A report from Japan: disaster relief efforts of pharmacists in response to the Great East Japan Earthquake

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Introduction
A massive earthquake, with a magnitude of 9.0, occurred off the Sanriku coast of the Tohoku region, Japan at 14:46 (JST) on 11 March, 2011. According to the Japan Meteorological Agency, the earthquake registered a 7 on the Japanese seismic intensity scale in Kurihara city, Miyagi Prefecture, and 6-plus across wide areas of the Tohoku and Kanto regions, including Miyagi, Fukushima, Ibaraki, and Tochigi Prefectures.

The earthquake generated a massive tsunami, that mainly hit the Pacific coast of northern Japan. Within 15 minutes after the earthquake, a tsunami over 10 m high surged in the coastal areas of Miyagi Prefecture, the closest to the epicentre, destroying breakwaters, and sweeping into inland areas, swallowing cities in an instant. The devastating tsunami rapidly engulfed houses, buildings, and people who were unable to escape in time, and caused extensive damage. Furthermore, a series of earthquakes with an intensity of 5 or 6, presumably related to the main quake, struck Nagano Prefecture in the Chubu region, Shizuoka Prefecture in the Tokai region, and around the Kanto region. More than a month after the main shock, earthquakes of these intensity levels have continued to occur.

In addition to such unprecedented situations, the Fukushima Daichi nuclear power station, a primary source of electricity for the Kanto region, was severely damaged in the aftermath of the tsunami that hit the Pacific coast of Fukushima Prefecture, leading to serious accidents. Of six reactor units, units 1-4 stopped operating. Moreover, the damage that the power station sustained resulted in an emergency, involving core damage and the leakage of radioactive materials into the surrounding areas.

After assessing the severity level of the Fukushima nuclear accident over a period of one month, its provisional evaluation was raised to Level 7, the maximum on the international nuclear event scale (INES). However, it was reported that the amount of radioactive materials released from the Fukushima plant was approximately 10% of that discharged in the accident at Chernobyl, which is the only other one to have been rated Level 7.

The Japan Meteorological Agency named the main earthquake, The 2011 off the Pacific Coast of Tohoku Earthquake, and the term Higashi Nihon Daishinsai (the Great East Japan Earthquake) is used to collectively refer to the main quake, subsequent tsunami, series of earthquakes, and nuclear accident. By 28 May, the death toll had reached 15 256, and 8 565 people were unaccounted for. Of these victims, 97% died from drowning. The number of demolished houses and buildings totalled 68 229.

Background
Immediately after the main quake, the government established emergency headquarters for the disaster response to determine the extent of damage and to implement relief measures. It worked in conjunction with cabinet-level ministries and

Tsunami waves surged in the coastal areas and rapidly engulfed houses and people.1
Pharmacists served in one of the four following medical relief activities:

- Being dispatched from their hospitals of employment as a member of DMATs.
- Being dispatched from pharmaceutical associations, or hospital pharmacist associations as volunteer staff.
- Being dispatched from their hospitals of employment as an assistant pharmacist for hospitals at disaster sites.
- Being independent from any groups or organisations, and performing support activities under the auspices of disaster countermeasures offices.

In natural disasters that have taken place in previous years, such as the Great Hanshin-Awaji Earthquake in 1995, and the Mid Niigata Prefecture Earthquake in 2004, no pharmacists were
deployed as members of DMATs. At these times, pharmacists who volunteered to travel to the disaster-stricken areas, undertook such tasks as sorting and selecting medicines, and providing drug administration guidance, for which they received high acclaim. Lessons were learnt from these experiences.

In response to the Great East Japan Earthquake, the ministry of health, labour and welfare (MHLW), and prefectural governments, officially called on hospital pharmacist associations and pharmaceutical associations to dispatch pharmacists, in accordance with agreements on disaster prevention and mitigation under the Disaster Relief Act. This marked the first time that pharmacists were formally sought by public agencies in a disaster relief operation.

The Japanese Society of Hospital Pharmacists (JSHP) and the Japan Pharmaceutical Association (JPA) made concerted efforts to recruit pharmacists for disaster relief volunteers, and dispatched them one after another.

Dr Ryuya Horiuchi, the president of the JSHP, set up a disaster task force within the organisation soon after the disaster, and released a statement that the office would make efforts to develop support systems from a long-term perspective, with regard to the following four issues:

• Appealing to municipalities and other concerned bodies to involve pharmacists in disaster medical assistance teams.
• Comprehending the state of medication supply, and collecting information on pharmacists’ relief activities.
• Recruiting and dispatching volunteer pharmacists.
• Raising relief money.

Apart from the disaster relief operations led by these organisations, a number of pharmacists volunteered to travel independently to the disaster sites, and engaged in medical relief efforts under the auspices of disaster countermeasure offices and hospitals in those areas.

Relief activities of pharmacists in a disaster setting

This section reports on how, and in what ways, pharmacists performed their role in providing relief activities after the Great East Japan Earthquake. In the immediate aftermath of the disaster, there was an absence of supply of pharmaceutical products in the disaster-hit areas. DMATs needed to obtain medicines on their own and bring them to these areas. However, within a few days, the Japan Pharmaceutical Manufacturers Association, the Japan Association of Chain Drug Stores, the Japan Self-Medication Industry, and a number of pharmaceutical associations and healthcare-related organisations, provided emergency supplies of pharmaceutical and hygiene products free of charge, with the assistance of distributing industries and others.

In response to the recent disaster, relief money and supplies have been continuously offered by individuals, companies, and healthcare-related organisations. Of such support made available for this disaster, the most noteworthy is that the maritime transport system was ensured through the cooperation of public and private sectors, which facilitated prompt delivery of relief supplies to the affected areas. Since the land routes were cut off, the Fisheries Agency and MHLW adopted an initiative to develop a plan of maritime shipment scheduled for 18 March. Various industries were promptly requested to assemble and deliver aid supplies, such as pharmaceutical products and daily commodities, to a designated location.

Despite such short notice, various industries answered the call, and consequently, within half a day, approximately ten 10-ton truckloads of relief supplies were assembled at the storehouses of the Fisheries Agency in Yokohama Port. The gathered items included pharmaceutical products, e.g. cold medicine, throat soothing spray, digestive medicine, antidiarrhoeals, laxative products, dermatological agents, nutritional fortifications, and disinfectants; and daily necessities, e.g. masks, hand soap, toothpaste and toothbrushes, disposable nappies, and disposable hand warmers.

In anticipation of the difficulties of unpacking and sorting the relief goods boxes at disaster sites, and to balance out the shortage and over-supply of needed items, it was decided that these boxes be unpacked and repacked before shipment. A classification checklist was prepared to categorise and sort out medicines according to their efficacy, and repack them into separate cardboard boxes in a style similar to a first aid home emergency kit.

Key participants in carrying out the sorting and repackaging of medicines were pharmacist and pharmacy student volunteers, who gathered upon the request of the MHLW. This process was conducted to prevent an unbalanced delivery of medical supplies to evacuation centres, and 500 packages were prepared for shipment. The volunteers promptly and accurately completed the tasks of sorting, packaging, and distributing these packages.

It is particularly noteworthy that both the public (the MHLW and Fisheries Agency), and private sectors (e.g. pharmaceutical manufacturers, delivery companies, retail organisations, pharmaceutical associations, and pharmaceutical universities), fulfilled their respective roles and prepared the supplies accordingly. They all responded to the request from the MHLW promptly after the disaster, mobilising available resources to procure and supply relief goods swiftly and efficiently. This is thought to be the first time that public-private collaborative support was developed and implemented in response to a disaster situation. It is hoped that this experience provides a foundation upon which the future provision of disaster relief responses can be enhanced and facilitated.

Pharmacists’ relief activities

Firstly, pharmacists can fulfil a number of roles in medical relief services.

Their activities vary, as outlined below, depending on where they practise:
Temporary pharmacies and distribution centres

- Ensuring the appropriate storage and handling of medicines, e.g. sorting out medicines according to efficacy and managing the inventory.
- Ensuring the safe storage and handling of controlled medicines.
- Providing the necessary medicines based on requests from medical shelters.
- Balancing the supply and needs of medicines, and contacting ministerial representatives to replenish the needed medicines.
- Preparing and supplying emergency health and hygiene kits.

Medical shelters and first-aid stations

- Taking part in activities designated to medical relief teams, e.g. prescription check, pill identification, prescription dispensing, the use of generic and non-prescription drugs, and the provision of drug administration guidance.
- Conducting medical rounds with physicians at evacuation centres.
- Assisting in general pharmaceutical services at the pharmaceutical departments of local healthcare institutions.

Evacuation centres

- Ensuring the appropriate storage and handling of medicines, and providing disaster victims with needed medicines.
- Conducting counselling on medicines.
- Providing instructions on hygiene control, e.g. disinfection of bathrooms.
- Engaging in activities that promote environmental hygiene, e.g. examination of drinking water quality.
- Cooperating in biosecurity measures.

Key criteria during a relief operation

Pharmacists who participate in medical relief operations are advised to:

- Work in harmony with other healthcare professionals, medical relief teams, and other supporters, at disaster sites.
- Hand over their tasks to replacement personnel in a smooth and efficient manner, e.g. keep a record of relief activities for future reference by replacement personnel.
- Prepare for, and bring along, small portions of powdered medicines. (Most emergency supplies of powdered medicine are packaged in boxes or tins. Since powder...
Packaging machines are not available at evacuation centres, powdered medicine, including paediatric medicines, need to be prepared and brought with in small quantities).

• Correctly dispose of surplus medicines. (Surplus medicines should not be neglected. They should either be handed over to replacement personnel, or taken home).

• Be dispatched as a member of a group. (Being dispatched as a member of a DMAT, or as a volunteer of a pharmaceutical association or hospital pharmacist association, is preferable to working personally and independently).

• Effectively utilise medication notebooks or medication record books. (Medication notebooks allowed the replacement medical teams to have access to prescription records, which were useful in helping to determine appropriate dosage regimens, and in supervising drug administration when treating disaster victims with chronic disease. The MHLW requested that the JSHP and JPA continue to dispatch volunteer pharmacists, as well as to obtain and distribute medication notebooks.)

**Items and equipment for personal preparedness**

Lastly, listed below are items that pharmacists should carry when travelling to disaster areas:

• Identification, e.g. nameplate.

• A helmet and emergency clothes.

• Rain gear, protective equipment against cold, a sleeping bag (depending on the conditions of the disaster site).

• A mobile phone, a personal computer, a radio, a flashlight, a battery charger.

• An emergency dispensing kit, e.g. paper or plastic bags for drugs, a prescription bottle, a spatula, paper to contain powders, and, if possible, weighing equipment.

• Books and dictionaries, e.g. drug formulary books for prescription and non-prescription drugs, drug identification code dictionaries, and pocket medical dictionaries.

• Drinking water and food.

**Conclusion**

A large number of pharmaceutical products sent by the government and various companies arrive in disaster-hit areas. Only pharmacists with expert knowledge can sort through these medicines with efficacy, and can quickly and appropriately select alternative medicines, if required.

A number of pharmacists responded rapidly to the Great East Japan Earthquake, and engaged in medical relief activities as DMATs personnel, or as volunteers. They contributed significantly to disaster relief by taking part in numerous activities, including selecting medicines, filling prescriptions, and providing instructions on dosage and administration. Disaster relief efforts executed in response to this disaster underscored the importance and necessity of involving pharmacists in medical relief teams.

It is hoped that this report will help enhance pharmacists' preparedness for, and response to, possible future disaster situations due to earthquakes, tsunamis, and other events.

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**References**

