Field Report

Early response to the Great East Japan Earthquake and Massive Tsunami at an evacuation shelter in Otsuchi, Iwate Prefecture

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Authors served with the Nagasaki University Medical Relief Team providing medical relief and health services at Terano Kyodojo evacuation shelter at Otsuchi, Iwate Prefecture, an area severely affected by the massive tsunami following the Great East Japan Earthquake. The relief team provided medical consultations at a temporary clinic in March 2011, in collaboration with a local general practitioner. The affected area has been characterized by its high level of population aging, which was also reflected in the age composition of the evacuees at the shelter: 38% of evacuees were aged 65 or older. Many patients presented to the clinic requesting routine medication refills for their chronic medical conditions (e.g. hypertension, diabetes, heart diseases and asthma). However, information on their medications had been lost in many cases, and the identification of medicines was thus a critical task. An increasing trend of symptoms apparently due to stress (e.g. insomnia) was also observed. We supported the introduction of infection control measures to prevent possible outbreak of infectious acute gastroenteritis. While most evacuees had experienced extremely stressful circumstances and profound loss, a functional community had already been developed in the shelter. The evacuees were divided into groups, and the group leaders held meetings to share information and to set the necessary shelter rules. Evacuees shared chores and conducted regular physical exercise together. New infection control measures were also discussed among the group leaders, and implemented only after reaching agreement. We believe collaboration with communities will be critical in planning and implementing future public health and restoration efforts in the affected areas.

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Introduction

The town of Otsuchi is located in Iwate, the prefecture in North-Eastern Japan with the second largest number of deaths associated with the Great Earthquake. The town is on the coast facing the Pacific Ocean, and was severely damaged by the massive tsunami waves that struck on March 11th. Otsuchi had an estimated population of 15,251 in February 2011. On June 19th, 779 people were confirmed dead and 827 people reported missing in the wake of the disaster.

After the Great East Japan Earthquake of March 11, 2011, the first team of doctors and nurses along with aid supplies from Nagasaki University arrived in Tono City, Iwate Prefecture at 4:30 am on March 18th (7th day after the earthquake). The dispatch took 36 hours over land from Nagasaki. The team immediately moved to the evacuation center at Terano Kyodojo (indoor archery facility, Fig 1) where the temporary clinic was set up, and initiated medical services. Though there was no electricity or water supply, the doctors and nurses elected to take up temporary residence at the shelter toward better understanding the needs of the evacuees.

Since then, Nagasaki University voluntarily sent three medical relief teams in rotation based on the initial assessment for which the second author entered the affected area in the immediate aftermath of the earthquake. In this report, we describe the activities of the third team, which operated from March 25th to 30th, 2011 (14th to 19th day after the earthquake). The third team consisted of a physician, a surgeon, a pharmacist, a nurse, a public health worker and a graduate student. The team worked with the local general practitioner, Dr "U", and his staff.

Local general practitioner Dr. U

Dr. U and his family are victims of the massive tsunami themselves. When the Great East Japan Earthquake hit Otsuchi on March 11th, Dr. U was seeing his patients at the clinic. His family managed to escape to the roof of the clinic building, from which they observed the series of massive tsunami waves that literally swept away the whole town (Fig. 2). They stayed atop the building throughout that first night, surrounded by water. Meanwhile, fires raged in many parts of the town.

It was not until the following day that Dr. U’s family and the clinic staff were rescued by helicopter. They were taken to the Terano Kyodojo shelter, where Dr U sprang immediately into action. He set up a desk and chair and started providing medical services to people in the shelter and from nearby communities.

Population aging in the affected area

The Terano Kyudojo shelter accommodated approximately 580 people according the regis-
created soon after the shelter was opened. Many moved out of the shelter in the following two weeks to live with family members and relatives in other parts of the country. On March 28th, according to the shelter’s updated register, 99 households were residing at the Terano Kyudojo shelter, a population of 221 people (110 males and 111 females).

Twenty-seven percent of the population in Iwate prefecture was 65 years of age or older in 2010. Such an aging pattern was even more obvious within the shelter. Fig. 3 shows the age composition of the Terano Kyudojo shelter residents. Nearly forty percent (31% of males and 45% of females) were aged 65 or older, 14 of whom lived alone. The March 11th tsunami is unique compared to other recent natural disasters experienced elsewhere in the world in that it assailed a society with a high level of population aging. It is thus critical that we pay sufficient attention to the health consequences affecting the aged populations in particular.

Great needs surrounding chronic medical conditions

The team dispatched from Nagasaki University worked with Dr. U at the temporary clinic arranged in the Terano Kyodojo Shelter. This clinic served both the shelter residents and people residing in the nearby communities. From the morning of March 26th to noon of the 29th, the clinic provided 266 consultations. Forty percent of the consultations were with the elderly (aged 65+), while infants and young children (aged 0–4) and children (aged 5–14) constituted 2% and 6%, respectively, of all consultations.

Such an age composition was clearly a factor behind the high rates of chronic medical conditions (e.g. hypertension, diabetes and heart diseases) observed among the patients. Many presented to the clinic asking for refills on routine medications for chronic diseases. Some presented with their medicine records or remaining pills. However, most people had lost those in the tsunami and were unable to provide the names of medicines they had been taking. Therefore, one of the critical
tasks facing the team was to identify patients’ medication regimens and determine alternatives from the set of available medicines at the temporary clinic. In this endeavour the role of the team pharmacist was especially significant.

The medicines stocked at the temporary clinic were donated by Nagasaki University and other sources. In addition, the pre-existing medicine supply chain for the region had recovered within a relatively short time. Two local drug wholesalers had restarted operations five days after the quake, and were thereafter able to deliver to the Terano Kyudojo shelter. On March 29th, the clinic had approximately 100 different medicines in stock.

The physician in the team estimated that about one-third of the cases presented with requests for refills on routine medications, while another third were suffering from the common cold. The remaining third attended the clinic with complaints apparently related to stress, most notably insomnia. On the other hand, the need for surgical intervention was relatively small even in the acute phase, according to Dr. U. This observation is consistent with reports from other relief workers3. According to official statistics4, the Great East Japan Earthquake caused far more deaths than injuries. This is likely due to the fact that the majority of people were either able to escape without major injuries or else suffered fatal consequences through the tsunami. This is in stark contrast to the impact of the Great Hanshin–Awaji Earthquake of 1995 which struck a large urban center and lead to 43,000 injuries4.

**Increased hygiene measures to prevent infectious gastroenteritis**

On the morning of March 27th, a patient
presented with severe diarrhea and nausea, suspected of acute gastroenteritis. Soon a few similar cases were also reported from the community. Assuming a high probability of gastroenteritis due to norovirus infection, we acted to increase hygiene measures. Noroviruses can be transmitted by faecally contaminated food or water and by person–to–person contact, and dehydration can pose a serious problem, especially among infants, children and the elderly.

Within the shelter, the taps were not functioning and there was no running water. The prevailing practice for toileting had been to defecate on the newspaper, wrap it up and place the article in a plastic bag. Under such conditions, chances of direct hand–to–stool contact were high. People were also washing their hands in water contained in buckets, which could easily become reservoirs for viruses. With the guidance of our team physician, we discussed the matter with the leaders at the shelter and agreed to introduce some new rules to guide toilet use.

First, we made chlorine–based disinfectants available at all the toilet facilities around the shelter. Until that time, only alcohol–based disinfectants had been available. Second, we asked the residents to stop washing their hands in the bucket water. Third, we introduced plastic bins with foot–operated lids to minimize direct contact with stool and the spread of aerosolized viruses. Fourth, we agreed to introduce designated sandals for the toilet, and asked people to habitually change their footwear for toilet use to minimize the chance that viruses might be carried to the living areas through contaminated shoes.

Extremely stressful experiences

It is obvious that this natural disaster has caused a great deal of stress for the residents of Otsuchi, likely creating profound impacts on both physical and mental health. Indeed, many people experienced traumatic life–or–death situations when the massive tsunami struck their town.

![Fig 5. Hygiene Measures. (Left) Chlorine–based disinfectants were made available at all the toilet facilities. (Right) Shelter leaders practicing the new toileting rules involving the elderly.]
Mr. A attempted to escape by car, taking his aged parents with him. But they encountered a traffic jam before reaching safety and had to abandon the car and flee on foot. Meanwhile, the tsunami wave was surging just 2 meters behind them. Even after clearing the tsunami, Mr. A and his parents had to walk further to escape from the spreading fire to the other side of the mountain in the snow.

Mr. I was pushed into a restroom by the wave. The room quickly filled with water. Suddenly trapped inside, he saw the window but could not open it. The water was extremely cold and soon reached the ceiling: Mr. I could not breathe. But then, the window opened, and his body started floating out and up. The following day, Mr. I was rescued by helicopter and taken to the shelter.

On top of their direct experiences of trauma, most people in the shelter had lost loved ones—dead or still missing. Many are likely suffering from guilty consciences at the thought that they could not save others. Many lost literally everything—houses, cars, televisions, refrigerators, washing machines, computers, books, photographs, and all. By the time of our interaction with them, residents of the shelter had already lived there for more than two weeks, alongside over 200 people and without access to tap water, electricity, television, telephone, or privacy—and they did not know how many more months they would have to stay there. Everything was uncertain for the future—where they could find a place to live and how they would secure their income, to start.

Although large quantities of donated goods were reaching the shelters, such stocks did not necessarily meet the basic needs of people in the shelter and across the affected communities. Some faced the arduous work of cleaning up houses filled with mud and debris, but did not have any spare shoes or clothes in which to do so. Some needed glasses to read documents, but had lost their glasses in the chaos. Even though some cars survived the tsunami, there was no gasoline and no means to go shopping.

Community organizing

Despite such extremely stressful circumstances, many people were working tirelessly in the community of Otsuchi. The shelter itself offered no privacy, no place for crying. Instead, people smiled. People spoke with humor and tried always to see hope ahead of them. Those whose houses still remained standing started cleaning up their houses, filled with mud and soaked with sea water.

In the midst of the devastation, it was extremely impressive to observe that people had already formed a community at the shelter within a few weeks of the earthquake. The shelter residents were divided into five groups and two leaders were selected from each group. The group leaders held meetings every night with the shelter leaders to facilitate communication and discuss the rules to govern living at the shelter.

New hygiene rules for toilet use were also discussed within these shelter meetings in terms of whether the proposed measures were feasible. One idea rejected during one such meeting was for everyone to use the shelf at the shelter entrance to store shoes rather than individuals bringing shoes into the living space, as contaminated shoes may
carry pathogens. However, the leaders were concerned that people would complain at the risk of having their shoes stolen or lost. Once the rules were agreed upon in the meetings, group leaders communicated such information to members of their respective groups.

As for upkeep of the shelters, the residents shared the chores—for example, serving the meals to all the evacuees and cleaning the living space and restrooms. They set rules to regularly open the windows for ventilation. They also practiced “Radio Taiso”, (or “Radio Physical Exercise”) a traditional warm-up calisthenics session practiced every morning as a group.

We felt great potential in the power embodied in the organization of this community, and genuine hope that such power will ultimately triumph to facilitate the recovery and reconstruction of the affected areas.

Discussion and recommendations

After March 11th, a number of medical and health providers were deployed to affected areas in North-Eastern Japan, an action which we believe constituted a major contribution to the robust and timely health response mounted. However, significant public health needs remain, and it is likely that long-term efforts will be needed in these areas.

Mental health and psychosocial needs must be addressed in earnest, recognizing the extreme and ongoing stress affecting the people. Indeed, physicians serving in the disaster-affected areas have observed a marked increase in conditions apparently associated with stress. Interventions may need to involve preventive approaches as well as counselling and treatment services in a gender-, age- and culture-sensitive manner. Consequences of the disaster on the burden of non-communicable diseases (NCDs) should also be continuously monitored among the elderly population in and out of shelters. During our visits to the shelter in Otsuchi, the evacuees were provided primarily with rice, instant noodles and canned food for sustenance, while people generally had very limited access to fresh vegetables, meats, fish and eggs. Such dietary imbalance, combined with long-term stress, could lead to a worsening of NCD conditions. There will also be ongoing risks of potential commu-

Fig 6. (Left) The group leaders in the shelter held meetings to disseminate updated information and to set the shelter rules. (Right) Daily “Radio Taiso” exercise sessions at the shelter every morning at 7 a.m.
nicable disease threats, including outbreaks of infectious gastroenteritis. It may take time for tap water and sewage systems to recover, while people start to cook food for themselves and continue living in crowded condition.

In an effective public health response, we believe communities play critical roles. Like the makeshift community developed at Terano Kyudojo Shelter, community organizations will be able to plan feasible public health measures and disseminate health messages. Through working with communities, we will be able to reach not only those in the shelters but also those outside the shelters. Moreover, communities have the potential to function as a safety net, especially for vulnerable individuals, such as the elderly living alone.

Health authorities should be responsible in providing an effective overall health response and continuing services, and external support will be critically needed to this end. We believe the public health response in the disaster-affected areas will be most effective when the health response and external support are designed in such a way that they empower the local communities, including the local health care providers. Community empowerment can be achieved when the role of the external agent is to catalyze, facilitate or accompany the community. Such an approach may be the key to swift and lasting recovery.

(Parts of the contents were also reported at http://www.dghonline.org/news/dgh-reporter. Dr. U provided his consent for including his episode in this manuscript.)

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References


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