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Review of the domestic utilization of pre-positioned international medical relief equipment in Japan

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Abstract

This study discusses the domestic deployment of the disaster response team of the International Red Cross based in Japan. The team responded to the Niigata Chuetsu Earthquake, the Great East Japan Earthquake and Tsunami (GEJET), and the 2016 Kumamoto Earthquakes. Relief equipment such as large tents, water supply equipment, and generators were useful for supporting damaged medical facilities and improving the living conditions at the evacuation centers. Whilst many studies point out the difficulties in needs matching and logistics arrangements in receiving foreign medical teams in the GEJET, the international disaster response team of the Japanese Red Cross has overcome these challenges by utilizing the existing networks that were constructed before the event.

Keywords: Humanitarian Logistics, Relief Equipment, Pre-positioning, Foreign Medical Teams

1. Introduction

In 2011, the Great East Japan Earthquake and Tsunami (GEJET) caused historical damage in a large part of Japan. Currently, there is growing concern about other catastrophic disasters such as the Nankai Trough Earthquake and the Tokyo Inland Earthquake. In Japan, the medical disaster response system has been improved by establishing disaster base medical centers and disaster medical assistance teams (DMAT) since the Great Hanshin-Awaji Earthquake. In the response to the recent 2016 Kumamoto Earthquakes, a number of medical teams were deployed to provide life-saving support to the disaster-affected people. However, Kawata (2015) suggests that local medical resources and the deployable medical relief teams will not be enough to cope with the increase in injuries caused by the Nankai Trough Earthquake. Therefore, the reception of foreign medical teams (FMTs) should be considered to prepare for catastrophic disasters.

Past case studies reviewed the reception of FMTs in the GEJET. These studies pointed out the challenges in the needs matching between the FMTs and the medical needs in the disaster-affected areas. Banzai (2012) and Katayama (2013) pointed out the importance of needs matching between the specialties of the deployed medical teams and the needs in the field. Tazunoki (2012) also pointed out the challenges in needs matching. In addition, his study pointed out challenges in the self-sufficiency of the FMTs deployed to Japan. In terms of logistics issues in the reception of FMTs, Sakamoto (2012) studied the foreign relief teams deployed to the GEJET including the Israeli field hospital teams. In this case, the offer from the Embassy of Israel in Japan was made on March 18, 2011 and the Israeli advanced team arrived the next day for a needs assessment and coordination. The Israeli medical team, which consists of 53 staff, arrived on March 27 and provided medical services from March 29 to April 11. The field hospital filled the gap between medical needs and local medical resources damaged by the tsunami. To establish a field

hospital, Kurihara City provided logistics arrangements such as 30 prefabrication rooms, generators, field latrines, accommodation, and food for the Israeli medical teams. In this way, the reception of FMTs in the GEJET highlighted the challenges of needs matching and logistics support for the FMT by the Japanese counterparts.

Therefore, past studies proposed the effective use of domestic resources in receiving foreign relief in Japan. Kawata (2000) reviewed the reception of foreign relief teams in the Great Hanshin-Awaji Earthquake. His report proposed strengthening the role of the International Emergency Response Team of the Japan International Cooperation Agency (JICA), as the leading agency for the reception of foreign aid. Eldridge et al. (2006) proposed the effective utilization of the Japan-based American forces in the case of disaster. Asazuma (2012) pointed out the importance of the roles of the Japanese counterparts in providing detailed support to the FMTs. Kai et al. (2012) pointed out the need for medical coordinators who have experience in international humanitarian missions, such as JICA and international medical NGOs.

In addition to the governmental organization, international humanitarian organizations based in Japan can be one of the candidates for coordinating the reception of FMTs. In terms of the utilization of the global network in emergencies, Chu et al. (2011) reviewed the medical response by Médecins Sans Frontières (MSF) in the Haiti earthquake. This study proposed the formation of the Emergency Surgery Coalition (ESC), a group consisting of organizations with extensive experience in delivering surgical care in disasters. This study also proposed the pre-positioning of standardized surgical kits worldwide. The International Red Cross and Red Crescent Societies (IFRC) have been implementing unique disaster preparedness programs. The programs pre-position water and sanitation kits in disaster-prone countries. At the same time, local Red Cross volunteers are trained to operate the kits before the event. In emergencies, these volunteers are mobilized to disaster-affected areas with the kit to supply clean water, whilst other water supply teams from foreign Red Cross societies are mobilized to work together with the local volunteers.

Likewise, international humanitarian organizations based in Japan such as the Red Cross and MSF can be a candidate for the Japanese counterpart in the reception of FMTs.

Therefore, this study discusses the domestic deployment of the medical team of the IFRC based in Japan. In this study, past international and domestic deployments were reviewed to determine the relief approaches in these deployments. In addition, this study aims to reveal how the team solved the issues of needs matching and logistics arrangements that past studies on the reception of FMTs pointed out as challenges in the GEJET.

The paper is structured as follows: Section 2 introduces the methods to be used for this study. Section 3 overviews the disaster response systems and tools of the IFRC. This section also reviews past international medical relief operations of the IFRC and the Japanese Red Cross Society (JRCS). Section 4 reviews past domestic relief operations of the JRCS. Section 5 discusses these issues. Finally, Section 6 presents a conclusion.

2. Methods

2.1 Research Object

This study discusses the domestic deployment of the Emergency Response Units (ERUs) based in Japan. ERUs are the global disaster response tool of the IFRC. ERUs consist of trained specialists and pre-packed equipment, which are deployable within 48-72 hours upon request. Figure 1 shows an overview of the ERU system. The ERU owner Red Cross society (hereafter the ERU society) is responsible for training the ERU staff and pre-positioning ERU equipment at their own cost. The ERU society, such as the JRCS, organizes ERU training based on a standardized training module. The IFRC technically supports the ERU society in organizing ERU training courses. The staff of the Red Cross societies in a disaster-prone country (hereafter the host society), which may host the ERU in the future, are invited to the JRCS ERU training. The participants of other ERU societies can participate in the JRCS ERU training. If a large disaster occurs, the IFRC issues a deployment order to the ERU society based on the request of the host

society. The staff of the host society, who were previous participants in the ERU training, provide support to incoming ERUs. The operation costs of ERU deployment are covered by the ERU society. Table 1 presents the types of ERUs and their functions, as well as the ERU societies. Currently, in the ERU system, there are three types of medical ERUs: (1) Basic Health Care; (2) Rapid Deployment Hospital; and (3) Referral Hospital. The JRCS introduced the Basic Health Care ERU in 2001. The JRCS Basic Health Care ERU consists of a team leader, head nurse, two doctors, two nurses, and four non-medical staff: administrators and technicians. Currently, the JRCS registers 400 staff, comprising 66 doctors, 176 nurses, 124 administrators and technicians, and another 34 health professionals as JRCS ERU staff.

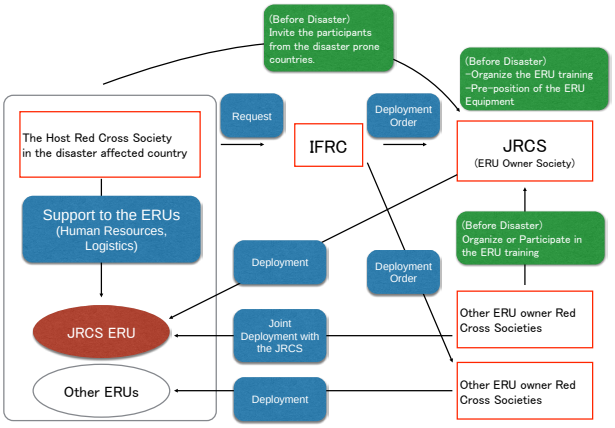

Fig. 1. ERU system

Table 1. ERU Types and Functions

Type	Function	Red Cross Society
Referral Hospital	Impatient capacity, provide surgical operations	Norway, Finland, Germany, Canada
Basic Health Care	Basic curative, preventive and community health	Japan, Norway, Finland, Germany, France, Spain
Water/ Sanitation	Provide safe water and the basic sanitation	Austrian, British, French, German, Spanish, Swedish
IT/Telecom	Setting up telecommunication network in the field.	American, Austrian, Danish, Finnish, New Zealand, Spanish
Relief	Distribution of food, non-food items	American, Benelux, Danish, Finnish, French, Spanish
Logistics	Provide transportation and storage services	British, Danish, Finnish, Spanish, Swiss
Base Camp	Provide accommodation and staff welfare	Danish, Italian

2.2 Secondary Data Review

Firstly, this study reviews nine overseas deployments to earthquake settings: (1) the 2001 Earthquake in Gujarat, India; (2) the 2003 Earthquake in Bam, Iran; (3) the 2004 Earthquake, Aceh, Indonesia; (4) the 2005 Earthquake in Kashmir, Pakistan; (5) the 2006 Earthquake in Jogjakarta, Indonesia; (6) the 2008 Earthquake in Sichuan, China; (7) the 2010 Earthquake in Haiti; (8) the 2010 Earthquake in Chile; and (9) the 2015 Earthquake in Nepal. Then, three ERU deployments using pre-positioned equipment in Japan were also reviewed: (1) the 2004 Earthquake in Niigata; (2) the 2011 Earthquake in the Eastern Japan; and (3) the 2016 Kumamoto Earthquakes. The authors retrieved the information from the IFRC homepage for each disaster. IFRC emergency appeals and operation updates were reviewed.

2.3 Direct Observations

The authors have various field experiences as members of International Red Cross medical teams. Furthermore, the authors are deeply involved in the research and development of international medical relief equipment and its domestic and international deployment.

2.4 Comparative Analysis

Firstly, this study reviews the international and domestic medical relief operations by the IFRC and the JRCS. Through this review, the medical relief approaches in past international and domestic operations are categorized. Secondly, a comparative analysis of the categorized approaches is conducted.

3. International Deployments of the ERU

3.1 JRCS ERU Equipment

The JRCS has two whole sets of Basic Health Care ERU (Photo 1). As of April 14, 2016, when the earthquake struck Kumamoto, one of them was stored in the Japanese Red Cross Kumamoto Hospital (JRCK) (Photo 2) and the other one was in Dubai. The maximum capacity of the Basic Health Care ERU is approximately 18 metric tons, which can be categorized into standardized modules such as surgery, immunization, maternity and child health, and other functions. In addition, the Basic Health Care ERU is equipped with power supply, water supply, latrines, tents, telecommunications, a kitchen, and accommodation modules, which enables the ERU team to be self-sufficient in the field. Table 2 presents the contents of the JRCS ERU equipment. The standardized-medicine “Inter-Agency Emergency Health Kit” and vehicles are purchased and transported to the disaster-affected country upon deployment. The equipment to set up the hospital infrastructure such as generators, lighting equipment, tents, water treatment plant, and furniture occupies the large part of the ERU equipment whilst medical items such as surgical consumables, X-ray machines, and portable echo equipment are at hand. Upon a deployment order from the IFRC, the ERU equipment is transported to the disaster-affected country as air cargo. The logistics service provider is deeply involved in the transportation of equipment both in overseas deployment and ERU training in Japan.

Photo 1. Basic Health Care ERU

Photo 2. Pre-packed ERU equipment

Table 2. JRCS ERU Equipment

Capacity/Weight	Module	Contents
120 ㎥ / 12MT	***Infrastructure Equipment (Non-Medical)***	
	Power	***Generators, Batteries, Cables***
	Lighting	***Lighting Equipment***
	Tents	***Large tents***
	Kitchen	***Kitchen Utensils***
	Adminstration	***Stationaries***
	Accommodation	***Desks, Chairs, Beds***
	Toolbox	***Tools***
	Water Supply	***Water treatment plant, hoses, Shower rooms etc.***
	Sanitation	***Field Latrines***
	Medical Equipment	
	Clinic	Portable Echo, X-ray
	Medical Admin	Desks, Chairs, Stationaries
	Surgery	Surgical Comsumables
	Pharmacy	Infusion, Drip Infusion set
	Mother and Child	Thermometer, Delivery Kit
	Vaccination	Cold Box, Syringes
	Ration	Rice, Noodles
	Telecom	Satellite Phones, PC, Radio
5 ㎥ / 1MT	Medicine	Interagency Emergency Health Kit
38 ㎥ / 5MT	Vehicle	Land Cruiser X 2

3.2 Medical Relief Approaches in Overseas Deployment

Table 3 presents past ERU deployments in earthquake relief operations. Past deployments were categorized into four approaches. The first approach is to set up a field hospital or clinic with their own relief equipment in the premises of a public facility such as a university, stadium, or community center. The second approach is to support damaged local medical facilities by using both the ERU staff and the equipment. The third approach is where medical teams support damaged local hospitals by installing hospital infrastructure with the ERU equipment, such as tents, generators, and water supply system. In this case, medical staff did not perform the medical practices. Finally, the fourth approach is where medical staff treat injuries at the local hospital before arrival of the ERU equipment. This was seen in the acute phase of the relief operation, when transportation of relief equipment was quite difficult due to logistics problems such as congestion of the international airport.

Table 3 Red Cross ERUs in Past Relief Operations

Approaches	Setting up field hospitals or clinics	Support to local medical facilities		
Input from Red Cross Teams	(Type-1) Both staff and equipment	(Type-2) Both staff and equipment	(Type-3) Equipment only	(Type-4) Staff only
Japanese Red Cross ERU	Gujarat, India(2001) Bam, Iran(2003) Ache, Indonesia(2004) Haiti (2010)	Pakistan (2005) Java (2006) Nepal (2015)	Chile (2010)	Ache, Indonesia (2004)
IFRC Referral Hospital ERU	Gujarat, India(2001) Bam, Iran(2003) Ache, Indonesia(2004) Pakistan (2005) Haiti (2010)		China (2008)	

4. Domestic Deployments of the JRCS ERU

In this section, domestic deployments of the JRCS ERU are investigated to determine the relief approaches and to identify how the team solved the problems of needs matching and logistics arrangements.

4.1 Niigata Chuetsu Earthquake (2004)

On October 23, 2004, an earthquake measuring 6.8 in magnitude on the Richter scale struck Niigata Prefecture. The JRCK mobilized the ERU equipment and the technical team consisted of some staff who had experienced overseas ERU missions. In this case, the gymnasium of Higashi Ojiya Junior High School, which was expected to function as an evacuation center, was damaged and unable to accommodate evacuees. The team established a field evacuation center (Photo 3) in the athletic field of the school by installing large tents, generators, lighting equipment, latrines, heating equipment, and shower rooms. Infants and their mothers, pregnant women, and the elderly, 200 in total, were accommodated in the field evacuation center.

Photo3. Setting up the field shelter

4.2 Great East Japan Earthquake and Tsunami (2011)

On March 11, 2011, a magnitude-9.0 earthquake struck the eastern part of Japan and generated a catastrophic disaster. The JRCK deployed ERU equipment and a technical team including several technical staff who had experienced overseas missions. The team arrived at the Ishinomaki Red Cross Hospital in Miyagi Prefecture. The technicians installed large tents to establish a field clinic (photo 4) and staff accommodation. In addition, field shower rooms were installed to support the Red Cross medical personnel at the hospital.

Photo 4. Emergency field clinic

4.3 Kumamoto Earthquakes (2016)

(1) Support to medical facilities

Following a magnitude-6.5 earthquake on April 14, 2016, a magnitude-7.3 earthquake struck Kumamoto on April 16. The main shock of April 16 cut off the power and water supply to the JRCK, where the Basic Health Care ERU equipment was stored. The ERU equipment was immediately utilized for ensuring the business continuity of the hospital. The lighting equipment illuminated the emergency department. The pumps, hoses, and the tanks were used for receiving water from water tankers (Photo 5). The water purifier supplied clean water to the field showrooms that were installed for the Red Cross medical teams from other Red Cross hospitals. Furthermore, large tents (Photo 6) were installed to establish a drug dispensary at the damaged referral hospital. Generators and batteries were delivered to the pediatric clinic in Mashiki Town where the power supply was cut off.

Photo 5. Reception of water

Photo 6. Large tent at the referral hospital

(2) Support to evacuation centers

In addition to support provided to the medical facilities, ERU equipment was installed to improve the living conditions at the evacuation centers. The water supply equipment was used to install hand-washing facilities (Photo 7) at the evacuation centers in Mashiki, Minami-Aso, and Nishihara. Field shower rooms (Photo 8) were established at the two evacuation centers in Nishihara. As a contingency plan for the outbreak of diarrheal diseases, a large tent was installed as an isolation space at the evacuation center in Nishihara (Photo 9).

Photo 7. Hand washing facility

Photo 8. Field shower rooms

Photo 9. Isolation tent

4.4. Review of Domestic Deployments

(1) Relief activities

Table 4 shows the purposes of the domestic deployment of ERU equipment. The purposes of domestic deployment were support of the business continuity of the medical facilities and the improvement of living conditions at the evacuation centers. Support given to the local medical facilities was seen in the GEJET and Kumamoto Earthquakes. In the GEJET, ERU equipment was utilized to establish a field clinic for the treatment of outpatients. Support provided to evacuation centers was seen in the Niigata Chuetsu Earthquake and the Kumamoto Earthquakes. In these three cases, the ERU equipment was flexibly used to respond to local needs.

Table 4. Purpose and Activities of Japanese Domestic Deployments

Disasters	Support to the local medical facilities	Support to evacuation centers
Niigata Chuetsu Earthquake	No case was reported.	-Installation of temporary shelters with large size tents -Air conditioning by Heating unit -Installation of field shower rooms -Installation of hand washing facilities and latrine
GEJET	-Provided Outpatient Treatment Space with tents -Installed the accommodation for relief staff -Installation of Shower Rooms	No case was reported.
2016 Kumamoto Earthquakes	-Provide a field dispensary by large tents -Illuminate with the lighting equipment -Reception of the water from the tanker -Transportation of the large amount of water by hoses, pumps and tanks from the water source	-Installation of hand washing facilities -Set up field shower rooms -Provide nursery rooms -Installation of the isolation tent -Installation of Lighting equipment around latrines

(2) Logistics arrangements

Figure 2 illustrates the transportation and the utilization of the ERU in domestic deployments. In the Niigata Chuetsu Earthquake, ERU equipment was delivered and installed on October 27, 2004, one day

after its dispatch from the JRCK. In the GEJET, the ERU equipment was delivered two days after the occurrence of the event. In the recent Kumamoto Earthquakes, the ERU equipment was immediately utilized for ensuring the business continuity of the JRCK. In domestic deployments, relief vehicles of the JRCK, such as two land cruisers, a pickup truck, and two large trucks were fully used to transport ERU equipment and technical personnel. Furthermore, in the GEJET, several trucks were chartered to transport ERU equipment and additional supplies such as food, medicine, and fuel. The arrangement of the chartered trucks was made by the logistics service provider that had been in charge of past transportations of the ERU equipment in overseas deployments and ERU trainings in Japan. In this way, a certain level of self-sufficiency in logistics capacity and the existing logistics framework with the general logistics company played key roles in the domestic deployment of ERU equipment.

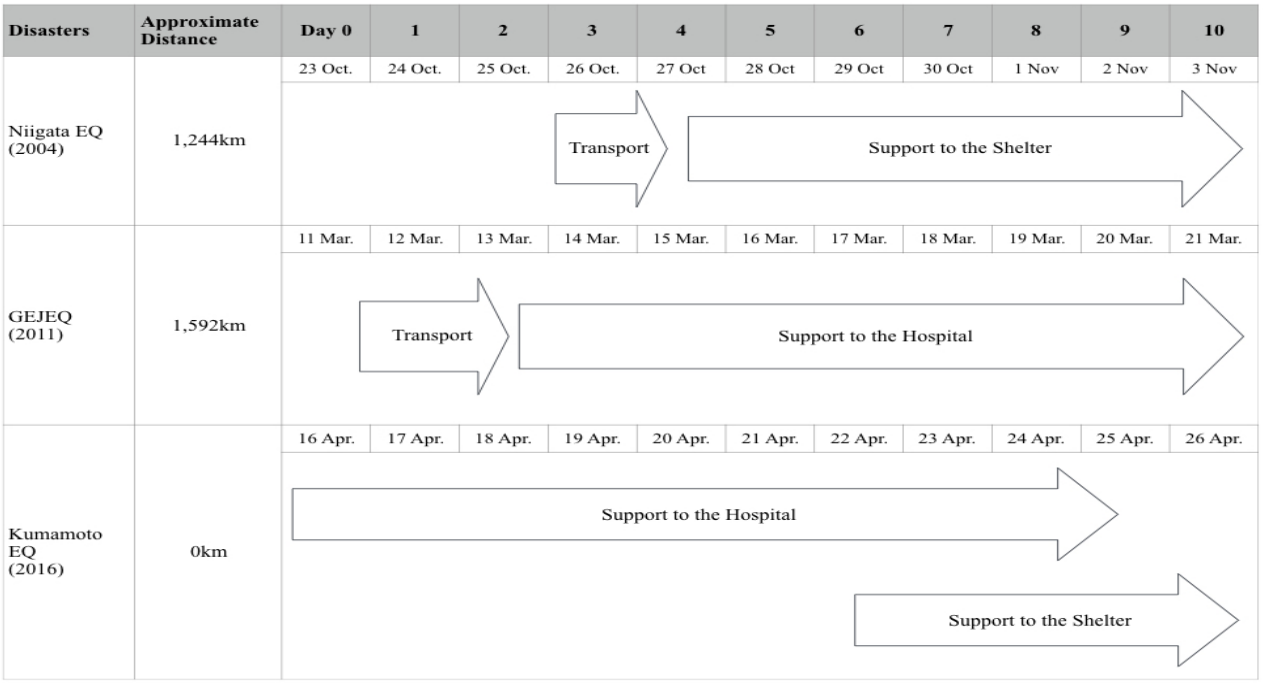

Fig. 2. Domestic deployments of the JRCS ERU in Japan

(3) Needs assessment and needs matching

Table 5 explains the needs matching in the three domestic deployments. In the Niigata Chuetsu Earthquake, the JRCK sent an advanced team for needs assessment. The advanced team visited the JRCS Niigata branch and joined the coordination meeting. After discussion with the local stakeholders, the advanced team visited Higashi Ojiya Junior High School. The advanced team held discussions with the community members and agreed to establish a field shelter with the ERU equipment.

Table 5. Information Source in Needs Assessment

Disasters	Activity	Information Source
Niigata EQ	Establish the field shelter	Red Cross Network/Local Coordination meeting
GEJET	Support to the hospital	Red Cross Network
Kumamoto EQs	Support to the referral hospital	Red Cross Network
	Support to the pediatric clinic	The existing network of pediatric medical facilities
	Support to the evacuation centers	The existing network of the local stakeholders on the infection control

In the GEJET relief operation, the JRCK dispatched a relief team with two JRCK large trucks and a large ambulance. The two JRCK trucks loaded the ERU equipment and a forklift. At that time, the destination of the team was not decided. Whilst the relief team advanced to the Tohoku region, the JRCK collected information from the JRCS headquarters and other Red Cross hospitals. Regular contact between the team and the JRCK was maintained by satellite phone. Finally, the JRCK ordered the relief team to move to the Ishinomaki Red Cross Hospital.

In the 2016 Kumamoto Earthquakes, the JRCK received a request for assistance from three types of local networks. Regarding the support provided to the damaged referral hospital, the request was received through the JRCS Kumamoto branch. The request from the local pediatric clinic was made over the existing referral network of pediatric medical facilities. In terms of the support given to the evacuation centers, information on the needs at the evacuation centers was given via the existing infection control network in Kumamoto.

These three cases indicate the importance and effectiveness of utilizing existing networks in the domestic deployments of the JRCS ERU.

4.5 Comparative Analysis

Table 6 presents the relief approaches in both international and domestic deployments. In the domestic deployments, the ERU equipment was flexibly utilized not only for supporting the existing medical facilities and the evacuation centers. In particular, utilizing the ERU equipment for evacuation centers is a unique relief approach that has only been seen in domestic deployments. In IFRC relief operations, the Water and Sanitation ERU provides safe drinking water and installs hand-washing facilities in the refugee camps. On the other hand, in domestic disaster response, the role of the JRCS is mainly focused on lifesaving medical services. However, the technical staff had experienced IFRC overseas missions and worked with the Water and Sanitation ERU in the field. Therefore, the technical staff were able to think of installing hand-washing facilities and field shower rooms with the JRCS ERU equipment. In this way, the domestic deployments of the JRCS ERU were opportunities to utilize the knowledge and experiences gained through IFRC overseas missions.

Table 6. Comparative Analysis of the Utilization of Medical ERUs

Approaches	Setting up field hospitals or clinics	Support to local medical facilities			Support to Evacuation Centers
Input from Red Cross Teams	(Type-1) Both staff and equipment	(Type-2) Both staff and equipment	(Type-3) Equipment only	(Type-4) Staff only	Domestic Response by Prepositioned ERU
Japanese Red Cross ERU	Gujarat, India(2001) Bam, Iran(2003) Ache, Indonesia(2004) Haiti (2010)	(Overseas) Pakistan (2005) Java (2006) Nepal (2015) ***(Domestic) Great East Japan(2011)***	(Overseas) Chile (2010) ***(Domestic) Kumamoto (2016)***	Ache, Indonesia (2004)	***(Domestic Use) Niigata (2004), Kumamoto (2016)***
IFRC Referral Hospital ERU	Gujarat, India(2001) Bam, Iran(2003) Ache, Indonesia(2004) Pakistan (2005) Haiti (2010)		China (2008)		No case was reported

5. Discussion

5.1. Results

This study reviewed the domestic deployment of the JRCS ERU, which is the IFRC's global disaster response tool based in Japan. In domestic deployments, the equipment was used for the business continuity of the damaged medical facilities in the disaster-affected areas. In addition, the equipment was used for improvement of the living conditions at the evacuation centers. Existing networks, which had been constructed before each event, played a major role in information collection for needs assessment and logistics arrangement. The ERU technical staff who had experience of IFRC overseas missions utilized their experience for using the ERU equipment to support the evacuation centers.

5.2. Implications

Three research contributions were made through this study. Firstly, the domestic deployments of the JRCS ERU, which is one of the IFRC global disaster response tools based in Japan, were effective in responding to the acute phase in emergencies. From a global viewpoint, the IFRC succeeded in starting the disaster response by mobilizing the JRCS ERU based in Japan, not by mobilizing other ERU teams from outside Japan. Having considered that the ERU is the standardized disaster response tool of the IFRC, the lessons learned in these domestic deployments can be valuable for ERU deployments in other high-income countries. In fact, ERUs were deployed to the United States in response to the recent Hurricane Irma disaster. Therefore, these domestic deployments need to be recognized not only as domestic disaster response in Japan but also as ERU deployments in high-income countries including Japan.

Secondly, this study points out the importance of existing networks in the domestic deployment of the JRCS ERU. These networks, which had been established before disaster, were valuable for information collection in needs assessment and logistics arrangements. Previous studies on the reception of FMTs in the GEJET pointed out the challenges in needs matching and logistics arrangement. The existing networks reviewed in the domestic deployments could be utilized for the reception of other ERUs in future catastrophes in Japan.

Thirdly, this study reveals the importance of the flexible use of knowledge and experience gained through international humanitarian activities. The flexible use of JRCS ERU equipment is owed to the

ERU technical staff who had experienced IFRC overseas missions. In the JRCS, compared to the staff in charge of the domestic disaster response, JRCS ERU staff tend to be deployed for low-frequency high-impact disasters. In addition, the ERU staff are familiar with global humanitarian standards such as the UN cluster system, the Sphere Project, and the Code of Conduct, which are crucial in working with international humanitarian organizations.

Furthermore, the ERU is a standardized tool in terms of training modules and equipment. Sakamoto (2012) reviewed the reception of FMTs in the GEJET and pointed out the necessity of a coordination mechanism, standardization of equipment, and the medical services of the FMTs. The ERU consists of standardized equipment and specialists trained based on the standardized training module. In Japan, there is at least one JRCS ERU that can function as a coordination tool between the other Medical ERUs and domestic stakeholders.

Therefore, in the reception of IFRC Medical ERUs in Japan, mobilization of the JRCS ERU staff is essential. On the other hand, the JRCS ERU staff need to deepen their knowledge of the domestic disaster response system such as laws, coordination mechanisms, and main stakeholders in each sector if they really want to function as a coordinator who links the Health ERUs and the domestic stakeholders.

As practical contributions, this study points out the importance of the flexible use of ERU equipment. The JRCS ERU equipment showed its capacity to support damaged medical facilities and evacuation centers. This should be shared with other ERU societies as one of the effective relief approaches. On the other hand, in the domestic deployments, the JRCS ERU equipment, which was originally planned for overseas deployment, included some items that were not suitable for domestic use such as those with different electric plugs, voltages, and radio frequencies. These problems were always found in the handover of ERU equipment in the termination phase of relief activities. Therefore, in the reception of Health ERUs and FMTs, a standardized guideline on relief items should be drafted for the smooth operation of relief equipment.

6. Conclusion

This study reviewed the domestic deployments of the JRCS ERU. The JRCS ERU equipment and technical staff contributed to the business continuity of the local medical facilities. The installment of ERU equipment improved the living conditions at the evacuation centers. Whilst many studies have pointed out the difficulties in needs matching and logistics arrangement in the reception of FMTs in the GEJET, the domestic deployments of the JRCS ERU were rapid and effective. In the domestic deployments, the JRCS ERU utilized the existing networks of the Red Cross, the logistics provider, the local pediatric medical referral system, and the local infection control network. These networks, which had been established before the disasters, were valuable in information sharing and logistics arrangements for rapid deployment in emergencies. The ERU technical staff who had experience in IFRC overseas missions flexibly utilized the ERU equipment according to the needs in the disaster-affected areas. In this sense, the domestic deployment of the JRCS ERU may have the potential to function as a platform in the reception of other medical ERUs of the IFRC. For its realization, the JRCS ERU staff need to understand the domestic disaster response system in Japan. On the other hand, domestic disaster response stakeholders are expected to increase their knowledge of global humanitarian standards and reflect the standards in the disaster response system in Japan.

One limitation of this case study stems from the lack of review of deployments of other medical ERUs in real situations in Japan. Further studies on ERU deployments in high-income countries are necessary. A study on recent ERU deployments to the United States in response to the recent Hurricane Irma will be valuable. In this sense, deployments of the JRCS ERU in Japan, which is a high-income country, can be defined as ERU deployments in high-income countries. Therefore, the lessons learned from domestic deployments should be shared among other ERU owner societies in high-income countries.

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