PUBLIC HEALTH XXX (2012) 1–3

Available online at www.sciencedirect.com

Public Health

journal homepage: www.elsevier.com/puhe

Short Communication

Excess mortality among relocated institutionalized elderly after the Fukushima nuclear disaster

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ARTICLE INFO

Article history:
Received 9 March 2012
Received in revised form
8 August 2012
Accepted 18 October 2012
Available online xxx

Immediately after the accident at the Fukushima Daiichi nuclear power plant following the Great East Japan Earthquake on 11 March 2011, the Japanese Government ordered all residents within 20 km of the plant to evacuate. Among the evacuees were 1770 institutionalized elderly at 34 community facilities in the evacuation zone, including: specialist nursing homes; general nursing homes; geriatric health service facilities; and group homes. The Government arranged transportation, and transfers started on 12 March, moving the elderly to hospitals, municipal gymnasiums and public schools. They could not take any personal belongings (even clothes and blankets) because of limited space, and many were transferred several times to different locations over a few months. Some institutions in other prefectures rejected evacuees from the radiation zone due to fears that they could transmit radiation to others. Evacuees were required to present certificates of being 'radiation free' to the shelters, and if not presented, they were refused entrance.[1] Previous studies outside Japan have reported that the relocation of elderly inpatients increases their mortality risk by two to four times.[2–4] This is the first report of data on excess mortality among relocated institutionalized elderly after the nuclear disaster in Fukushima prefecture.

Monthly mortality data among institutionalized elderly are collected routinely from facility reports in Fukushima prefecture, even for people who have been transferred outside the prefecture. The mortality rate per 1000 institutionalized elderly before and after the disaster was calculated using prefectural data. The data only included institutionalized elderly in the evacuation zone (within 20 km of the plant), and reported deaths were stratified by month of death, age, sex and cause. Mortality data after the disaster were only available from March to October 2011, and these were compared with data for the same period in the same region in the previous year. The analysis was conducted as part of planning for the 'Sixth Fukushima Welfare Plan for the Elderly 2012'.

The analysis showed 109 deaths among community institutionalized elderly in the evacuation zone from March to October 2010. Most were reported from special nursing homes ($n = 82$, 75%). The total number of deaths increased to 295 (including 32 tsunami victims) in the same period after the disaster in 2011. In 2011, most deaths were reported from special nursing homes ($n = 170$, 58%), followed by geriatric health service facilities ($n = 101$, 34%). Both types of institution are covered by Japan's long-term-care insurance system,[5] but their functions differ; special nursing homes accommodate severely physically and mentally disabled elderly who need constant care, and geriatric health service facilities provide care and rehabilitation to assist patients in returning home. It is striking that the number of deaths among those from geriatric health service facilities accounted for approximately one-third of the total number of deaths in 2011.

Seventy percent ($n = 207/295$) of deaths after the disaster occurred among women, and 93% ($n = 244/262$, age unknown for 33 deaths) of deaths occurred in individuals aged ≥75

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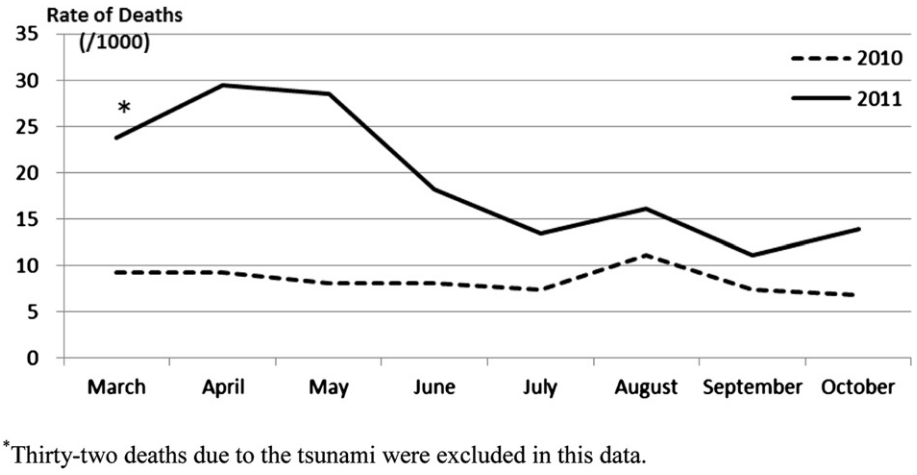
Please cite this article in press as: Yasumura S, et al., Excess mortality among relocated institutionalized elderly after the Fukushima nuclear disaster, Public Health (2012), http://dx.doi.org/10.1016/j.puhe.2012.10.019



*Thirty-two deaths due to the tsunami were excluded in this data.

Fig. 1 – Comparison of mortality rates among institutionalized elderly between 2010 and 2011.

years, suggesting a particular vulnerability of the oldest people to relocation. Pneumonia was the most common cause of death (40.9%), suggesting the influence of poor living conditions (low temperature and poor nutrition) during relocation. Tanigawa *et al.* provided medical support in the acute phase, and reported that deaths of patients during or after evacuation were probably due to hypothermia, dehydration or deterioration of underlying medical problems.[6]

The difference between mortality rates in 2010 and 2011 was exceptionally high during the first 3 months, and continued at a lower level for 6 months (Fig. 1). The overall mortality rate was 2.4 times higher in 2011 than in 2010 (32 tsunami victims excluded). This observed increase was similar to data reported in the abovementioned studies outside Japan.[2–4] The analysis suggests that the impact of a disaster on the excess mortality of institutionalized elderly is most significant in the immediate aftermath, but has a lasting impact due to continuing changes in nutritional, hygienic, medical and general care conditions.

This finding of excess mortality reflects the vulnerability of the institutionalized elderly to change, and their need for special attention and care in disaster evacuation. There is a need to prevent excess deaths among this group by improving the disaster guidelines at elderly institutions in Japan.[7] These guidelines existed but did not function well in the response to the Fukushima nuclear disaster, because no specific plans were included for elderly people in institutions.[6] The evacuation guidelines for institutions should be improved by providing for increased stocks of food for the elderly (easy to cook, chew and swallow), water, warm blankets and enough space at relocation institutions to accommodate elderly evacuees in emergency cases. Furthermore, no nuclear power plant accident drills were performed in elderly institutions before the disaster. Effective disaster prevention drills have to be planned and performed at all institutions. This must be accompanied by additional national financial support, as payments for institutionalized elderly care are lower than payments for medical treatment[5,8]; and by efforts to strengthen the community network for these institutions, as this type of social support is very limited nowadays. The guidelines should also be expanded to address problems of stigma and discrimination that may arise in disasters and create additional stress for evacuees.

A further recommendation is to improve the collection and reporting of health statistics after disasters.[9] In the immediate postdisaster period, the Fukushima prefectural office was overwhelmed with the response, limiting the availability of even basic statistics such as mortality data; as such, the capacity to collect basic health data for vulnerable groups in disasters must be improved. Fukushima prefecture and Fukushima Medical University have launched the Fukushima Health Management Survey to assess long-term low-dose radiation exposure.[10,11] The survey targets all residents in the prefecture, and may help improve the overall health statistics system for the elderly.

Concerted 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.

Acknowledgements

Ethical approval

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

Funding

None declared.

Competing interests

None declared.

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Please cite this article in press as: Yasumura S, et al., Excess mortality among relocated institutionalized elderly after the Fukushima nuclear disaster, Public Health (2012), http://dx.doi.org/10.1016/j.puhe.2012.10.019

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Please cite this article in press as: Yasumura S, et al., Excess mortality among relocated institutionalized elderly after the Fukushima nuclear disaster, Public Health (2012), http://dx.doi.org/10.1016/j.puhe.2012.10.019