8.66
2011-2012(b) #	27.19	15.90	11.07	12.16
Quarterly mortality ratio (b/a)	3.1	1.8	1.4	1.4

: monthly average quarterly mortality rate (/1,000)

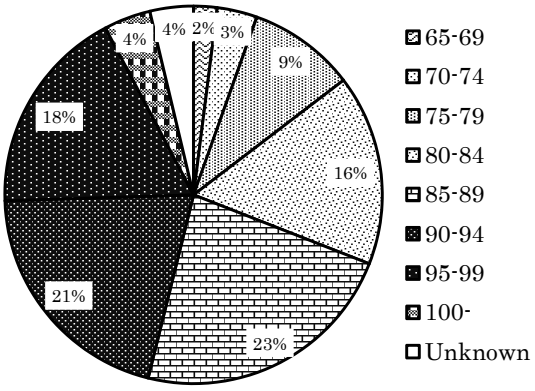

Fig. 2. Age distribution of the elderly who died after the disaster.

Most of Fukushima's disaster-related deaths are thought to be from evacuation mandated by the Government[2]. In contrast, there have been no deaths caused by radiation in this disaster.

Per the evacuation order of March 12, all residents within 20 km of Fukushima Daiichi were forced to evacuate. Most residents successfully evacuated on the 13th, but about 840 inpatients were left behind. Despite intensive transport efforts, 12 people died in transit and 50 people died as refugees immediately after transport[1]. This shows that in the very early stages of evacuation, transportation itself is very harmful to vulnerable persons.

In another study conducted among nursing home residents in Minamisoma City, located outside the 20 km evacuation zone, all elderly residents were voluntarily evacuated. In three of 5 facilities, initial evacuation significantly elevated mortality after the disaster[3].

Results of previous studies[1,3] are consistent with our data.

The fact that most people who died by evacuation in our study were elderly means that evacuation is a potent risk factor for them. We don't have detailed information on the cause and course of death. However, a previous report[2] mentioned that poor living conditions (low temperature and poor nutrition) during relocation affected the elderly greatly, with their most common cause of death being pneumonia.

On the other hand, people who continue to live as refugees in other prefectures were 62,038, versus 102,180 who evacuated within Fukushima as of May 2012. In total, 164,218 people including voluntary evacuees were not living in their own house. Newest data show that the total number of evacuees outside Fukushima has decreased gradually. However, Yabe *et al*. revealed that the nuclear accident after the Great East Japan Earthquake caused psychological distress among residents in Fukushima prefecture, according to results of a mental health and lifestyle survey through the Fukushima Health Management Survey[7,8].

There are some limitations in this study. First, we don't have enough data to analyse other risk factors relating to mortality. Second, we didn't refer to the cause of death, because most of causes 1 year after the accident were not verified. Third, data on shelter or other facilities where evacuees were transported were not obtained. We cannot yet propose effective and specific evacuation planning advice to national and local governments and facilities for the aged.

This study shows that relocation of institutionalized elderly increased mortality and this higher mortality continued over 1 year after the Great East Japan Earthquake. We need to pay special attention to evacuation of the elderly, regardless of whether voluntary or forced. I would like to reiterate that "Concrete efforts among local and national governments, and among healthcare professionals and epidemiologists, are needed to turn this tragic disaster into an opportunity to improve elderly care in Japan".

ACKNOWLEDGEMENT

Ethics approval : This report is in accordance with the Ethical Guidelines for Epidemiological Studies established by the Japanese government.

Conflict of interest : None declared.

I thank Professor Kenneth E. Nollet (Director, Office of International Cooperation, Radiation Medical Science Center for the Fukushima Health Management Survey, Fukushima Medical University) for helpful comments.

REFERENCES

1. Tanigawa K, Hosoi Y, Hirohashi N, *et al*. Loss of life after evacuation : lessons learned from the Fukushima accident. Lancet, **379** : 889-891, 2012.
2. Yasumura S, Goto A, Yamazaki S, *et al*. Excess mortality among relocated institutionalized elderly after the Fukushima nuclear disaster. Public Health, Feb ; **127**(2) : 186-188, 2013.
3. Nomura S, Gilmour S, Tsubokura M, *et al*. Mortality risk amongst nursing home residents evacuated after the Fukushima nuclear accident : a retrospective cohort study. PLOS ONE, **8**(3) : e60192. doi:10.1371/journal.pone.0060192. 2013.

4. Clough JD, Kay R, Gombeski Jr WR, Nickelson DE, Loop FD. Mortality of patients transferred to a tertiary care hospital. Cleve Clin J Med, **60** : 449-454, 1993.
5. Bernard AM, Hayward RA, Rosevear J, Chun H, McMahon LF. Comparing the hospitalizations of transfer and non-transfer patients in an academic medical center. Acad Med, **71** : 262-266, 1996.
6. Gordon HS, Rosenthal GE. Impact of interhospital transfers on outcomes in an academic medical center. Med Care, **34** : 295-309, 1996.
7. Yabe H, Suzuki Y, Mashiko H, *et al*. Psychological Distress after the Great East Japan Earthquake and Fukushima Daiichi Nuclear Power Plant Accident : Results of a mental health and lifestyle survey through the Fukushima Health Management Survey in FY2011 and FY2012. Fukushima J Med Sci, **60** : 57-67, 2014.
8. Yasumura S, Hosoya M, Yamashita S, *et al*. Study protocol for the Fukushima Health Management Survey. J Epidemiol, **22** : 375-383, 2012.