

2011.3.11 Record Collection

CHAPTER **1**

Response of
Six Blood Centers
to the Disaster

■ The Six Blood
Centers in the
Tohoku Region



From the secretariat:

1) Seismic Intensity

Seismic intensity describes the scale of the ground motion at a particular location. It varies with the distance from the epicenter and the surface geology at each point. JMA's seismic intensity scale has 10 degrees (0 (imperceptible), 1, 2, 3, 4, 5 Lower, 5 Upper, 6 Lower, 6 Upper, 7). The seismic intensity is measured with a seismic intensity meter. "Tables explaining the JMA Seismic Intensity Scale" describes the situations and damage which may be caused by seismic motion of each seismic intensity.

2) Summary of Tables

It explains the JMA Seismic Intensity Scale.

(Note: The information was obtained from web site of JMA with the permission.)

Aomori Prefecture: Report of Damage Relating to the Great East Japan Earthquake

Tetsu Tsubota, Senior Director, Aomori Blood Center

I. Damage conditions in Aomori prefecture

The Great East Japan Earthquake occurred at 2:46 p.m. on Friday, March 11, 2011, and measured an intensity of 4 to 5 Upper in municipalities along the Pacific Ocean in Aomori. Two cities and two towns in the coastal area on the Pacific side (Hashikami-cho, Hachinohe City, Oirase-cho, and Misawa City) were inundated and significantly damaged by the tsunami caused by the quake. A huge aftershock also occurred on April 7.

These disasters affected the lifelines such as electricity, water, phone lines, Japan Railways, the Tohoku Super Express (Tohoku bullet train), and expressways. Electricity and water were almost recovered on the day following the quake and the aftershock. Aomori Airport had generally recovered by the day after the quake, though some flights were still cancelled.

Damage situation

(1) Human damage (people)

Dead:	3
Missing:	1
Seriously injured:	10

(2) Property damage (houses)

Residences:	
Fully destroyed:	311
Partially destroyed:	853
Non-residences:	
Fully destroyed:	508
Partially destroyed:	786

II. Damage to facilities at the blood center

In the Hachinohe Blood Office, there was only minor damage; the gate could not open due to shifting of the grounds.

III. Handling of operations

1. Blood collection and production

(1) Due to the disconnection of electricity and water, blood collection was suspended for two days (March 12 and April 8).

(2) In accordance with instructions from the Blood Service Headquarters, platelet collection was suspended through April 28 and only red blood cells were collected. Platelet products were supplied by air from the Tokyo Metropolitan Center, with some additional platelets from the Osaka Center.

(3) Since the Miyagi Center was damaged by the quake and the Tohoku bullet train was disconnected, test samples were shipped with NAT (Nucleic Acid Amplification Test) samples by air from Aomori Airport to the Tokyo Metropolitan Center. Operations returned to normal after April 29.

2. Distribution

(1) Since there was no private power generator in the Hirosaki Blood Donation Room, a supply station, blood products stored in the refrigerator of the center during the

electrical outage (March 11 and April 8) were transported to the Aomori Blood Center by land.

There was a private power generator in the Hachinohe Blood Office, but little fuel left on March 11, so blood products stored in the refrigerator were transported to the Aomori Blood Center by land. The private power generator was used at the time of the electrical outage caused by the aftershock on April 7. After that, a private power generator was introduced in the Hirosaki Blood Donation Room by the owner of the building.

(2) Approval was granted to use the expressways, which were restricted to emergency-priority vehicles only. Operations were conducted in collaboration with the facilities in Aomori prefecture, the Miyagi Blood Center, and the Iwate Blood Center.

3. Promotion of blood donation

(1) The bloodmobile transportation schedule had to be carefully reviewed, because the office in the Hachinohe area, which usually coordinated blood donation, was damaged.

(2) After the quake, it was difficult to get gasoline and other fuels. However, thanks to the contracted stations that preferentially supplied gasoline to the vehicles and boilers of our blood center, there was no impact on the bloodmobiles or their ability to deliver blood products to medical institutions.

4. Others

(1) Although gasoline could be secured for operations, the gasoline rationing made it difficult for some employees to obtain gasoline for their personal commuting vehicles, and the restricted sale of gasoline affected their ability to commute.

(2) Since facilities and equipment in medical institutions were damaged by the quake, the demand for blood products decreased and the number of blood donors increased for about one month after the quake. As a result, the amount of stock increased.

IV. Future issues

It's not an overstatement to say that it was the functions of Aomori Airport that made it possible for the Aomori Blood Center to continue operations, even though various utility lifelines had been cut after the quake.

In order to improve the supply of blood products and transition to a wide-area management system (integration management system) in the future, important issues must be addressed, including assessing the risk management manual and raising

risk management awareness for employees on a daily basis, through educational training, etc. It is also necessary to inspect facilities and equipment, specifically in relation to disaster-preparedness, and make any necessary improvements.



General meeting at the JRC Ishinomaki Hospital



Support for the people of Noda-mura in Iwate Prefecture (support delivered by the rescue station of the JRC Nara Chapter)

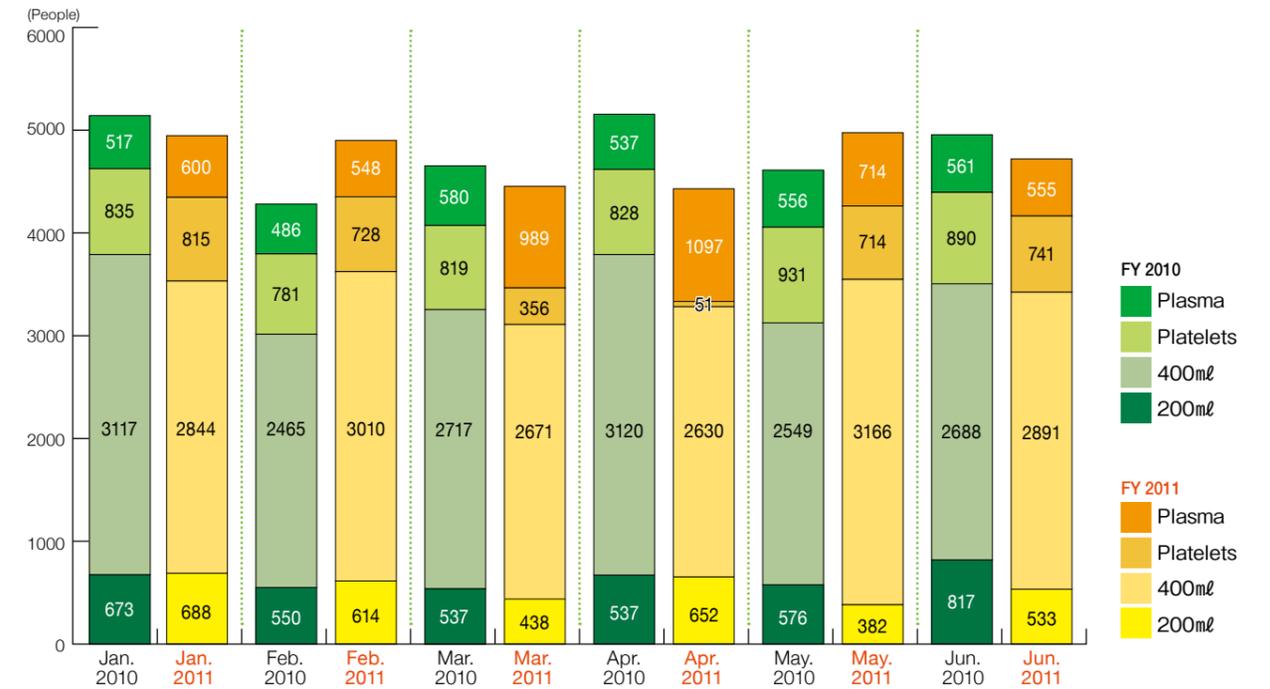


A nurse visiting the site

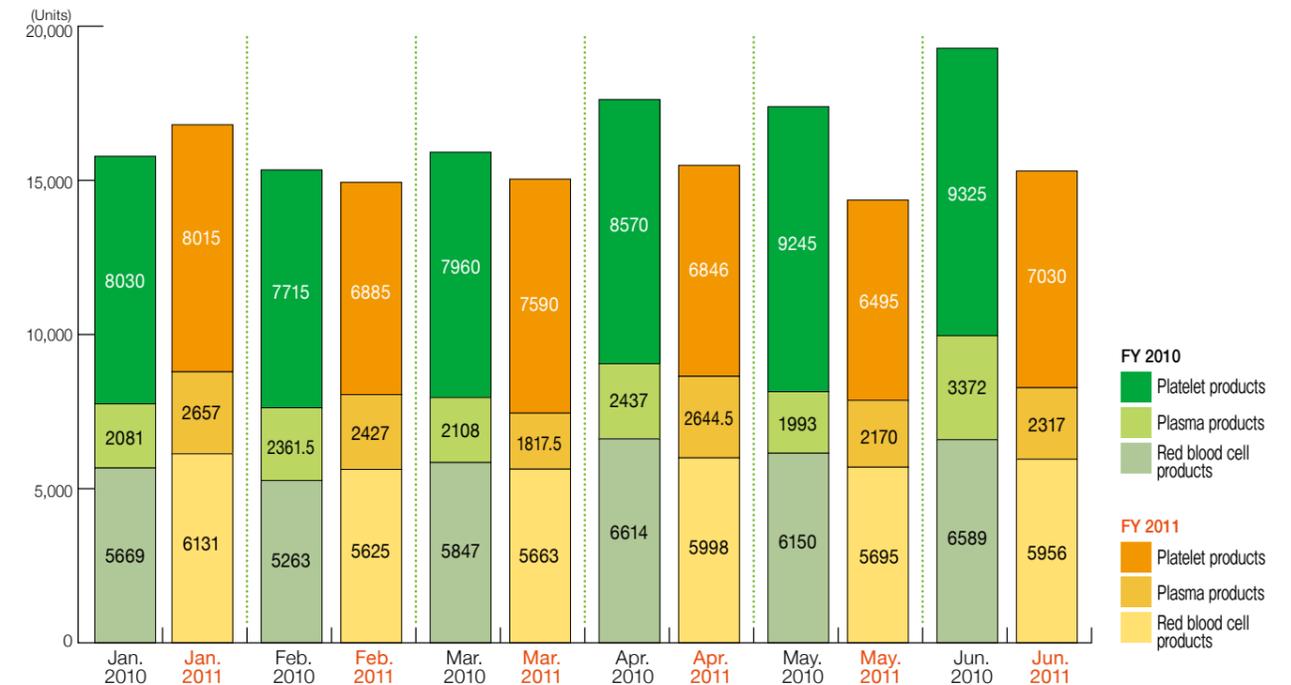


Assistance team to support the JRC Ishinomaki Hospital

Comparison of the number of blood donors between 2010 and 2011 (first half term)



Comparison of the amount of products distributed between 2010 and 2011 (first half term)



Iwate Prefecture: Report of Damage Due to the Great East Japan Earthquake

Shigeo Sato, Senior Director, Iwate Blood Center

I. Initial response

At 2:46 p.m. on Friday, March 11, 2011, as I was searching documents in the library, the emergency earthquake alarm of my mobile phone suddenly went off and destructive shaking started at the same time. Bookshelves and cabinets started shaking. Staff inside the facility tried to hold the shelves instead of running away.

A magnitude 9.0 earthquake had occurred, the country's largest magnitude in recorded history, and it required us to start fighting against the previously unknown consequences of this natural disaster.

Electricity inside the facility was cut immediately and the private power generator was activated. However, there were a limited

number of available outlets, and the necessary outlets were secured by using electrical extension cords.

Immediately after the quake, I called all blood donation sites and confirmed the safety of donors and staff. There was also no damage to equipment. I felt relieved after finding out that there was minor damage, only to the building of the blood center, and that everyone was alright.

On that day, five sites (blood center, blood donation room, temporary blood donation site in Morioka City, and two mobile blood collection buses) were receiving blood donations. One of the bloodmobile buses donation site was a hospital located about 3 km from the coast in the coastal area of Miyako City.

A few minutes later, a huge

tsunami warning was issued in the coastal area. I couldn't believe my ears when I listened to the radio and watched as the TV announced an estimated tsunami height of five meters or higher. I tried to call the mobile blood collection team in Miyako again, but the phone, which had been working just after the quake, was disconnected and the emergency priority line and satellite phone were also overloaded. Phone connection was impossible, and I was worried about the safety of donors and staff.

About 30 minutes after the quake, a giant tsunami hit a wide area, including the Sanriku coastal area, and the devastation caused by the tsunami was broadcasted on TV. At around 6 p.m., about 2 hours and 30

minutes after that, we were relieved to hear a report from staff working on a bloodmobile in Miyako that they had escaped, and were on their way back to the blood center.

Phone lines, which were disconnected just after the quake, recovered gradually. That evening, I was finally able to contact the central Miyagi Blood Center, the Iwate Prefectural Office, and the JRC Iwate Chapter, and reported to them the situation after the quake. I also tried to contact the Blood Service Headquarters by e-mail, but I could not find the e-mail addresses or names of the person in charge of each section on the contact list of the "Risk Management Guideline" issued by the Blood Service Headquarters, which only includes phone and fax numbers. I relied on guessing each contact person's e-mail address.

Moreover, in the evening I discovered that there was a problem with fuel supply for the emergency power generator and the heating equipment, which were supplied by the same fuel tank. The tank was refilled regularly and was scheduled to be refilled on the 12th. However, on the morning of the 12th, there was a report from the contracted gas station that they could not supply fuel

due to difficulty with procurement. Based on the remaining amount, it was expected that we would run out of fuel in about 13 hours (around 9 p.m. on the 12th). Therefore, although it was a cold and snowy day, we tried to save the fuel for heating equipment as a precaution, and obtained dry ice and ice to preserve the blood.

After reporting this distressing situation to the Iwate Prefectural Disaster Response Headquarters, they immediately made arrangements with a fuel company, and fuel for the private power generator and heating equipment was supplied at noon on the 12th.

There was relatively little damage to our blood center, but the Miyagi Blood Center, which acted as a central blood center of blood testing and processing for collected whole blood to become blood productions in Tohoku region, was significantly damaged. This damage included the collapse of part of the air conditioning system on the ceiling and the falling/shifting of testing and processing equipment. We had to stop blood collection after receiving the information that all examination and production functions had stopped because of the Miyagi Blood Center's multiple malfunctions.

On the day of the quake, an emergency response committee was established to deal with and understand the situation, particularly in relation to the following ten issues:

1. Response to emergency situations ⇒ Evacuation and safety assurance;
2. Blood donation rooms and bloodmobiles ⇒ Confirmation of security of donors and staff;
3. Establishment of the "Emergency Response Committee";
4. Research and understanding of the situation ⇒ Lifelines, buildings, preservation of blood products, and damage of equipment, etc.;
5. Report of the situation ⇒ The Blood Service Headquarters, the Miyagi Blood Center, Iwate Prefectural Office, and JRC Iwate Chapter.
6. Damage situation of major hospitals (lifelines) ⇒ Confirmation of supply and demand of blood, etc.;
7. Public announcement (cancellation of blood donation, supply and demand system) ⇒ Citizens of the prefecture, mass

5 blood donation sites in the prefecture on the day of the quake (at 14:46)



The huge earthquake and tsunami caused devastation the whole metropolitan area with massive destructive power (Kamaishi City)



The huge earthquake and tsunami washed out many hometowns and memorial places (Rikuzentakata City)

- media, medical institutions, prefecture, and municipalities;
- 8. The Miyagi Blood Center and neighboring blood centers ⇒ Communication, collaboration, and support;
- 9. Iwate Blood Center Emergency Response Committee, JRC Iwate Chapter, ⇒ Communication, collaboration and support;
- 10. Preparation for resuming blood donation (resumption plan and confirmation of restoration of lifelines) ⇒ The Blood Service Headquarters and the Miyagi Blood Center (making a schedule for the resuming services).

11. Issue of authorized passes for emergency vehicles to all blood delivery cars from nearby police stations.

II. Actions after the disaster

1. Electrical outage

Electricity in all buildings was cut immediately after the quake and switched to the emergency power supply. Commercial power was restored at 4:15 p.m. on the 12th (restoration of electricity). The emergency power supply was used during these hours (25 hours and 29 minutes).

The functions of the building (CT33

Building) of the Morioka Donation Room were stopped due to electricity outage, because the building had no emergency power supply, but they were restored at 6 p.m. on the 12th.

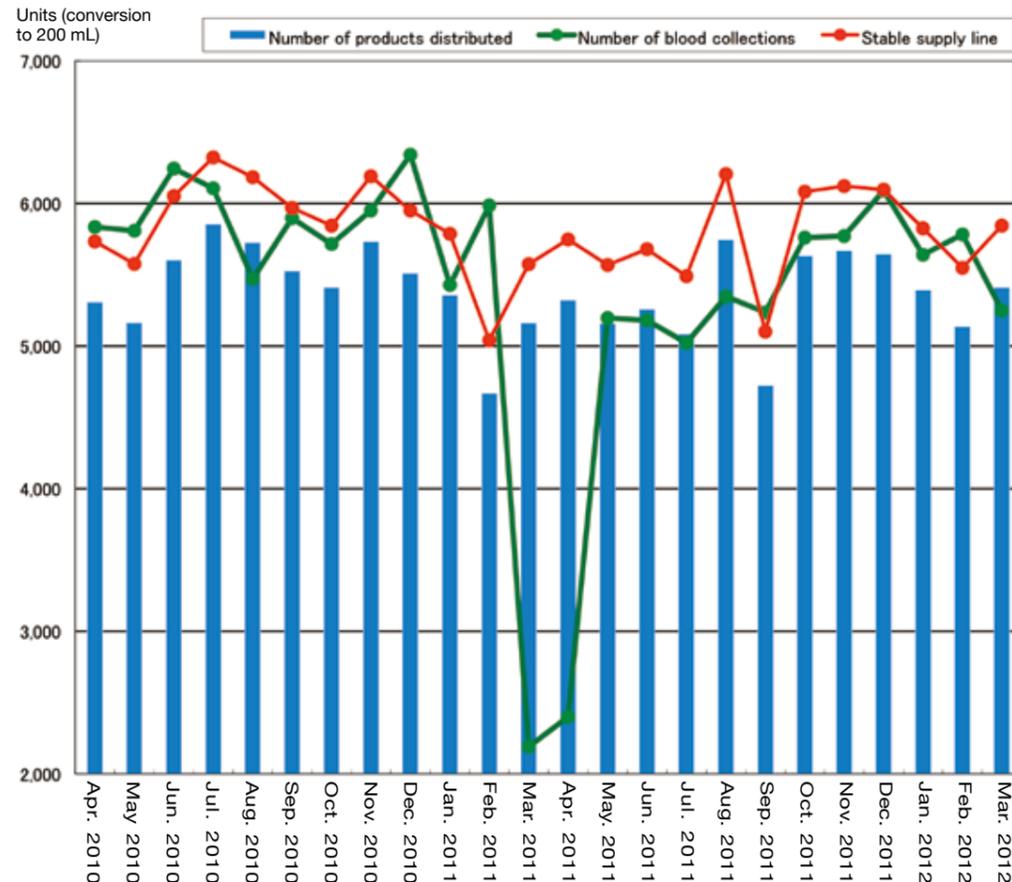
2. Damage to the Miyagi Blood Center

The Miyagi Blood Center, which has facilities for blood testing and the production of blood for transfusion, was significantly damaged. We had to stop blood collection in Iwate Prefecture because its testing and production operations were lost.

3. Blood supply system

It was difficult to assess the blood demands of medical institutions

Securing of red blood cell products before and after the quake



*Stable supply line (red line): If the number of blood collections (green line) exceeds the stable supply line, it means that the demand can be supplied in the prefecture. In March 2011 and April 2011 after disasters occurred, the green line fell far below the red line.

since we could not get through to them, especially those located in the coastal area, due to failure of phone and fax immediately after the disaster. On some occasions we were able to contact them by using a satellite phone, but it was difficult to contact the section in charge of blood directly, as the satellite phone locations in the hospitals was not usually near their part of the building.

As a result of altered situation of the consigned delivery company, delivery of blood was completely halted after the disaster. We therefore restructured our blood center's original supply system and changed the work system from 13 employees on a single shift to a two-shift system (12-hour working shifts: 7 members during daytime and 6 members at night). Due to the worsening condition of the roads, two employees took an emergency vehicle to the coastal area to deliver blood to the major hospitals that store red blood cell products. One employee drove the car and the other checked the safety of the roads by

monitoring public information on a cellular phone. The blood delivery support system was also organized by employees in other divisions to maintain the supply system.

An announcement about the "Status of blood supply for blood transfusion in relation to the quake" was promptly issued in order to reassure medical institutions in the prefecture that adequate support was provided by blood centers throughout the country thanks to the arrangement of the Blood Service Headquarters. This announcement was distributed several times to major medical institutions in each district through persons in charge of blood transfusion.

The blood demand decreased 80% to 90% for about two months after the disaster compared to that of previous years. This may have been due to failure of hospital functions as a result of damage to core hospitals in the coastal area by the huge quake. Operations were limited to emergency surgery at inland medical institutions, mainly because of the shortage of the medical supplies for

operation, and it also reflects the fact that the main cause of death (estimated at 90%) was drowning. Afterwards, the demand gradually returned to normal levels.

4. Restoration of blood supply after the disaster

Adequate stock of blood for blood transfusions was available even during our suspension of blood donation and adequate amounts of blood were delivered to each medical institution in Iwate prefecture by air or via the expressways for the outlying regions. This was done with the support and co-operation of blood centers throughout the country, and supply-and-demand control by the central Miyagi Blood Center, using the network of the Blood Service Headquarters of the Japanese Red Cross Society.

5. Resumption of blood collections

Since the functionality of the Miyagi Blood Center, which handles the donated blood, did not recover, information about the "Suspension

Status of medical institutions in relation to the Great East Japan Earthquake

As of March 24, 2011

Names of medical institutions	Affected conditions (building, electricity, water, gas, etc.)	Examination functions (general outpatient and hospital inpatient)	Amount of stored red blood cell products	Status of demand and supply for blood (difficult or smooth)	Surgery	Remarks
Iwate Medical University	Normal functions	As usual	Stock in the hospital	smooth	As usual	
Prefectural Central	Normal functions	As usual	Stock in the hospital	smooth	As usual	
Storage medical institutions						
Prefectural Chubu	Normal functions	As usual	400 mL x 6 units	smooth	As usual	
Prefectural Isawa	Normal functions	As usual	400 mL x 6 units	smooth	Some operations cannot be performed	
Prefectural Iwai	Normal functions	As usual	400 mL x 8 units	smooth	As usual	
Prefectural Senmaya	Normal functions	As usual	400 mL x 6 units	smooth	As usual	
Prefectural Ofunato	Normal functions	As usual	400 mL x 10 units => 22 units	smooth	As usual	
Prefectural Kamaishi	Building partially cracked	Normal function from Mar. 28	400 mL x 7 units => 14 units	smooth	Restricted	Until around Aug.
Prefectural Itono	Normal functions	As usual	400 mL x 3 units => 4 units	smooth	Restricted	
Prefectural Miyako	Normal functions	Accepting only emergency patients	400 mL x 7 units => 19 units	smooth	As usual from Mar. 28	
Prefectural Kuji	Normal functions	As usual	400 mL x 7 units => 11 units	smooth	As usual	
Prefectural Ninohe	Normal functions	As usual	400 mL x 6 units	smooth	As usual	

of blood donation due to the quake” was displayed in the main entrances of the Iwate Blood Center and the Donation Room, and was also posted on the website of our blood center and in newspapers to inform the prefectural citizens about the suspension of the acceptance of blood donations.

A few days after the disaster, our system for taking blood donations was restored. However, the blood service headquarters gave instructions not to resume blood collections for some time after this because of the delay in restoring the functionality of the Miyagi Blood Center, which supervises testing and production. In addition, both the persistent aftershocks, and lack of urgent demand for blood donation (due to an increase in the number of donations from other regions) were reasons which reinforced this delay. Bloodmobiles eventually re-started operations on April 18,

except in the coastal area (suspended for a total of 37 days), whilst blood donation rooms resumed operation from April 20 (suspended for a total of 39 days), after restoration of the testing and production function at the Miyagi Blood Center. The Blood Donation Room, which had been planned to open in March, opened on April 20 instead, after its relocation and expansion.

The disaster affected about 20% of the 930 bloodmobiles which had been planned to operate in FY 2011 (from April 2010 to March 2011). Since some of these bloodmobiles were used to increase the amount of available vehicles in the inland area, it was difficult immediately to cover the shortage. However, we made efforts for early restoration in cooperation with concerned organizations and persons in accordance with the basic principle that “Necessary blood for the prefecture should be

secured by blood donation within the prefecture”.

- (1) The prefecture informed municipalities about the difficulties regarding blood donation and sought the cooperation of the citizens in the inland area.
- (2) The difficulties were announced to the citizens of the prefecture through local newspapers, and we made a request for blood donations to citizens in the inland areas through the website, etc.
- (3) Since October, 2011 announcements have been made in newspaper inserts, informing citizens of the prefecture about the dates of the visits of bloodmobiles in their area, and asking for donors. Blood collections resumed after the quake in those coastal areas with relatively minor damage, after consultation with the local municipalities. By these actions, blood donation

temporarily increased to 110% in the inland area. However, due to the suspension of coastal blood collection services from March 12 to April 17 and the inability to collect blood due to the damage of the coastal area by tsunami, the number of donors in March and April decreased to around 35% to 40% on the coast, compared to that of previous years. The number of donors recovered to around 90% by May compared to that in previous years, and was fully returned to normal levels by the end of December, 2011.

6. Securing of fuel for vehicles

With suspension of the distribution of gasoline due to the shortage of fuel caused by devastating damage to an oil factory in the coastal area, it was difficult to secure fuel for vehicles as contracted gas stations and other gas stations started to ration fuel supply (such as 20 liters in each).

Fuel for the vehicles of our blood center could be obtained from the designated gas stations through the intervention of the Prefectural Emergency Response Headquarters. However, as it was difficult to get fuel for private vehicles of employees, the general affairs division of our blood center arranged to get fuel preferentially by negotiating with neighboring gas stations. As a result, almost no employees were affected in their commuting.

7. Rescue Activities after Disaster

At the request of the JRC Iwate Chapter, a total of 265 employees were dispatched mainly to the coastal area that had suffered the most significant damage during the period of suspension of blood donation, in order to carry out

disaster relief activities of the Red Cross Society such as support for medical relief activities and delivery of goods to evacuation centers.

■ Main activities

(from March 14 to April 17)

- 1. Dispatch of employees to the on-site Emergency Response Office in the JRC Tono:**
Administrative staff: Total of 51 employees for 29 days (Acceptance of relief teams, etc.)
- 2. Support for the Red Cross Iwate Chapter:**
Administrative staff: Total of 18 employees for 12 days (Delivery of disaster relief supplies, etc.)
Nurses: Total of 2 employees for 1 day (Provided services as a relief team)
- 3. Support for the Iwate disaster countermeasures office:**
Administrative staff: Total of 13 employees for 8 days (Note-taker, etc.)
Nurses: Total of 8 employees for 2 days (Testing and blood collection, etc.)
- 4. Support for the JRC Morioka Hospital:**
Nurses: Total of 173 employees for 31 days (Blood collection and hospital ward, etc.)

the private power generator’s oil tank and securing of the private power generators in blood donation rooms

4. Establishment of communication methods (doctors and staff, etc.) after the disaster
5. Establishment of special measures for temporary disability compensation (examination doctors and staff, etc.) in case of disaster
6. Securing of utility lifelines (gas, water, electricity, and fuel)
7. Implementation of disaster training for employees

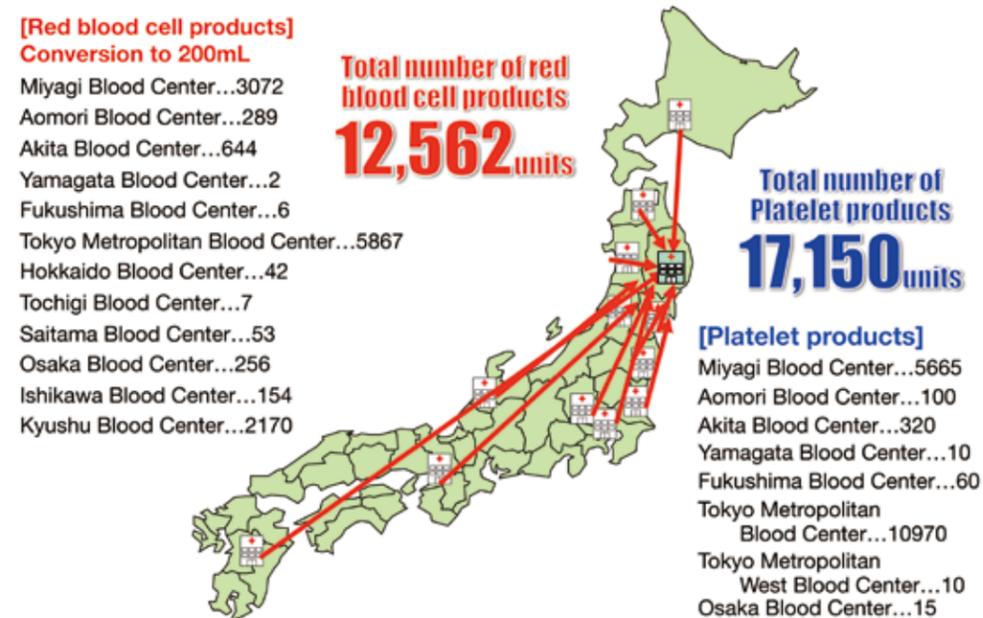
Further improvement is needed, applying lessons learned from this disaster, so that we strive continuously toward the objective of “Stable supply of safe blood”, which is one of core elements of the blood services.

III. Future issues

In reviewing our actions during this huge disaster, it appears that the following issues should be considered as a priority:

1. Improvement of the contact desk of the Emergency Response Headquarters by the Blood Service Headquarters
2. Confirmation of security of employees of the blood center and improvement of the phone tree
3. Improvement of the capacity of

Status of blood acceptance from other prefectures in relation to the Great East Japan Earthquake (March 12, 2011 to May 14, 2011)



*Number of blood products received by the Miyagi Blood Center was the number of blood products once collected from all over the country to the Miyagi Blood Center as the center was affected by the quake.



The Prefectural Otsuchi Hospital was damaged up to the 3rd floor. There were many missing persons and victims.



A school also collapsed in the tsunami (Kamaishi City)



Black wave over the coastal levee (Miyako City)
(Quoted from Iwate Nippo on March 13, 2011 daily issue with the permission)



On-site emergency response office and the hospital director of the Morioka Red Cross Hospital participated (Kamaishi City).



"The Ipponmatsu (a pine tree)" in Takatamatsubara, which was symbolically left out of seventy thousands pine trees destroyed by the huge tsunami.

Miyagi Prefecture: Records of the Blood Center in the Great East Japan Earthquake

Koichi Chiba, Deputy Senior Director, Miyagi Blood Center

I. Introduction

The region was hit by a strong earthquake, the Great East Japan Earthquake, with the maximum intensity of 7 and magnitude of 9.0 at 2:46 p.m. on Friday, March 11, 2011. The intensity in the Miyagi Blood Center was 6 Upper.

Especially in the coastal areas in Iwate, Miyagi, and Fukushima prefectures, huge areas were devastated by the quake and ensuing tsunami, and infrastructure and utility lifelines in the inland areas were cut off, causing major disruption.

In our center, lifelines (electricity, water, and gas) were cut off just after the quake, part of ceiling and walls of the building fell down, and piping equipment was fractured. The blood donation acceptance services stopped operation for a period, including bloodmobiles and 2 blood donation rooms (blood donation rooms AER20 and AOBA). Blood testing services consolidated the operations of the 6 prefectures in Tohoku, and production services consolidated the operations of Iwate and Yamagata prefectures, which had to be suspended due to the damage at the Miyagi Blood Center.

Despite this difficult situation, we were able to supply blood products to each of the Blood Centers with the support of blood centers throughout the country, coordinated by the Blood Service Headquarters in Tokyo.

One month after the quake, testing and production functions resumed, starting April 13, and some blood collection resumed on April 18 in the Miyagi, Iwate and Yamagata Blood Centers.

We could not contact the other blood centers in the Tohoku area immediately after the quake. Although it was difficult to communicate with each other, we regained contact as communication infrastructure gradually recovered. We confirmed the extent of the damage and the support required, and passed on support requests to the Blood Service Headquarters.

On March 17, which was six days after the quake, a provisional meeting was held between the director generals and the senior directors of the six blood centers in Tohoku region, in order to discuss the extent of the damage and the time-table for resuming testing and blood production.

On March 19 and 20, we visited

the Fukushima Blood Center, the Iwate Blood Center, and the Hachinohe Blood Office to evaluate the damage.

Below, I will now set out the actions of the Miyagi Blood Center, which had acted as the central blood center in Tohoku region and describe the difficulties in operating conditions caused by the Great East Japan Earthquake.

II. Conditions after the disaster

In the situation that we faced with the Miyagi Blood Center having lost its functions, we tried to secure the safety of donors, and also made the utmost efforts to provide distribution services whilst securing and confirming the safety of staff.

At the request of the JRC Miyagi Chapter, we dispatched our staff to the JRC Ishinomaki Hospital to support evacuation guidance for patients, etc.



Copy machine in the office on the 3rd floor covered in dust due to collapse of the ceiling

We also arranged communications with the blood centers in the Tohoku region, and acted as the central blood center for the disaster, in collaboration with the Blood Service Headquarters in Tokyo.

1. Distribution of blood products in the Tohoku region at the time of the quake

Red blood cell products for the Iwate, Yamagata, and Miyagi Blood Center and the Fukushima Center were delivered from the national supply and demand network, and were distributed via the Miyagi Blood Center.

2. Actions after the quake

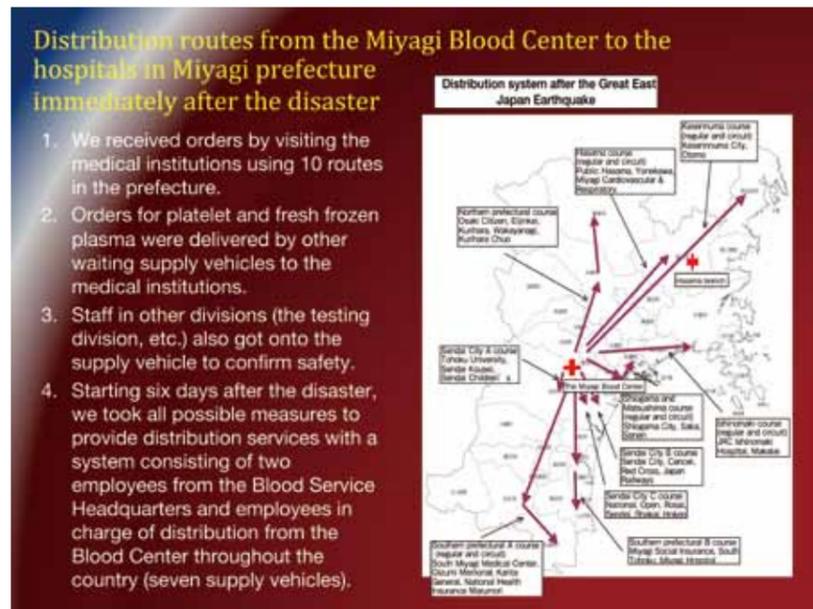
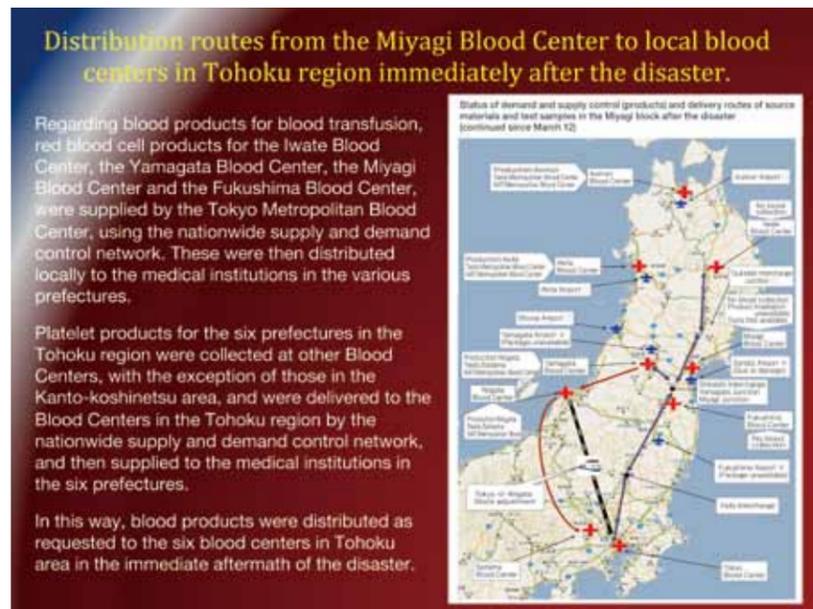
(1) Distribution routes for blood products after the quake.

- March 13: Requested the Blood Service Headquarters in Tokyo to send ten supply support staff and six gasoline/supply vehicles
- March 16: The Blood Service Headquarters decided to dispatch delivery support staff to the Miyagi Blood Center beginning March 18, and also send Blood Service Headquarters staff to the Miyagi Blood Center to help.
- March 17: First team of support staff (from the Kyushu Blood Center and the Blood Service Headquarters) arrived at the Miyagi Blood Center. It was decided that 12 employees would work in the blood center beginning on March 22.
- March 18: The Blood Service Headquarters announced that the required amount of platelet products would be supplied by the national supply chain, in order to support the Blood Centers in Tohoku.

- April 1: The Blood Service Headquarters announced the amount of red blood cell products would be supplied by the national supply chain, to support the Blood Centers in Tohoku.
- April 13: The Blood Service Headquarters announced that the nationwide network support supply would be halted during the period April 12-

16, since the functions of testing and blood production had resumed at the Miyagi Blood Center.

- April 17: All of the support staff that had arrived from all over the country, and the staff from the Blood Service Headquarters, and the staff who worked at the Miyagi Blood Center returned home.



(2) Blood collection

- March 12: At this time, the functionality of the blood donation rooms and bloodmobiles was unknown, and a schedule for resuming blood donations could not be determined.
- March 14: The Blood Service Headquarters requested that blood collection and platelet collection in the Iwate and Yamagata Blood Centers should not start for a while, and all types of blood collection should be canceled in the Aomori, Akita, and Fukushima Blood Centers, as the delivery routes for test samples could not be secured.

Resuming blood collections after the disaster in the Miyagi Blood Center

- Blood collection resumed from April 18 at the Donation Room, Aoba
- Blood collection resumed from April 27 at the Donation Room, AER20
- Blood collection resumed from May 1 in the bloodmobiles

(3) Replacement of missing items

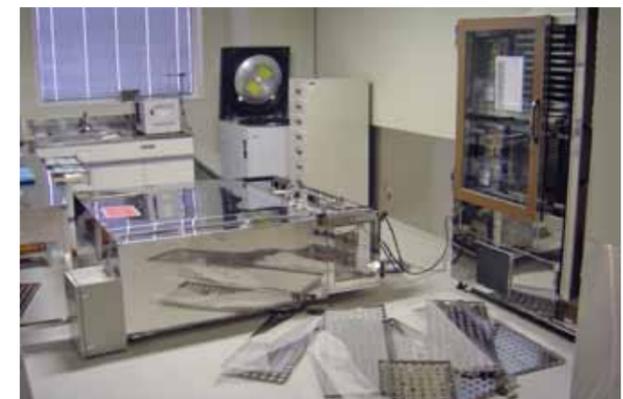
- March 13: The list of missing items requested by the Miyagi Blood Centers was sent to the Blood Service Headquarters in Tokyo by fax.
- March 17: Additional list of requests for fuel, heating equipment, and food was faxed to the Blood Service Headquarters.
- March 20: Requested items arrived from the Blood Service Headquarters.

(4) Recovery of testing system

- March 11: Testing equipment was checked and found not to work as a result of damage in the quake.

- March 12: Procedures for handling test samples were sent from the Blood Service Headquarters by fax.
- March 12: Professional inspection of testing equipment was started by an outside maintenance company.
- March 24: Operation of validation of the infectious disease system was started.
- March 28: The Blood Service Headquarters sent us instructions on how to conduct repairs and validations of cabinets containing blood products, in cases where the cabinet's electrical supply had been cut for a significant period after the disaster.
- March 29: The Blood Service Headquarters sent us instructions on how to

- conduct operation of validation of PK 7300, an infectious examination system, and to arrange for the large centrifuge to be checked by an outside maintenance company.
- March 31: Started validation of PK 7300, to confirm full operational function of equipment.
- April 5: Results of validation of PK 7300 and the infectious examination system were sent to the Blood Service Headquarters. The large centrifuge was also checked by an outside maintenance company.
- April 7: TV conference was held with the Blood Service Headquarters on resuming operations. It was decided to resume testing starting April 13.



A platelet shaking apparatus in the preparing division on the 2nd floor had fallen down and smashed.



Testing room on the 3rd floor with a printer and various testing equipment that had fallen

■ April 10:

It was decided that the deputy director of the Blood Service Headquarters and the director of quality assurance would visit the Miyagi Blood Center on April 12 to make the final decision about re-starting blood testing.

■ April 13:

Testing system at the Miyagi Blood Center resumed.

(5) Production

■ March 12:

The Blood Service Headquarters sent us instructions on how to accept whole blood from the Aomori Blood Center and the Akita Blood Center at the Miyagi Blood Center. The whole blood products were transferred to the Akita Blood Center, since it became possible for the Akita Blood Center to produce platelets and plasma from the whole blood.

■ March 12:

An outside maintenance company started inspection and validation of equipment.

■ March 28:

The Blood Service Headquarters sent us instructions to confirm the number of cabinets containing blood products which had lost electricity due to the disaster, as part of the re-validation.

■ March 29:

Instruction from the Blood Service Headquarters for an outside maintenance company to check the large centrifuge.

■ April 5:

Large centrifuge was checked by the maintenance company.

■ April 7:

TV conference was held with the Blood Service Headquarters regarding resuming operations at the Miyagi Blood Center.



A smoke vent, which should open only in case of fire, was malfunctioning due to the quake.



Director's room littered with fallen documents just after the quake



Water in the water tank (12t) flowing out due to the disconnection of the water pipe.

■ April 10:

It was decided that the deputy director general of the Blood Service Headquarters and the director of quality assurance would visit the center on April 12 to make the final decision about starting testing and blood production.

■ April 13:

Testing and blood production resumed.

III. Support activity for the JRC Ishinomaki Hospital

At 10 a.m. on March 15, four days after the quake, there was a request from the JRC Miyagi Chapter to send support staff to the JRC Ishinomaki Hospital, which was the only hospital

functioning in the Ishinomaki area, in order to carry out limited operations such as checking vital signs. Since our Blood Center had suspended blood collection after the disaster, we were able to send employees to the blood donation rooms, the blood collection division, and the blood collection promotion division at the hospital. At 4:55 p.m. on March 20, there was a follow-up request from the JRC Ishinomaki Hospital for five additional employees to start March 22 with the Ishinomaki area rescue medical team, and to input survival information data. Part of the administrative area of the hospital was allocated to accommodate the data entry process. Ample time was given for these employees to get ready, including preparing

their own food and bedding. Upon receiving the second report, at 8:40 p.m. on March 20, we changed the designated members, and decided instead to dispatch one member from the planning division and four members from the blood donation promotion division. They left on March 22. A total of 6 teams (i.e. a total of 20 members of the Miyagi Blood Center) contributed to these support activities.

The Japanese Red Cross Society (JRCS) performs a wide range of disaster relief activities such as medical relief, allocation of relief goods, acceptance of donations, and security research for survival, etc. At the time of the disaster, the JRCS made relief effort contributions on a company-wide basis, across

Notes by the Secretariat**(1) JRC Ishinomaki Hospital**

JRC Ishinomaki Hospital played an important role as the only rescue and care center in Ishinomaki region of Miyagi prefecture following in the Great East Japan Earthquake. The seismic isolation structure was installed in order to help maintain the building's normal functions immediately following a huge earthquake.

In 2006, the JRC Ishinomaki Hospital had moved to the new facility in Ishinomaki City's Hebata area, near the Sanriku Expressway, and since that time has functioned as a central hospital in the Ishinomaki medical area (Ishinomaki City, Higashimatsushima City, and Onagawa-cho). On the day of the quake, the hospital received little damage from the quake and tsunami, because it was constructed by a seismic isolation structure and built inland. However, in Ishinomaki City, with a population of more than 160,000, 13% of the city was inundated due to the huge tsunami that followed the quake, and up to 50,000 people were evacuated to about 300 evacuation centers in the Ishinomaki medical area. Moreover, since the city infrastructure was significantly damaged, Ishinomaki City functions were temporarily lost. In the urban area, which was without lights due to a blackout, community residents gathered at the hospital, since the hospital was the only place with lights, powered by a private power generator. Since most medical institutions in the city had stopped functioning, many patients rushed to the JRC Ishinomaki Hospital. The situation there at that time was reported in the media as similar to that of a field hospital.

Various medical support teams including the Japanese Red Cross Disaster Relief Medical Teams arrived in Ishinomaki. As the JRC Ishinomaki Hospital was designated as a hub hospital for the disaster and had enhanced disaster relief activities, the "Ishinomaki area joint disaster medical team" was set up in the JRC Ishinomaki Hospital. It was composed mainly of doctors working as disaster medical coordinators in the prefecture, to control medical teams collectively and to conduct medical relief activities fairly and effectively.

all of Japan. More than 800 relief teams were dispatched from all over the country and more than 79,000 patients were treated. The total amount of donations from all over the country to the JRCS was over 300 billion yen, which was three times the amount gathered at the time of the Great Hanshin-Awaji Earthquake in 1995. Since the disaster was the greatest earthquake on record in Japan, and no one had experienced anything like it, it was necessary to develop activities throughout the nationwide Blood Service network.

Our Miyagi Blood Center unfortunately did not have enough know-how to conduct a wide range of JRC disaster relief activities since we do not have any experience in organizing medical relief teams. Our hands-on experience of disaster operations were limited to two employees who had been dispatched to help with the delivery of relief goods at the time of Mid-Niigata Prefecture (Chuetsu) Earthquake in 2004. Taking this into consideration, it was more appropriate for our blood center to support the JRC Ishinomaki Hospital as specific tasks were designated. We dispatched staff to evacuation centers as delivery support staff, from divisions that were usually in charge of driving and distribution. They were able to conduct flexible operations by using their local knowledge, such as delivering goods to a small evacuation center that was not on the map.

Regarding operational support, there were employees with some experience of disaster relief who used to work at a chapter or hospital, and employees in the blood collection division with nursing licenses, that were dispatched. Two new employees were also dispatched to get experience in the practical activities

of the Japanese Red Cross Society. Since most support teams were dispatched from other prefectures, employees engaged in support operations had some difficulties dealing with inquiries, when patients assumed they were employees of the JRC Ishinomaki Hospital.

Disaster relief activities of the Japanese Red Cross Society have a long history, dating back prior to the relief efforts of the Red Cross in most other countries, and disaster relief is positioned as the most important of Japanese Red Cross Society's various operations. The basis for these activities is the humanitarian principle of the Red Cross, which is to "make efforts to prevent and reduce suffering in order to protect human life, health, and dignity.

Since the employees in our blood center do not have much opportunity to get to know services other than blood services, perhaps the Red Cross's mission could be reaffirmed, and goals could be set when dispatching blood service employees to disaster relief operations.

IV. Issues and points for improvement: What was learned from the disaster?

1. Issues

(1) Securing of multiple communication methods

The disaster priority phone did not work as a means of contacting the Blood Service Headquarters.

(2) Thought needs to be given in advance to decide and assign specific roles and tasks to team members in the event of a disaster.

(3) Thought also needs to be given in advance as to how relief goods will be obtained.

It was difficult in the heat of the

moment to determine what exactly were the necessary relief goods. This should also be decided in advance.

Future requirements for food, gasoline, heating oil, and heating equipment were also difficult to anticipate because of high levels of confusion and uncertainty after the disaster. Indeed, needs changed from day to day, which in itself presents a problem in predicting them. But so far as it is possible to do so, it is necessary to think about all of these things in advance.

(4) Advance consultation setting distribution priorities

Outside the prefecture, we have developed a broad range of supply and demand control systems, and have established a nationwide supply and demand network, organized from the Blood Service Headquarters in Tokyo. This system, designed for normal day-to-day operations, played a central role in the distribution of blood products to the stricken areas in the Tohoku region. The lessons learned may be relevant world-wide.

(5) Inspection of production equipment

Following a disaster, it is necessary to set the degree of inspection and validation for equipment, based upon the degree of damage. Since the testing equipment was dislodged and piping was damaged in the quake, it was also necessary to determine when the inspection and validation should begin, and how detailed the process should be.

(6) Suspension and resumption of blood collection

It is necessary to determine if the blood production and collection should be suspended following a disaster, based on the situation 'on the ground'. It is also necessary to determine any necessary adjustments to the delivery routes and confirm or establish storage space for whole

blood and test samples.

(7) Disaster training

Ongoing training measures should be implemented on a regular basis.

(8) Awareness of disasters

It is necessary to be continuously conscious of the risk of disasters.

2. Improvements influenced by the experience of the disaster

(1) Revised, and centralized, allocation of the duties of each section by the Emergency Response Committee.

(2) Introduction of designated e-mail for emergency matters and emergency contact

(3) Setting up of advance teams for the Blood Centers in the other six prefectures in the Tohoku region.

(4) Preparation of rescue clothing for disasters

(5) Preparation of emergency goods

(6) Installation of a powerful emergency power supply (625KVA⇒1,500KVA×2 units)

(7) Preparation of earthquake-proof precision measuring equipment

(8) Installation of solar power generators

(9) Cyclic use of cooling water to cool irradiating equipment

(10) Changing the energy source for air-conditioning facilities from natural gas to electricity (For the city utility supplier, restoring natural gas services may take longer than restoring electrical power).



Shizugawa area in Minamisanriku-cho devastated by the tsunami



Soon after the Great East Tohoku Earthquake, floating debris and containers carried by the tsunami together with spilt oil from the industrial complex covered the water surface of Kesenuma Bay, which consequently caught fire. The huge waterborne fire raged for more than three days (Photo: permitted by Kahoku-Shimpo Co. Ltd. in Sendai) .

Records of the events in the Miyagi Blood Center from the beginning of the disaster response

Period: March 11, 2011 to March 14, 2011

Date	Descriptions
March 11	
14:46	<p>Occurrence of the Great East Japan Earthquake with a magnitude of 9.0</p> <p>Initial confirmation</p> <ul style="list-style-type: none"> Impossible to use the unified system Switched to the emergency power supply in the building The refrigerator does not receive electricity from the emergency power supply <p>⇒ Removed red cells from the refrigerator and placed them in a carrying box for preservation with ice</p> <ul style="list-style-type: none"> The freezer does not receive electricity from the emergency power supply. Asked the electricians who are on the rooftop for maintenance of equipment to check the emergency power supply <p>⇒ Because of a fire risk in switching on the emergency power supply, it had to be switched off until it could be confirmed as safe to use, given the risk of a natural gas leak from the freezer, as a result of the earthquake.</p> <ul style="list-style-type: none"> The platelet shaking apparatus is functional as there is a 100-volt current by the emergency power supply. Received a report from the Iwate Blood Center that they have no damage Received a report from a medical institution in Akita area to the Miyagi Blood Center that they cannot make contact with the Akita Blood Center Not yet able to contact the blood donation rooms and blood delivery station under the Miyagi Blood Center Blood testing equipment does not work due to the earthquake Impossible to examine platelets collected during that day.
15:38	<ul style="list-style-type: none"> Removed all red blood cell products from the refrigerator and placed them in the carrying box Fresh frozen plasma units only had 2 hours of preservation left, due to a shortage of dry ice Made contact with two out of the three bloodmobiles on duty and confirmed their safety. Suspended blood collection with bloodmobiles and had them return to the Blood Center Made contact with the JRC Hasama Delivery Station. Electricity for the refrigerator and freezer at the Hasama Delivery Station was supplied by the emergency power supply Established possibility to use the refrigerators and equipment in the quality control division The shaking apparatus in the research division had fallen over, but there was no impact on other equipment
15:58	<ul style="list-style-type: none"> Each division gave instructions to their staff to return home to confirm the safety of their houses, except for staff who had to stay at the Miyagi Blood Center as part of their work. The refrigerator electricity supply was restored (manual operation, since the automatic switching malfunctioned). Cancelled collections in the blood donation rooms and bloodmobiles the next day Confirmed ability to use the unified system (confirmed time: 15:49) Checked production equipment at 15:51 <p>⇒ Production unavailable (may be available if the electric power is resumed)</p> <p>⇒ Shaking apparatus for blood products: One apparatus storing 6 units of product fell down and was left as it was.</p> <p>⇒ X-ray irradiator: Impossible to use 13 units of red cell 400 mL, type A, since they were undergoing the process of irradiation</p> <p>⇒ Source plasma in the preparing division: possible to use since it was moved to the refrigerator</p> <p>⇒ No damage to the refrigerator for blood production (confirmed time: 16:19)</p> <p>〈Examination conditions〉</p> <p>⇒ Afternoon's test samples were moved to the bag.</p> <p>⇒ Impossible to use the examination system for several days because of the need to wait for inspection etc.</p>
15:53	<ul style="list-style-type: none"> Began the transfer of dry ice from the Iwate Blood Center to the Miyagi Blood Center.
16:14	<ul style="list-style-type: none"> Possible to use all refrigerators, freezers and reservoirs although electricity is not switched on Requested the Blood Service Headquarters to deal with the following issues (all issues handed down to the production management division) <ol style="list-style-type: none"> It should be decided where to deliver the test samples in case the system fails. Biochemical testing had been performed on 840 units. Where should whole blood from various prefectures be delivered? <ul style="list-style-type: none"> Promotion division: At this time, the plan for the operation of bloodmobiles cannot be fixed until Monday. <p>⇒ There were no problems with operation of the bloodmobiles themselves, but there is a problem with the sites that have to accept blood donations.</p>

16:30	<ul style="list-style-type: none"> One equipment delivery vehicle (van) was submerged by the tsunami. No human injury There was a strong aftershock. The intensity was unknown.
16:34	<ul style="list-style-type: none"> Confirming the necessity of blood supply with major medical institutions in the prefecture, using a disaster priority phone Since it was impossible to make contact with Sennan area by phone, a routine blood delivery vehicle with blood departed for that area. Water leaked from a drainpipe on the ceiling of the 3rd floor. Measures were taken to mitigate the damage.
16:38	<ul style="list-style-type: none"> Water leaked from a drainpipe of the machine room on the 4th floor. No functional problems were reported
16:40	<ul style="list-style-type: none"> Waiting for instructions from the Blood Service Headquarters concerning the handling of test samples and whole blood
16:44	<ul style="list-style-type: none"> Employees, excluding those who were confirming damage, had evacuated the building, but now moved back inside the building due to snow and low temperature.
16:47	<ul style="list-style-type: none"> Inspecting functions and availability of biochemical testing equipment and Labospect. The HVAC equipment was unable to work.
16:50	<ul style="list-style-type: none"> Possible to use LAN inside the center but impossible to use the internet and e-mail
16:51	<ul style="list-style-type: none"> The distribution division started receiving phone orders (general lines). Phone lines that had been restricted just after the quake were gradually restored.
16:53	<ul style="list-style-type: none"> Made contact with the Akita Blood Center and confirmed that they had no major damage. Possible to use the unified test sample registration system → Informed the supply management division about it There was an additional aftershock. <p>〈Confirmation of lifelines〉</p> <ul style="list-style-type: none"> Water ⇒ Only possible to use the water in the water storage tank Natural Gas ⇒ Restoration unconfirmed Electricity ⇒ Supplied by the emergency power supply Toilet ⇒ Impossible to use
16:59	<ul style="list-style-type: none"> Started to return concentrated red cells previously stored outside back inside, because electric power supply for the refrigerator had been restored Fresh frozen plasma was kept stored in the freezer. No impact on platelets since the products can be stored at room temperature. Shaking apparatus in the blood production division remains overturned. Possible to use the shaking apparatus in the distribution division Impossible to make contact with the blood delivery stations in Miyagi Prefecture. Requested the Blood Service Headquarters to make contact with them.
17:19	<p>〈Report from the Blood Center to the Chapter〉</p> <p>Damage situation in the Miyagi Blood Center, confirmation and contact with major medical institutions, and allocation of a routine blood delivery vehicle to go with blood to Sennan area</p>
17:20	<p>〈Disaster situation (already partly cited)〉</p> <ul style="list-style-type: none"> No major damage to the building of the blood center An equipment delivery vehicle was submerged in Shiogama due to the tsunami (the vehicle stayed there to support the evacuation of hospital patients) Platelet shaking apparatus in the blood production division fell down, and it seemed to be unusable. Impossible to use 13 units of red cell (400mL) because they had been undergoing the process of irradiation at the time of the quake Waiting for instructions from the Blood Service Headquarters concerning the handling of 840 units of test samples that had been in the process of being tested Confirmed the possibility of distributing regular red cells and platelets Impossible to distribute HLA-platelets that required testing, and second products that required further preparation. Determined that support from neighboring blood centers would be necessary.
17:31	<ul style="list-style-type: none"> Bloodmobile: Bloodmobile No. 6, allocated to the Blood Delivery Office, could not travel because it was unable to remove the jack in order to fix the body of the vehicle. <p>⇒ Another vehicle was allocated from the Blood Center to the site. Source materials and staff returned to the Miyagi Blood Center.</p>
17:40	<ul style="list-style-type: none"> Information regarding the situation at the Iwate Blood Center: Blood collection by bloodmobiles and schedule for two teams on March 12 were cancelled. Rooms lost power but may be able to function by March 13 if the power is restored. Blood donation room "AER20" ⇒ No human injury but it seemed that the apheresis devices could not be used because they had fallen over.
17:44	<ul style="list-style-type: none"> Blood donation room "AOBA" ⇒ No human injury, but property damage was unconfirmed
19:56	<ul style="list-style-type: none"> Emergency power supply connected to all refrigerators and freezers (freezers for rare blood group had malfunctioned) The platelet shaking apparatus in the blood production division is still overturned No prospects for the recovery of lifelines (city gas)

*	The first meeting of the Emergency Response Office with directors, senior directors, and the director generals
	① No human injury
	② No situational changes from the report at 17:00
	③ Each division had the necessary number of staff work on a rotating schedule and had other staff go home.
	④ Next meeting to be held at 15:00 on Saturday the 12th.
	〈Testing and production〉
	• Trying to complete the production of the products that were being processed, but they could be lost.
	• Deputy Senior Director Kikuchi and Director Minegishi contacted each other concerning the handling of the test samples.
	• It was planned to accept whole blood that was on the way to Sendai.
	• Tests and production seemed impossible to be conducted on Saturday, March 12.
	• Water leaked in the Miyagi Blood Center and the X-ray irradiation apparatus had shifted due to the quake
22:01	〈Matters related to tests and production〉
	• The separator, centrifuge, and blood cell counter in the preparation division were all operational
	Only eight of all the separation apparatuses were operational (with the emergency power supply).
	• Chart input for whole blood completed
	• Materials were unable to be weighed due to continuous aftershocks and centrifuge was unable to operate.
	• Primary tests on blood collected up to March 10 were completed, but tests were not conducted on blood collected on March 11.
	• The 362 units of test samples for NAT were unable to be sent to the Tokyo Metropolitan Blood Center and were stored in Sendai.
	• Test samples (Fukushima: 162, Akita: 119) arrived and were stored in the Miyagi Blood Center.
	• Tests on 137 units of the first delivery from the Miyagi Blood Center were not conducted.
	• Test samples of the second delivery from the Miyagi Blood Center, 2 blood donation rooms, the bloodmobiles and the Aomori Blood Center have not yet arrived.
	• Explained the damage situation to the prefectural police upon request
	• Since we could not confirm a reliable supply of gasoline for the emergency power supply
	in the Hasama Delivery Station, the blood products were moved to the Miyagi Blood Center.
	• Blood collection on March 12 and 13 could not be conducted.
	• The Miyagi Blood Center takes over product distribution for the Hasama Delivery Office's territory.
	• Major medical institutions already confirmed the orders from the Miyagi Blood Center, using disaster priority phone lines.
March 12	
03:00	• According to the instruction from the Blood Service Headquarters, whole blood of the Aomori Blood Center and the Akita Blood Center was to be delivered to the Miyagi Blood Center, and should be separated within 24 hours. Due to arrive around 9:30
03:50	• Whole blood of the Iwate Blood Center arrived (third delivery).
03:55	• A fax about the handling procedures for acceptance of test samples arrived from the Blood Service Headquarters.
03:59	• Earthquake with an intensity of 6 Upper in Nagano occurred
04:10	• Prediction of earthquake in Ibaraki (tsunami advisory) but could not be felt physically
05:00	• Confirm with major hospitals by phone since the fax machine in the distribution division was unusable
06:15	• Prepared money to replenish gasoline
06:40	• Emergency vehicles able to refill with gasoline at the Kamei store at Izumi-Interchange (4 vehicles left at 6:50).
07:36	• Commercial electric power supply restored.
07:50	• Confirmed with the production division ⇒ No problems, since none of their operations rely on the commercial power supply
07:55	• Confirmed with the examination division ⇒ No problems, since none of their operations rely on the commercial power supply
08:00	• Test samples were delivered to the Yamagata Airport at 14:45. JAL2236 ⇒ Osaka Itami (handled by 3 employees)
08:10	• Simultaneous announcements to confirm the temperature for storing blood, etc.
08:30	• Left for the Blood Donation Room "AOBA" to collect whole blood (Director of the blood collection division and one other person)
08:40	• The Blood Service Headquarters contacted a company that repairs irradiators in order to complete necessary maintenance.
	⇒ The contracting company did not know when they could come.
10:20	• Reported the condition to the Miyagi prefectural pharmaceutical division
10:40	• Completed delivery of whole blood and test samples of the Blood Donation Room "AOBA" to the Miyagi Blood Center (Director of the blood collection division)

10:55	• Information from the Blood Service Headquarters at this time ⇒ No major damage in Hokkaido, Saitama, Tokyo area and southern part of Japan
	• There was production damage in Ibaraki, Tochigi, and Tohoku areas.
11:18	• A company in charge of electrical equipment visited the Miyagi Blood Center.
11:20	• Test samples that had to be delivered arrived at the Yamagata Airport from the Miyagi Blood Center. The method of transportation switched to land vehicle because of a change in plane status at 13:20 (Yamagata Airport ⇒ Osaka)
	• The 370 units of red cells and 110 units of platelets from the Tokyo Metropolitan Blood Center (ANA895) departed Haneda Airport at 12:15 and arrived at the Shonai Airport at 13:15.
11:37	• Reported to the Blood Service Headquarters about the safety of employees (impossible to make contact with four employees at the Miyagi Blood Center and 10 employees at the Blood Donation Room)
11:58	• Platelets and plasma were delivered to the Akita Blood Center since it had become possible to resume production at the Akita Blood Center (handled by supply staff). Left at 13:00 upon instruction of the production management division at the Blood Service Headquarters
13:30	• Requested a supply of water to operate the testing equipment and irradiation apparatus from the JRC Miyagi Chapter.
15:00	The second meeting of the Disaster Counter-measures Office
	1. Status of the safety of employees: Impossible to make contact with 12 employees
	2. Disaster conditions
	3. Progress
	4. Discussion about actions for the next day
	Blood donation room operations were expected to resume after the buildings had been made safe.
	Bloodmobiles were to resume operations after March 15 at the earliest, taking the recovery of testing and production into consideration.
	Meeting of the Disaster Counter-measure office is to be held at 13:00 on a daily basis (directors and above)
	Each division had employees handle matters constantly and started working toward returning to full operating conditions.
	Maintenance of the testing/production equipment was requested in order to resume operations.
16:20	• Reported to the blood donation promotion division in the Blood Service Headquarters about the situation (Timing for resumption of blood collection: Not yet determined at the time)
21:05	• Requested the Blood Service Headquarters to send platelet un-irradiated labels
	• The Tokyo Metropolitan Blood Center sent platelet un-irradiated labels through the supply and demand network.
March 13	
06:00	• Reported to the Blood Service Headquarters about the situation at the Miyagi Blood Center
	• The Miyagi Blood Center sent the ionization chamber survey meter to the Fukushima Blood Center to detect the of radiation levels.
08:40	• Received report from the Blood Service Headquarters. Questioned which airport should be used, Shonai or Yamagata Airport, and if air transportation would be OK to deliver platelet materials? (Concerning arrangements for the Shonai Airport)
09:10	• The 12 units of test samples, platelet products, and red cell products left from the Miyagi Blood Center at 11:30
	⇒ Left the Yamagata Blood Center at 16:00 ⇒ Kept at the Niigata Blood Center until 21:30
	⇒ Sent to the Saitama Blood Center (which had already made contact with the Blood Service Headquarters)
09:30	• From the Blood Donation Room "AOBA" ⇒ Electricity and water was restored, and confirmed the safety of one previously unconfirmed employee
	• Allocated staff to obtain gasoline for the Blood Delivery Vehicles
13:00	The third meeting of the Disaster Response Committee at the Miyagi Blood Center
	1.As a result of a review of the status reports, blood collection was to be resumed from the 18th at the earliest.
	2. Employees who were able to work should be at work from the 13th. Names of employees who were not able to work should be recorded in each division and reported to the general affairs division.
	3. Since it may therefore be necessary to provide emergency instructions to a division, at least one employee should stand by in each division to receive (and if necessary carry out) any such new instructions.
	4. The status of each division should be recorded.
	5. The status of each division should be reported to the Disaster Response Committee as soon as there is any change in status.
	6. Make sure to make contact and consult with the planning division concerning the unified system (the Blood Service Information System). In case of failure to make contact with them, this should be done via the unified network.
	7. Regarding a Public Announcement, information on the resumption of blood collection should be provided to the media by direct contact since the website had not been restored.
	8. Each division should report to the Emergency Response Headquarters before and after work.

	<p>9. External companies should provide their business cards to the Disaster Response Committee at the time of entering the building and should report to the office at the time of leaving.</p> <p>10. Only the water system and toilets in the lounge on the 3rd floor and the distribution division and the promotion division on the 1st floor could be used.</p> <p>11. Recycled waste water could be used as usual but toilets on the 2nd floor could not be used.</p> <p>12. Received a report that parents of an employee in the examination division and an employee in the blood collection division were OK</p> <p>13. Blood collection in Tohoku / Aomori Blood Center ⇒ 2 Blood Donation Rooms functioned / Iwate Blood Center ⇒ All suspended Akita Blood Center ⇒ 2 Blood Donation Rooms functioned / Miyagi Blood Center ⇒ All suspended Yamagata Blood Center ⇒ 1 Blood Donation Room and 1 bloodmobile functioned / Fukushima Blood Center ⇒ suspended</p> <p>14. The facilities (the Blood Center and Institutions) which are open in other regions (2 facilities in Hokkaido, 2 facilities in Fukuoka, 1 facility in Kumamoto) temporarily open for the day (informed from the Blood Service Headquarters).</p> <p>15. It is decided that 2 employees (Administration: 1, Technical: 1) would work at the Emergency Response Headquarter for night and day shifts.</p>
16:00	• Reported the status to the Blood Service Headquarters
16:10	• Started the inspection and verification of the repaired irradiation equipment
16:30	• Reported the status to the JRC Chapter by phone (sent a fax at 17:57 separately)
16:40	• Issued a new release to media organizations (FM Sendai, Tohoku Broadcasting, and Sendai Television) Content: Impossible to accept donations at blood donation rooms and stock was being supplied from the nationwide supply-and-demand network
17:45	• Received an offer for assistance from the Kyushu Blood Center for human support ⇒ Several employees available!
18:00	• Requested delivery vehicles and personnel from the Yamagata Blood Center, if possible. ⇒ The Miyagi Blood Center provided night and day services and maintained a high priority on operations, even when there were injuries to family members and damage to houses. The Yamagata Blood Center agreed to lend their support. ⇒ Asked the Blood Service Headquarters about the resumption of blood collection in the Yamagata Blood Center and the Iwate Blood Center, and waited for their reply
20:00	• Water storage tank became empty. Based on inspection, the possible causes were: → ① Running out of water for a short period, even while rationing water and ② Water leaks from the pipe under the 1st floor. Remedial actions: *In case of cause ① → Strengthening the use of rationing *In case of cause ② → Note increased risk of supplying water to the 1st floor
20:40	• Sent the operation schedule to the Blood Service Headquarters by fax • What kind of items should be supported by the Blood Service Headquarters to help the Miyagi Blood Center? ⇒ The Blood Service Headquarters requested us to report the necessary items.
22:10	• Upon request of the Bureau of Waterworks Sendai, a water tank truck of the water emergency team of the Bureau of Waterworks Tokyo Metropolitan Government arrived (6 t of water supplied).
22:30	• It was decided that the water system on the 2nd and 3rd floors to be used, but not that on the 1st floor due to the risk of water leakage.
23:10	• Reported to the JRC Chapter and requested continuous water supply. Water emergency team of the Bureau of Waterworks Tokyo Metropolitan Government arrived again (6 t of water supplied).
March 14	
00:45	• Additional support from the water emergency team of the Bureau of Waterworks Tokyo Metropolitan Government arrived (4 t of water supplied). ⇒ Requested by the Miyagi Blood Center. • Internet environment restored (possible to use the internet and e-mail)
01:35	• Water supply completed by the water emergency team of the Bureau of Waterworks Tokyo Metropolitan Government.
02:30	• Platelets of the Tokyo Metropolitan Blood Center delivered (Blood type A: 20 units, Blood type O: 15 units, Blood type B: 6 units, Blood type AB: 8 units) ⇒ A blood delivery vehicle returned by passing via the Fukushima Blood Center, the Miyagi Blood Center, and the Iwate Blood Center to deliver blood products.
06:00	• Became possible to use the fax in the distribution division
09:50	• Electricity in the blood donation room "AER20" restored, and received information on restoration of the phone lines
10:05	• Started to update the Center's website ⇒ Posted information about the cancellation of the operational plan • Received a report that the safety of the final employee could be confirmed
10:20	• Apology for the electricity outage by Tohoku Electric Power announced • Impossible to use the icemaker in the distribution division on the 1st floor due to water outage; an instruction to make ice by using freezers of other divisions issued

10:20	<p>〈Plan for use of water supply〉</p> <p>Examination division: 10:20 – 11:30 for blood group tests, 12:00 – 23:00 for infectious disease tests. Preparing division: No schedule planned</p>
11:30	<p>• Medical waste from the day was already collected by a medical waste treatment company</p> <p>• Remaining amount of water in the water storage tank seemed to be about 9 t.</p> <p>It seemed that amount of water was reduced by about 20% in the 10 hours between 1:00 and 11:00.</p>
13:00	<p>The fourth Disaster Counter-measures Office meeting in the Miyagi Blood Center</p> <ol style="list-style-type: none"> 1. Blood collection was to be resumed in the Blood Donation Rooms when the general public could safely enter the center. 2. Bloodmobiles could be operated if sufficient fuel is obtained. 3. Testing and production could not be done until the water supply is resumed. 4. Making sure to carry rain gear in consideration of the impact of the explosion accident at the nuclear plant in Fukushima. 5. Each division should allocate employees to support the distribution division. The distribution division should consist of 24 employees (support from the Blood Service Headquarters not yet decided). 6. Safety of families of staff and availability of work should be confirmed. Employees who could work were to support the distribution division.
14:44	• Making a request to the Blood Service Headquarters to consider the request for resuming blood collection at the Iwate Blood Center and the Yamagata Blood Center
15:00	• Repeated request to the Blood Service Headquarters for confirmation and consideration of the support request and blood collection at the Iwate Blood Center and the Yamagata Blood Center
15:20	• Reported to the Iwate Blood Center and the Yamagata Blood Center about blood collection and support system
16:13	• Reported the situation to the Blood Service Headquarters
16:40	• Reported the situation to the pharmaceutical division of the prefectural office
18:05	• Inspection of the waste liquid treatment equipment by an independent maintenance company ⇒ No problems



Evacuees help unloading goods (Shizugawa and Iriya areas)



Employees of the Miyagi Blood Center who were in charge of accepting relief teams (support for the JRC Ishinomaki Hospital)



Employees of the blood centers gathered from all over the country to support the Miyagi Blood Center

Akita Prefecture: Impact of/and Response to, the Great East Japan Earthquake

Yoshiaki Sasaki, Senior Director, Akita Blood Center

I. Damage situation in Akita prefecture

The largest intensity of the main quake on March 11 and the largest

aftershock on April 7 in Akita Prefecture was 5 Upper. The damage situation is provided in the table below.

Category	Great East Japan Earthquake		
	Main quake		Largest aftershock
Date of occurrence	Mar. 11, 2011		Apr. 7, 2011
Intensity in Akita (intensity of 5 or 5 Upper)	5 Upper	Akita City, Daisen City	
	5 Lower	Yokote City, Yurihonjo City, Ikawa-machi	Gojome-machi, Yuzawa-machi, Senboku City
Human injury	Total of 12 people (Heavily injured: 4, Lightly injured: 8)		
House damage	Partially damaged: 3		
Other damage	Road damage: 9 locations		

II. Impact of the Akita Blood Center

An intensity of 5 Upper was recorded on March 11, followed by the largest aftershock on April 7. Fortunately, the buildings, facilities, and equipment of the center and 2 delivery stations had no direct damage. Three bloodmobiles that were operating on the day of the main quake also had no damage.

However, there were various kinds of impact on our blood center due to the electrical outage caused by the damage to the Tohoku Electric Power Company, and the suspension of testing at the Miyagi Blood Center.

An outline of the impact is as follows:

1. Electrical outage

Immediately after the quake on March 11, the power went out in the entire prefecture. The electrical outage continued for about 18 hours until commercial power in the area of our center resumed around 9:40 a.m. on the 12th.

At the time of the electrical outage, the under voltage relay (UVR), which is designed to automatically activate the power generator and switch to the emergency circuit when detecting an electrical outage, did not work. So hastily, we manually switched to

the emergency circuit. As a result, the emergency power generator was activated one hour later at 3:52 p.m. According to an investigation at a later date, it was found that the emergency power generator was not automatically activated, because the UVR was malfunctioning, and the electrical outage was not detected.

The power went out again immediately after the aftershock that occurred at 11:32 p.m. on April 7. It took about 13 hours until the city's commercial power was restored around 12:00 p.m. on the 8th.

Since the emergency power generator did not have the capacity to provide electricity to the entire

blood center, the production section could not perform the processes of centrifugal separation and the delivery of radiation.

In association with the suspension of production, blood collection had to be suspended.

There were also two delivery stations the blood donation room "Atorion" and the blood donation station "Ion", that suspended their operations for the period listed below because the building was closed due to the electrical outage.

A summary of the suspension of the operations of the three fixed facilities and collection with bloodmobiles is as follows:

Facilities	Terms of cancellation			
	Cancellation and operation in association with the quake on Friday, March 11 at 14:46		Cancellation and operation in association with the quake on Thursday, April 7 at 23:32	
Blood donation park "Rupu" (the Akita Blood Center) Regular holiday: Sundays	From just after the quake on the 11th and all day on the 12th *Temporary operation on Sunday the 13th	1.5 operations	On the 8th between 8:30 and 13:00	0.5 operations
Hirokoji Branch (blood donation room "Atorion") Regular holiday: Wednesdays	From just after the quake on the 11th and all day on the 12th	1.5 operations	On the 8th between 10:00 and 13:00	0.5 operations
Goshono Branch (Blood donation station) Regular holiday: Thursdays and Fridays	From the 12th to the 16th (5 days)	5 operations		
Collection with bloodmobiles	From just after the quake on the 11th Car 1: Odate City Car 4: Yokote City Apheresis car: Akita City	1.5 operations	On the 8th Car 1: Ikawa-machi Car 3: Akita City Car 4: Daisen City	3 operations
	On the 13th Car 1: Nikaho City and Yurihonjo City	1 operations		
Total	About 10.5 operations		About 4 operations	

2. Damage at the Miyagi Blood Center

Miyagi Center, which is the test facility of our center, had tremendous damage due to the Great East Japan Earthquake. Therefore, tests were consigned to the Tokyo Metropolitan Blood Center and the Osaka Blood Center.

This situation continued for about one month until testing resumed at the Miyagi Blood Center.

3. One Month Cancellation of blood collection of platelets

According to the instructions of the Blood Service Headquarters, blood collection of platelets at our

Blood Center was suspended for about one month between March 16 and April 17.

During this period, platelets were provided by other Blood Centers to respond to orders from medical institutions in the Akita prefecture.

4. Distribution

There was concern at medical institutions that the distribution of blood products for blood transfusion could be delayed due to the quake. To eliminate this concern, the stock status was provided to major medical institutions by fax on a daily basis.

As a result, there were no problems with distribution throughout the country, including our prefecture. We are very proud of this result, which we achieved by repeatedly doing risk management assessments of the blood services. We consider that this builds a more solid sense of trust with medical institutions.

5. Restrictions on blood donations

For a couple of days after the quake, the number of donors at blood collection facilities across the country increased. In one case, donors had to wait for three hours in a blood donation room in a prefecture. However, since blood products have a limited validity period, some blood products will expire if there is a temporary concentration of donors. This may affect the stability of the supply to medical institutions.

With lessons learned from the Great Hanshin-Awaji Earthquake in January 1995, the Japanese Red Cross Society issued an appeal that

“Regular and continuous blood donation is necessary to make maximum use of goodwill blood donation without wasting it” and asked for understanding of the appeal.

Since the number of donors temporarily increased at the blood collection facilities in our center, a sign was placed to inform them about the restrictions on blood donation.

The table below shows the status of blood donation for the two days immediately after the quake.

Facilities	Sunday, March 13		Monday, March 14		Saturday, March 19		Sunday, March 20	
	Plan	Result	Plan	Result	Plan	Result	Plan	Result
Blood donation park “Rupu”	0	40 39	27	53 41	—	—	—	—
Hirokoji Branch	57	81 65	38	101 72	—	—	—	—
Goshono Branch	—	—	—	—	51	75 57	60	80 68

Upper space: Number of people accepted / Lower space: Number of donors

6. Rationing of supply of fuel at gas stations

Due to the disruption of fuel (gasoline, etc.) logistics after the quake, supply of fuel was restricted at gas stations for some time. Since our blood centers regularly use vehicles for distribution and other operations, the rationing of fuel caused a serious problem for us. It was also a waste of time to wait for refueling.

As a result of negotiations with several gas stations in the city to secure gasoline, they preferentially supplied gasoline to the vehicles of the blood center. Thanks to them, there was no impact on our operations.

There was some impact on the employees’ private vehicles, but there was no major impact on their commuting.

7. Events

Due to the quake, the following scheduled events were cancelled.

Events cancelled

- March 14 Reception given by the Yuzawa Medical Association Blood Transfusion Therapy Committee of the Fujiwara Memorial Hospital

- March 15 Board of Councilors’ of the JRC Akita Chapter
- March 17 Conference between the Director General and Senior Director of Administrative Department of the Miyagi Blood Center Reception given by the Kazuno Medical Association

- March 19 Red Cross Symposium
- March 22 Reception given by the Akita City Medical Association

8. Dispatch of disaster relief staff

The JRC Akita Chapter made full-scale efforts to conduct disaster

(1) Employees for the medical relief teams

Names of relief team	Term	Name of employees dispatched		Place to be dispatched to	Remarks
10th team	March 20 to 22	Deputy director of the finance division	Yoshihisa Miura	Rikuzen-takata City, Iwate	Liaison and coordination staff
14th team	March 24 to 26	Deputy director of the public relations division	Manabu Kunii		Liaison and coordination staff
19th team	March 30 to April 1	Deputy director of the medical affairs division	Etsuko Wakabayashi		Liaison and coordination staff
20th team	April 1 to 3	Secretary	Yosuke Ito		Liaison and coordination staff
29th team	April 19 to 21	Second deputy director of the supply division	Takahito Saito		Secretary
31th team	April 23 to 25	Deputy director of the registration division	Yuetsu Takehana		Secretary
33th team	April 27 to 29	Second deputy director of the management division	Haruo Kato		Secretary
41th team	July 8 to 10	Secretary	Yudai Kikuchi		Secretary
43th team	July 12 to 14	First deputy director of the management division	Satoshi Takahashi		Secretary

(2) Employees dispatched for other services

Date	Name of employees dispatched	Place to be dispatched	Remarks
March 12	Assistant Manager of Second Operation Masashi Sato Temporary employee Shinichi Sakagami	Ishinomaki Red Cross Hospital	Delivery of emergency food
March 19	Administrative Manager Yoshiaki Sasaki	Ishinomaki Red Cross Hospital	Delivery of food
March 25	Administrative Manager Yoshiaki Sasaki	Prefecture’s border between Akita and Yamagata (handover with the Yamagata C)	Delivery of goods (gas canisters and fuel tanks)

relief activities in collaboration with the Red Cross facilities in Akita prefecture (the JRC Akita Hospital, the Akita Blood Center, the JRC Akita Home for Infants, the JRC Akita College of Nursing, and the JRC Junior College of Akita). Medical relief teams were dispatched to the affected areas immediately after the disaster.

Our blood center sent employees for disaster relief activities at the request of the JRC Akita Chapter.

Medical relief teams usually consist only of doctors, nurses, and administrative staff of the JRC Akita Hospital. However, since several teams provided services in affected areas on a steady basis just after the disaster and it affected the regular services of the hospital, our blood center was also requested to dispatch employees.

After they returned, all dispatched employees said that they had a good experience acting as an employee of the Red Cross.

Since the employees at our blood center do not have much opportunity to get to know services other than the blood services, and to provide services in other facilities with employees, it can be considered that the dispatch of blood center employees on this occasion was meaningful and beneficial to them, and enabled them to reaffirm their responsibility as employees of the JRCS.

III. Actions of the Akita Blood Center (time series)

The actions of our center immediately after the disaster are detailed on the attached list*.

IV. Issues and measures

Some issues were highlighted through the experience of the Great East Japan Earthquake.

Specific issues and responses are as follows:

1. Matters relating to communication methods

Issue 1: Difficulty in making contact with staff (delivery staff, etc.)

Measure 1: Increase the number of disaster priority mobile phones and prepare satellite mobile phones

Issue 2: Disconnection of communications (fax, etc.) with medical institutions

Measure 2: Request the medical institutions to secure a disaster priority line connected to their fax machine for ordering blood. This apparatus should be powered by an emergency power generator

2. Matters related to facilities and equipment

Issue 3: Water-cooled type private power generator (vulnerable to water outage)

Measure 3: Preparation of an air-cooled emergency power generator

Issue 4: Unified system* not connected to the private power generator

Measure 4: Measure already taken

*Unified system means a unified database system at the Blood Service Headquarters

3. Matters related to operations

Issue 5: Difficult in securing fuel for blood-delivery vehicles, etc.

Measure 5: Securing arrangements with disaster-priority gas stations during normal times (consignment contract, etc.)

Issue 6: Failure of eight check (reagent) and refrigerators to preserve antiserum at branches (blood delivery stations)

Measure 6: Reagents must immediately be delivered to the Akita Blood Center in case of power outage. UPS (uninterruptible power system) will be installed in the refrigerators in blood delivery office to maintain their function.

4. Matters related to the improvement of rules, etc.

Issue 7: Review of “Rules”, “Guidelines”, and “Manuals” related to various kinds of risk management for a disaster

Measure 7: To be improved based on the “Risk management guideline” established by the Blood Service Headquarters

V. Postscript

Even though part of the functions of the blood centers in the Tohoku prefectures, including the Miyagi Blood Center, was lost due to this massive disaster, there was no impact on distribution thanks to the nationwide support network. In our view, this gave us the confidence to promote the wide-area management system, and the principle of “Stable supply” could be demonstrated to the medical institutions.

In Japan, there are growing concerns about the occurrence of an “Earthquake directly beneath the Tokyo Metropolitan Area,” “Tokai earthquake,” “Nankai earthquake,” and “Tonankai earthquake.” Natural disasters other than earthquakes and artificial damage may also occur anytime and anywhere.

In order to establish a reliable system to stably supply blood products, the JRCS will have to take measures by contemplating every possible disaster scenario, including huge earthquakes.

Attached list: Actions of the Akita Blood Center in the Great East Japan Earthquake

Period: March 11, 2011 to July 14, 2011

Date	Descriptions
March 11	
14:46	The occurrence of an earthquake with a magnitude of 9.0, a maximum intensity of 7 (Northern Miyagi Prefecture) Seismic center: Off the coast of Sanriku (About 130 km East-southeast of the Oshika Peninsula) Depth: 24 km Akita Pref.: Intensity 5 Upper (Akita City and Daisen City) • Electrical outage immediately after the quake • Private emergency power generator did not work.
14:50	• Damage to facilities confirmed at the Akita Blood Center (including its blood collection site, Blood donation park “Rupu”) → No damage
14:55	• Had contact with Akita Electrical Equipment concerning malfunction of the private power generator • Only a telephone in the night duty room is available.
15:00	• Received damage report from the JRC Hirokoji office (blood donation room “Atorion”) → No damage
15:05	• Established the Akita Blood Center disaster countermeasures office • Holding of the first disaster countermeasures office meeting (Attendees: Sasaki, Abe, Kamata, Ito, Wakabayashi, Sato) ① Confirmation of the damage to “facilities” and bloodmobiles ② Security of the safety of donors ③ Storage and control of products ④ Cancellation of the blood collection on the day
15:06	• Had contact with Mr. Nagai, the general affairs director (stayed in Kagoshima City for a business trip) to report the situation
15:15	• Content of the meeting transferred to the Blood Donation Room “Atorion” • Content of the meeting transferred to the Blood Donation Park “Rupu” • Content of the meeting transferred to the bloodmobile No. 4 (Yokote area) and confirmed their damage → No damage • Content of the meeting transferred to the bloodmobile No. 1 (Odate area) and confirmed their damage → No damage
15:30	• Content of the meeting transferred to the bloodmobiles for apheresis (in Akita City) and received their damage report → No damage
15:31	• Inquiry from the Blood Service Headquarters about the situation
15:40	• Report from Mr. Sato, the director of the Goshono Branch (blood donation room), that the room has no damage
15:47	• Inquiry from the Information System Management division of the Blood Service Headquarters about the situation
15:52	• The private emergency power generator activated
15:53	• Report to the JCR Chapter that there is no damage
16:00	• Report to the director general (stayed in Kagoshima City for a business trip) about the situation through Mr. Nagai, the director of the general affairs
16:35	• Inquiry at Tohoku Electric Power about the restoration schedule
16:40	• Call from the director general → Reported the situation
16:42	• Answer from Tohoku Electric Power that restoration has not been determined yet • Information that the ceiling in the administrative room on the 3rd floor of the Miyagi Blood Center had collapsed
16:50	• Information from Mr. Takashima, the director of the supply division of the Miyagi Blood Center, that he is having a discussion with the Blood Service Headquarters concerning a place to deliver the test samples from the Akita Blood Center • The supply division uses dry ice and ice to preserve products • Information that the emergency power generator will be able to work for at least three days
16:57	• Call from Mr. Hizawa of the medical and regulatory affairs division of the prefecture to confirm the situation, and to make an inquiry as to whether we could confirm the stock at Kazuno Hospital • Responded that there were no problems with blood storage and we would handle it on a round-the-clock basis • Responded that we would call him upon confirmation of the conditions at Kazuno Hospital
17:30	• Holding of the second disaster countermeasures office meeting (Attendees: Sasaki, Abe, Tamura, Kamata, Ito, Sasaki) 【Blood collection on the 12th】 • Supply division: No problems as long as the private power generator was activated. Available for at least three days with 1.9 kL Possible to conduct services by using dry ice and ice. Fax restored and orders accepted

	<p>Preservation equipment in the Miyagi Blood Center activated normally and distribution implemented</p> <p>Inquiry as to whether blood collection on the 12th would be conducted or not</p> <p>Impossible to use refrigerators in the Hiraka Hospital</p> <ul style="list-style-type: none"> • Technical division: Storage equipment normally activated <p>Blood products cannot be produced with an emergency power supply. Impossible to use the centrifugal and the irradiator</p> <p>Test samples were delivered to the Miyagi Blood Center. System inaccessible</p> <ul style="list-style-type: none"> • Blood collection division: Impossible to conduct blood collection if production cannot be implemented • Conclusion: Services on the 12th will depend on the restoration of Tohoku Electric Power. It is necessary to set the system after restoration. Decision whether or not to provide services will be made at 8:00 a.m. on the 12th. <p>Members of the disaster countermeasures meeting should arrive to work at 7:30 a.m. on the 12th.</p>
18:15	• Report to Mr. Sumi, the secretary of the management planning division of the Blood Service Headquarters concerning the above content
18:40	• Reported to the director general through Mr. Nagai, the director of the general affairs, about the above content
21:00	• Received instruction from the Blood Service Headquarters to cancel blood collection on the 12th
March 12	
03:50	<ul style="list-style-type: none"> • Instruction from the Blood Service Headquarters to deliver whole blood to the Miyagi Blood Center. It was decided to relay it via Kitakami. • Saito and Kirigoshi were designated as the delivery staff.
05:15	• Saito and Kirigoshi left to go to the Miyagi Blood Center.
07:30	<ul style="list-style-type: none"> • Holding of the third disaster counter-measures office meeting (Attendees: Sasaki, Abe, Tamura, Kamata, Ito, Wakabayashi, Terada, Takahashi) <ol style="list-style-type: none"> ① Replenishment of gasoline for blood-delivery vehicles → To confirm gas stations that can supply gasoline ② Replenishment of heavy oil for the emergency power generator → To confirm gas stations that can supply heavy oil ③ Restoration of systems → To have contact with Akita Electrical Equipment ④ Handling of blood that can be delivered → Test samples will be delivered at 11:00. ⑤ Advertising and communication regarding suspension of blood collection and distribution of personnel (blood donation room "Rupu") *Blood donation rooms "Ion" and "Atorion" will be closed. ⑥ Next meeting → At 10:45
08:10	• Inquiry from the medical and regulatory affairs division of the prefecture to confirm the stock
08:15	• Answer (Blood type A: 152, Blood type O: 350, Blood type B: 305, Blood type AB: 112)
08:35	• Saito and Kirigoshi returned.
09:40	• Electricity restored
10:20	• Received call from the director general. He noted that he would return on the 13th
10:40	<ul style="list-style-type: none"> • Received update and instructions from the blood donation promotion division and the blood collection management division of the Blood Service Headquarters: <ol style="list-style-type: none"> ① To report the result of inspection of the functions of the blood collection equipment ② To report the results of inspection on the function of the production equipment ③ To report the schedule of restoring the rooms in Atorion and Ion ④ Do not use kits that had fallen → 1 set that had fallen
10:45	<p>Holding of the fourth disaster counter-measures office meeting (Attendees: Sasaki, Abe, Tamura, Kamata, Ito, Sasaki)</p> <p>[Actions on the 13th in association with the restoration of electricity]</p> <ol style="list-style-type: none"> ① Scheduled to operate 3 facilities (Atorion, Ion, and Bloodmobile) The bloodmobile may be suspended since it is allocated to Blaublitz (a local football team). There may be an inquiry from the Blood Service Headquarters concerning operations as on the 11th. The operation schedule should not be decided by this meeting, but we should seek the instructions from the Blood Service Headquarters; basically the plan is as follows: To prepare for the operations of the blood donation rooms "Atorion", "Ion", and "Rupu" ② Next meeting to be held regarding the instruction from the Blood Service Headquarters
11:25	• Information from the manufacturing management division of the Blood Service Headquarters that blood collection on the 13th is subject to the instructions from the Blood Service Headquarters
12:40	• Request from Mr. Hiwatashi, Secretary General of the JRC Akita Chapter, concerning the following items: There was a request from the Blood Service Headquarters to deliver emergency food from the JRC Akita Hospital to the JRC Sendai Hospital, since there was a food shortage there.

	<p>We confirmed with the Akita hospital and found that food was available to be sent to Sendai. However, we requested that the matter should be handled by the Blood Service Headquarters since we had no available method of transportation.</p>
12:45	• Upon consultation with Mr. Tamura, the director of the management division, it was decided to dispatch Mr. Hitoshi Sato, the deputy director, and Mr. Sakagami, a temporary member of staff.
14:02	• Mr. Sato and Mr. Sakagami left.
14:12	• Report from Mr. Sasaki, the director general of the Hirokoji Branch, that electricity in Atorion was not yet back on.
15:00	• Request from the chapter to change the place to deliver emergency food to the JRC Ishinomaki Hospital
15:10	• Informed Mr. Sato about the updated delivery location
15:15	<ul style="list-style-type: none"> • Received report from the medical and regulatory affairs division of the prefecture that there was an inquiry from the governor whether it was necessary to send a message to ask for blood donations • Confirmed with the Blood Service Headquarters → Not necessary to ask for blood donations since nationwide actions had been taken. (Since the Blood Service Headquarters provided the same report to the government as well, it would conflict with the report if special action is taken.) • Received instructions from the medical and regulatory affairs division of the prefecture: conduct blood collection at available facilities on the 13th
15:25	• Sent a response to the medical and regulatory affairs division of the prefecture that the announcement would not be necessary for the time being
15:30	<ul style="list-style-type: none"> • The only available facility at this moment is the blood donation room "Rupu". It was decided to conduct blood collection at Rupu • Operations involving the two other rooms (Atorion and Ion) will be decided at 8:00 on the 13th. • Reported the above content to the director generals of the branches
15:45	<ul style="list-style-type: none"> • Call from the director general that he would come back on the afternoon of the 13th by air, and reported the situation to him • Mr. Nagai, the general affairs director would come back on the 15th.
19:20	• Mr. Hitoshi Sato, the deputy director, and Mr. Sakagami, a temporary member of staff, arrived at the JRC Ishinomaki Hospital.
March 13	
00:30	• Mr. Sato and Mr. Sakagami returned.
In the early hours	• Electricity in the Atorion building was restored
07:20	• Received a report from Mr. Sato, the director general of the Goshono Branch, that Ion would remain closed for the day, except for the food department
07:30	<ul style="list-style-type: none"> • It was decided that the Akita Blood Center and the Hirokoji Branch would be operated for the day. (Operation of bloodmobiles in Ion Akita was considered, but it was abandoned due to the difficulty of providing services.)
08:20	<ul style="list-style-type: none"> • Reported to the medical and regulatory affairs division of the prefecture about the operation system for the day • Received a report from the medical and regulatory affairs division of the prefecture that the acceptance of patients from other prefectures is under consideration, and that a demand for blood products is expected
09:30	• Received a report from the manufacturing management division of the Blood Service Headquarters that the test samples of the Akita Blood Center will be examined at the Tokyo Metropolitan Blood Center for the time being
13:15	• The director general arrived at work.
16:40	• Received a report from Mr. Hiwatashi, Secretary General of the JRC Akita Chapter, that the board of councilors meeting scheduled for the 15th would be cancelled
19:00	• Request from the Blood Service Headquarters to inquire about shortages of goods, equipment, and staff
19:50	• After confirming information with Mr. Tamura, the director of the management division, we replied to the Blood Service Headquarters that there were no particular items in shortage
March 14	
08:30	• Received information from Mr. Sato, the director general of the Goshono Branch: the blood donation room "Ion" would remain closed for the day (except for the food department), only 10% of electricity necessary for Ion is currently supplied, and no further information on restoration of full power is available.
09:30	• Reception with a medical association (Yuzawa Medical Association) scheduled during the day is cancelled
11:40	• Temporary bloodmobile allocation on the 15th: Agora square
11:45	• Reception with a medical association (Kazuno City Medical Association) scheduled for the 17th is also cancelled
March 16	
	• Platelet collection suspended (per instructions from the blood service headquarters)
March 19	
08:30	• Mr. Sasaki, the senior director of the administrative department, was dispatched to the JRC Ishinomaki Hospital for delivery of relief goods.
March 20	
08:10	• Mr. Miura, the deputy director of the finance division, was dispatched to Rikuzen-takata as a liaison and coordination officer for the Akita relief team (until March 22).

March 22	
20:00	• Mr. Miura, the deputy director of the finance division, returned.
March 24	
08:30	• Mr. Kunii, the deputy director of the public relations division, was dispatched to Rikuzen-takata as the replacement liaison and coordination officer for the Akita relief team (until March 26).
March 25	
08:00	• Relief goods (50 boxes of gas canisters and 4 gasoline cans) for the Miyagi Center were delivered by Mr. Sasaki, the senior director of the administrative department, to Ogatsu roadside station, and were taken over by Mr. Ogawa, the director of the Yamagata Blood Center (goods from the Ehime Blood Center to Akita Airport).
March 26	
19:00	• Mr. Kunii, the deputy director of the public relations division, returned.
March 30	
08:30	• Mr. Wakabayashi, the deputy director of the general affairs division, was dispatched to Rikuzen-takata to take over as liaison and coordination member of staff of the Akita relief team (until April 1).
April 1	
08:30	• Ito was dispatched to Rikuzen-takata as the next liaison and coordination member of staff of the Akita relief team (until April 3).
17:30	• Mr. Wakabayashi, the deputy director of the medical affairs division, returned.
April 3	
17:00	• Ito returned.
April 7	
23:32	<ul style="list-style-type: none"> • Occurrence of an earthquake off the coast of Miyagi with a magnitude of 7.4, a maximum intensity of 6 Upper (Northern and central Miyagi) <li style="padding-left: 20px;">Akita: Intensity 5 Upper (Akita City, Yokote City, and Daisen City) • Power outage immediately after the quake • Staff gathered
April 8	
00:15	• Private emergency power generator activated
01:40	• Gathered staff dispersed
07:30	<ul style="list-style-type: none"> • Discussion about the operations on this day <li style="padding-left: 20px;">① Blood collection by 3 bloodmobiles would be cancelled (Ikawa-machi, Daisen City, and Akita City). <li style="padding-left: 20px;">② Blood donation park Rupu and Atorion blood donation room would be operated upon restoration of electricity.
11:00	• Electricity of the Atorion Blood Donation Room restored
12:10	• Electricity of the blood center restored
14:00	• Blood collection at the Atorion Blood Donation Room started
15:00	• Blood collection at the blood donation park Rupu started
April 18	
	• Platelet collection resumed
April 19	
08:30	• Mr. T. Saito, the second deputy director of the supply division, was dispatched to Rikuzen-takata as the secretary of the Akita relief team (until April 21).
April 21	
17:00	• Mr. T. Saito, the second deputy director of the supply division, returned.
April 23	
08:30	• Mr. Takehana, the deputy director of the registration division, was dispatched to Rikuzen-takata as a secretary of the Akita relief team (until April 25).
April 25	
17:00	• Mr. Takehana, the deputy director of the registration division, returned.

April 27	
08:30	• Mr. Kato, the second deputy director of the management division, was dispatched to Rikuzen-takata as a secretary of the Akita relief team (until April 29).
April 29	
17:00	• Mr. Kato, the second deputy director of the management division, returned.
July 8	
08:30	• Mr. Kikuchi was dispatched to Rikuzen-takata as a secretary of the Akita relief team (until July 10).
July 10	
17:00	• Mr. Kikuchi returned.
July 12	
08:30	• Mr. Takahashi, the first deputy director of the management division, was dispatched to Rikuzen-takata as a secretary of the Akita relief team (until July 14).
July 14	
17:00	• Mr. Takahashi, the first deputy director of the management division, returned.



Departing ceremony of the medical relief team of the JRC Akita Chapter



The JRC Akita Chapter established an aid station in Daichi Junior High School in Rikuzentakata City, which was the largest evacuation center in the city, and started medical examinations. At the evacuation center, there were 1,250 evacuees waiting for medical care. Sometimes the number of patients exceeded 300 per day.

Yamagata Prefecture: Response to the Great East Japan Earthquake

Yoshifusa Kuroki, Senior Director, Yamagata Blood Center

I. Introduction

The intensity of the Great East Japan Earthquake that occurred at 2:46 p.m. on March 11 was 5 Upper at a maximum in Yamagata Prefecture, though there were differences depending on the distance from the epicenter and the condition of the ground. Despite the location next to Miyagi and Fukushima prefectures, which had significant damage, there were only 2 deaths and 18 injured (heavy/light), and 21 houses were partially damaged (no full/half damage) in Yamagata. Regarding infrastructure, electricity was cut widely in the inland area, but it was restored by the evening of the following day, and there was no damage to water and gas services. Compared to the enormous damage caused by the huge tsunami on the Pacific coast, the damage in Yamagata was extremely small.

Our building is located in the eastern part of Yamagata City, and it takes about 15 minutes by car to Miyagi Prefecture. The intensity of the main quake was 4, but it continued for a long time and the shaking was unusual, as it began to subside but then increased again. The Yamagata Prefectural Red Cross Center, a three-story building built 33 years ago, containing the JRC Yamagata Chapter and our blood center, lost power immediately after the quake. Luckily no goods fell, and the private emergency power generator correctly activated, we still

felt generally anxious. Electricity supplied from the private power generator was not connected to the unified system (the unified database system of the Blood Service Headquarters), and we were facing significant adversity without light or heat.

A few hours after the quake, the surrounding area was steeped in darkness after sunset. It was also snowing, which was unusual in this season. I remember that I was confused, as if I was in a bad dream; meanwhile I only heard the unceasing sirens of emergency vehicles heading to the disaster area.

Since our country is one of those that has a lot of earthquakes, we cannot escape them as long as we live here. Faced with the greatest earthquake on record, many issues were discovered. Of course, the next possible disaster may be different, but it is necessary to learn lessons from each disaster in preparation for the future, as it is said, “Be prepared and have no regrets”.

The following report is based on our fading memories and anecdotal reports from those involved, with a desire to leave as detailed and accurate a recollection as possible. It owes much to the dedication of the staff of the blood service headquarters and the blood centers.

II. Operations on the day of the quake (March 11)

1. Acceptance of donors

On that day, blood collection was conducted in a blood donation room (Yamagata City) and in a bloodmobile at a company location (Higashine City: An electrical equipment manufacturer). Fortunately, there was no damage or trouble at either of these 2 blood donation sites, but blood collection was immediately cancelled for the day, at the field managers’ discretion.

The blood donation room lost electrical power simultaneously with the strong quake, about an hour after starting afternoon acceptance. There were 6 donors in the donation room and 3 of them were in the process of donating (Apheresis: 1, Whole blood collection: 2). Since there was no private emergency power generator in the room and only enough backup batteries to work for several minutes, treatment for the final retransfusion was abandoned and the needle and small tubes were removed immediately. Since the blood collection bag could not be sealed without electric power and the kit could not be removed, we ended the operation. At a later date, the necessity of a rechargeable sealer was pointed out.

Meanwhile, the bloodmobile was at a site in the afternoon to provide blood collection services. At the time of the quake, blood collection

had been completed for 15 people and another 3 donors were accepted. There were no donors in the process of donating. Access to the JRC facility immediately restricted after the suspension of blood collection services, and the bus returned to the blood center through the traffic jams caused by malfunctioning traffic signals.

2. Delivery of whole blood

Since we consolidated blood testing and production in April 2006 and April 2008 to the Miyagi Blood Center (now referred to as the Miyagi Blood Center), whole blood has been delivered to the Miyagi Blood Center, which is 72 km from our blood center (taking 70 minutes by road), three times a day.

The first issue we faced after the quake was how to deliver the collected blood. Though we had information of closure of the expressway, we did not have information that the Miyagi Blood Center was damaged significantly at that time. However, when confirming the procedures for the collected blood by the disaster priority phone, we came to understand the serious damage at the Miyagi Blood Center for the first time.

After being instructed by the Miyagi Blood Center as to how to deliver blood, two delivery employees left at the routine time of 4:30 p.m. They reached the Miyagi Blood Center at around 8:00 p.m. by using general roads, and avoiding traffic jams in the central part of Sendai. After loading the reserved blood products, they returned back to our blood center at around 11:00 p.m., about four hours later than usual, for part of the journey they traveled north, taking a detour to avoid traffic jams.

According to the report on a

later date, the Miyagi Blood Center continued production of the blood until midnight, in the face of continuous aftershocks. The blood was delivered to another central blood center the following day for testing, due to the malfunction of equipment at Miyagi Blood Center.

3. Distribution to medical institutions

At the time of the quake, there were no major problems, since regular delivery to the medical institutions scheduled on that day had been completed. Delivery of the washed blood reserved by university hospitals was completed around 11:00 p.m., about 4 hours later than usual, as it could be taken from the Miyagi Blood Center on the way back from the delivery of whole blood to our center.

4. Safety confirmation of employees

The first instruction from the Blood Service Headquarters was to report the status of damage and to confirm the safety of employees. The status of damage is described above. However, it took a long time to confirm the safety of some employees who were off duty on that day. We had to visit the homes of the employees, because of the poor communication system. A local TV station provided details of the damage in the prefecture. Though the pictures were not transmitted clearly (likely due to damage from the quake), the information and images alleviated some of our worries about the safety of our employees.

III. Operation on the days following the quake

For our blood center, which has no production function, the pre-requirement for “Full Restoration” was resuming blood examination and production at the Miyagi Blood Center, the main center. We had to prepare for an irregular work system since emergency responses were necessary until the day of resumption.

We reviewed the work system and blood donation plan at that time, based on the vague idea that conditions would be nearly back to normal if we got through the following two weeks. However, things were worse than we had imagined, and it took about a month until restoration.

1. Acceptance of blood donations

The day following the quake (12th) was Saturday. On that day, an event “Love in Action in Yamagata” was scheduled, and blood donation rooms and temporary blood donation sites using two bloodmobiles were scheduled at two shopping centers. Though electricity around the center was restored at around 8:00 a.m. and there was no anxiety about providing services, we started to announce the cancellation of blood collection on the day as instructed by the Blood Service Headquarters. Thanks to the cooperation of an FM radio station, there were no complaints.

The problem was the acceptance of blood donations after the 13th. Yamagata is in the Tohoku region, but the situation was different for the three prefectures that had tsunami damage, and directly suffered the nuclear accident. Immediately after the quake, we wanted to do

everything we could and wondered if there was anything that we could do for neighboring prefectures, since we are located next to the significantly affected areas. As if in answer to our thoughts, we had many calls from citizens in the prefecture, asking “Where can we make a blood donation?” etc., and accepted an offer of blood donations from a city council member groups. There were also inquiries about blood donation from media organizations.

In these circumstances, we judged that much more effort would be needed to explain to those who desired to make a blood donation the reasons for the cancellation of blood donations in the prefecture. Further, because of the extent of the damage at the Miyagi Blood Center, there was not a scheduled date when operations would be resumed. Therefore, we indicated to the Blood Service Headquarters our intention to resume blood donations after the 13th. As a condition, it was decided that all blood donations conducted at companies would be cancelled if an explanation of the situation helped them understand. Furthermore, the rapid increase in donors forced temporary sites to shorten the time for finishing each blood donation,

and the number of walk-in donations were much higher than normal while the scheduled appointments were about half of the normal average.

It was later found that the companies were just as confused as our staff was. Oddly enough, this was not the kind of situation in which we needed to request blood donations.

On the first day after resuming collection with bloodmobiles, more than 130 donors gathered despite the queuing and change of the blood donation site. We ran out of blood collection bags, but we replenished them and continued blood collection until around 7:00 p.m. We had our doubts about the resumption of blood collection, since the delivery location of whole blood was changed to the Niigata Blood Center. It took three times longer than usual to deliver, and there were difficulties due to shortage of fuel for more than two weeks following the earthquake. We initially had no option but to suspend blood collection services, despite sustaining no damage to our blood center, and we were satisfied that consideration was made which allowed us to have continued blood collection.

It is notable that there were more than twice the number of whole

blood donors at blood donation rooms in March and April compared with the previous year. Moreover, as a result of comparison for 20 days before and after the quake, the number of donors accepted at blood donation rooms for the first time after the quake was 4.5 times (101 to 454) more, than that before the quake. The quake had clearly generated a lot of interest in blood donation. The table below is a comparison between planned and actual results for blood donations from March 13, the date of resumption of the acceptance of blood donation, until the end of March.

Due to a rush of donors from around the country, an “Announcement of blood donation” was issued by the Blood Service Headquarters on March 13 to call for continuous blood donation. Moreover, as the local media reported on the rapid increase in donors, congestion seemed to be reduced. We reaffirmed that media showed sensitivity to matters directly relating to human life such as blood donation at the time of a disaster, and took positive and prompt actions.

Acceptance of blood donation (comparison between plans and results)

Unit: people

	Period	Plan		Results	
		Number of bloodmobiles and rooms/day	Number of donors scheduled	Number of bloodmobiles and rooms/day	Number of donors scheduled
Collection with bloodmobiles	3/13 ~ 3/31	35	1,610	19	1,099
Blood donation room		19	674	19	1,106
	Total	54	2,284	38	2,205

2. Delivery of whole blood

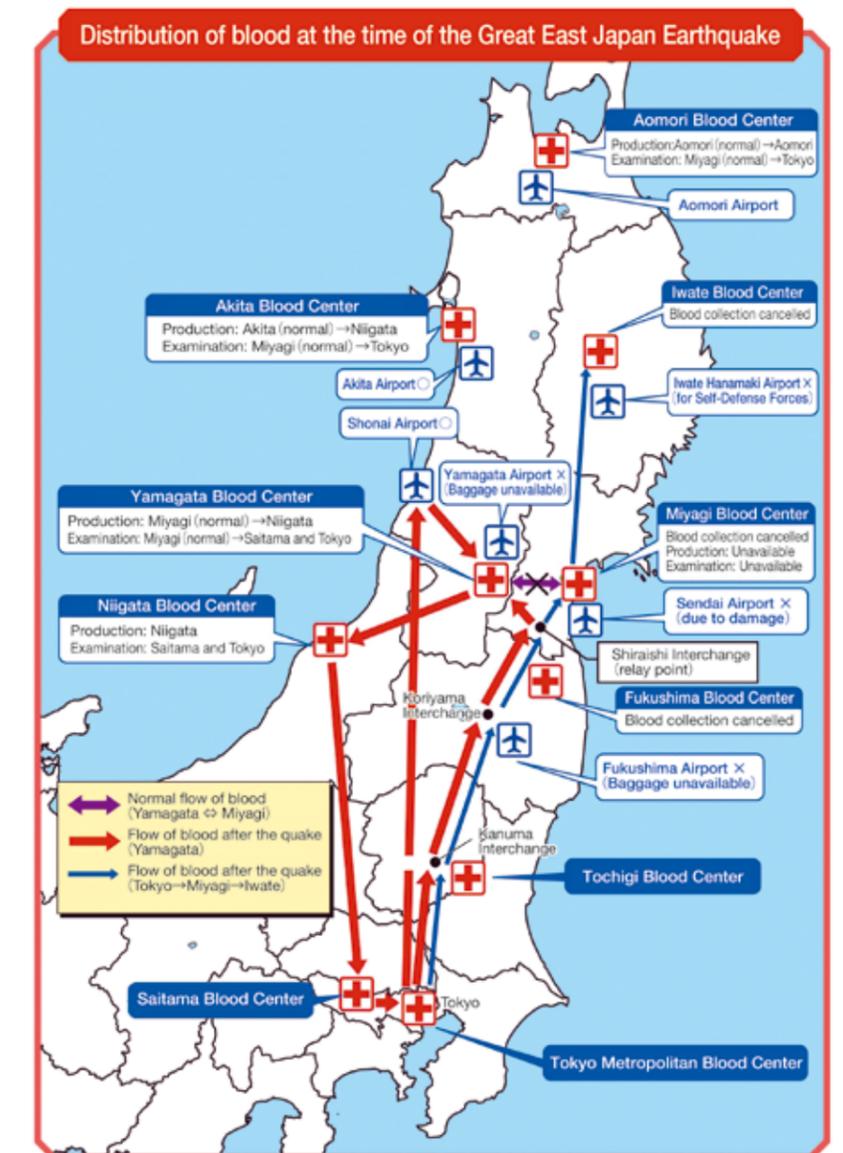
Upon determination of acceptance of donors, we had to secure a place to deliver the collected blood (= producer). Apart from Miyagi Prefecture, Yamagata Prefecture also has access to Fukushima Prefecture in the south (about 100 km one way), Akita in the north (200 km), and Niigata Prefecture in the west (180 km) by land, and to Tokyo and Osaka by air from Yamagata Airport and Shonai Airport. However, Yamagata Airport had not handled baggage before the disaster due to downsizing of equipment, and Shonai Airport had restricted the number of flights, and is located far from our blood center (120 km).

For blood examination operations, we considered that it would be best to ask for the cooperation of the Niigata Blood Center, which handles a large scale of blood donation and has better access to the Tokyo metropolitan area. After consulting with the Miyagi Blood Center, coordinating with the Tokyo Metropolitan Blood Center (Core Blood Center) the implementation was managed by the Blood Service Headquarters. Production operations were confirmed, and test samples were delivered to the Niigata Blood Center, by forwarding the deliveries through the Tokyo Metropolitan Blood Center and the Saitama Blood Center. We realized that this was a true nationwide network among the blood centers. Though the amount of staffing challenges were few, the blood centers also co-operated concerning possible difficulties due to the change in work shifts.

We ordinarily deliver whole blood to the Miyagi Blood Center once in the morning and twice in the afternoon. However, it took more than three hours to get to the Niigata Blood Center, even though we used

expressways in Niigata, because we had to go through an area with one of the heaviest snowfalls in Niigata prefecture. Therefore, it was decided to deliver whole blood twice a day, at 3:00 p.m. and 6:00 p.m. Two employees were in charge of the first delivery, given that blood products were also being brought back on the return journey, and a transport operator was used for the second delivery as the return to the blood center would be late at night. Delivery of collected whole

blood was started on the 13th, two days after the quake. Because of the cancellation of blood donation, employees in the blood donation promotion division who worked at the office were in charge of the delivery on the first day. Thanks to arrangements by the Blood Service Headquarters and the Miyagi Blood Center, the Aichi Central Blood Center dispatched support staff, and we requested their services for most of the deliveries. We will describe this in more detail below.



Material provided by Yamagata Shimbun

Delivery to the Niigata Blood Center continued for about one month, until April 12, when the blood examination and production functions of the Miyagi Blood Center recovered. After changing to wide-area management system, alternative blood examination and production facilities had to be prepared in case of malfunction of the regional blood centers or large-scale prohibition of traffic.

3. Acceptance of blood products

Blood products used in the prefecture were usually delivered from the Miyagi Blood Center twice a day, at 12:30p.m. and at 7:00 p.m. However, this changed drastically starting the day after the quake. It was decided that part of the plasma products and red blood cell products would be delivered from the Miyagi Blood Center as usual, but platelet products had to be delivered by air by the last flight arriving at Shonai Airport at 9:15 p.m. from the Tokyo Metropolitan Blood Center. The expressway can usually be used to

get to the Shonai Airport, except for mountainous areas. At that time, however, the end of the expressway could not be used due to closure by an avalanche, so general roads had to be used. Moreover, roads in the mountainous areas were closed from 9:00 p.m. until the next morning. Therefore, it took about six hours in total for each delivery, about 2 hours to get to the airport and more than 3 hours from the airport to the blood center by another route. During this period, staff in the branch office sometimes supported the delivery at the relaying points due to a delay in the arrival times and snow due to a cold wave.

Fortunately, the Tohoku Expressway recovered earlier than expected, and the transportation method changed from air to land transport. This enabled us to accept blood products, which were delivered from the Tokyo Metropolitan Blood Center through the Tochigi Blood Center and the Fukushima Blood Center, taking about 50 minutes from the blood center. The arrival time was not always punctual, but

the acceptance of products was completed around 9:00 p.m., which considerably reduced the burden on the staff.

4. Distribution to medical institutions

There was no damage to the distribution network of blood products. Although there were traffic jams in some areas on the 12th due to malfunction of signals as a result of the electrical outage, the products could be delivered to medical institutions as usual. However, since the situation at our blood center was not announced to the medical institutions, many medical institutions called us for confirmation. We informed them that there were no problems with the delivery of stock products, washed blood could be produced at the Miyagi Blood Center, and it might take more time to deliver products including reserved products (platelet products). We then sent a notification again, but we reviewed the situation that it was necessary to take measures to eliminate worries

Distribution of blood products (comparison between the year of the quake and the previous year)

Unit: units (conversion to 200 mL)

	March		April		May		Total during the period (March to May)	
	Previous year of the quake	Year of the quake	Previous year of the quake	Year of the quake	Previous year of the quake	Year of the quake	Previous year of the quake	Year of the quake
Red blood cells	4,964	4,697	4,500	4,823	4,574	4,718	14,038	14,238
Plasma	1,932.5	1,804.5	1,278	1,773.5	1,291.5	1,607	4,502	5,185
Platelets	4,870	4,745	4,375	5,010	4,220	4,190	13,465	13,945
Total	11,766.5	11,246.5	10,153	11,606.5	10,085.5	10,515	32,005	33,368
Ratio		95.6		114.3		104.3		104.3

as soon as possible after a quake.

Since the distribution route of products was disconnected after the quake, products were supplied from the blood centers of other regions for more than one month. However, there were no specific complaints from medical institutions in the prefecture during this time. This showed that the nationwide network of blood services functioned properly. It might be expected that the demand for blood would suddenly increase at the time of a large-scale disaster in the neighboring prefectures, but in fact, there was no substantial change. This was because there was information from medical institutions that there was a shortage of medicinal agents and equipment necessary for surgery, due to the series of distribution problems, and this restriction reduced the number of hospitalized patients and operations.

The table of “Distribution of blood products” is a comparison of the amount of blood distributed the year of the quake against the previous year. The amount of blood distributed decreased to less than 70% the week following the quake, compared to that of the previous year. However, it rapidly recovered from the end of the month, after remaining slightly declined during March. It can be considered that rapid growth in April was because of the resumption of surgery for patients, that had been restricted by the medical institutions.

IV. Support and collaboration of the organizations of the Japanese Red Cross Society

1. Support by other regional blood centers

Though the planned collections with bloodmobiles were reduced by half, shortage of staff and vehicles was a concern. We had to deliver whole blood to the Niigata Blood Center, accept blood products at Shonai Airport, provide full cooperation for the JRC Yamagata Chapter, and conduct temporary operations. We also had to enter the data of applications for blood donation again, which had been operated as a trial at the Miyagi Blood Center just before the quake.

We felt anxious about these matters, so we requested an assessment of the staff and equipment shortages, and submitted details through the Miyagi Blood Center. Based on the material we submitted, it was promptly decided that each blood center under the jurisdiction of the Aichi Blood Center, the central blood center, would dispatch two employees from March 18 (one week after the quake) through March 22. We received support of 7 teams, a total of 14 employees from 8 blood centers (Toyama, Ishikawa, Fukui, Nagano, Gifu, Shizuoka, Numazu, and Hamamatsu), and a vehicle to deliver whole blood to the Niigata Blood Center, with 42 employees/day and 360 km round trip until April 15 when the function of the Miyagi Blood Center recovered. They worked irregular hours, from 2:30 p.m. to around 11:00 p.m. They delivered dry ice for keeping products cool, gasoline, which could not be obtained in Yamagata City, and returned with blood products

including matched platelets.

The whole blood delivered from our blood center arrived at the Niigata Blood Center at around 7:00 p.m. and around 11:00 p.m., which caused the staff involved great anxiety. Especially in the blood production section, since work hours were temporarily drastically different from ordinary times. Employees at the blood centers under the jurisdiction of the Okayama Blood Center, the central blood center, were dispatched to support it along with our center from March 18 to April 14.

Other than the above, gas canisters and portable gasoline cans themselves, which were out of stock in eastern Japan, were delivered from the Ehime Blood Center to the Miyagi Blood Center.

In this way, we were able to get over the difficulties with the cooperation of various blood centers. We consider that employees of our blood center understood the involvement of the nationwide network of blood services and derived a sense of fulfillment from achieving tasks even in this difficult situation.

2. Collaboration with the JRC Yamagata Chapter

The organization of the Japanese Red Cross Society in our prefecture is quite small, it only consists of the JRC Yamagata Chapter and the blood center, with about 70 employees in total. Therefore, with the improvement of the Yamagata Prefectural Red Cross Center in 1979, we have moved within the same building and have had close relationships with each other, not only personnel exchanges but also business exchanges. Based on this relationship, we had promised to extend every possible cooperation for relief activities to the JRC Yamagata

Chapter in case of an emergency, so all of our employees were provided relief clothing.

As our prefecture is closest to the significantly affected area, the relief goods distribution center of the JRC headquarters was established in Yamagata City immediately after the quake, and a lot of relief goods were delivered every day. As a matter of course, the JRC Yamagata Chapter had to conduct operations such as acceptance of relief goods, delivery and distribution of goods to the disaster areas, organizing and dispatch of relief teams, support to relief teams of other prefectural branches passing through our prefecture, preparation of meals by volunteer groups, and acceptance of donations. However, since these operations could not be handled by only a dozen employees of the JRC Yamagata Chapter, our blood center provided as much manpower as possible, starting the day after the quake.

All employees dealt with the receiving the myriad of delivery trucks from local companies and from overseas which contained blankets and food, and loading the relief goods bound for the affected areas. Employees were assigned to tasks systematically, including nurses who were working in the administrative office for the first time (since Bloodmobile operations were suspended). These assigned tasks included the delivery of goods to affected areas, preparation of meals, support for relief teams, and acceptance of donations in collaboration with the employees of the JRC Yamagata Chapter.

V. Other issues from the quake

1. Electric outage

The electrical outage from the quake lasted about 18 hours at our blood center. Though the private emergency power generator was old, it could function at the time of the electrical outage for three days, and fortunately the oil tank was filled up. However, the private emergency power generator was connected only to the product storage in the distribution room and was not connected to the administrative room or the server room. Therefore, the Unified System (Blood Service Information System), intranet, fax machines, and TV could not be used. We hastily secured the power for TV and computers by extending the cord that was connected to the emergency power source to the administrative office on the second floor. Since the electrical outage occurred in the daytime, it took a relatively short time to draw the power source by using the cable reel. However, it was a big issue in terms of risk management. In particular, it was regretted that the quake occurred just after the need for improvement of the emergency power source had been pointed out, and construction was being planned for later in the year.

Electrical construction to connect the private emergency power generator has already been completed, but measures such as a simple indication or drawing of the location of the emergency power source, etc are still required.

2. Communication failure

The situation of telephone communication after the disaster was reported on news. It could be confirmed that mobile phones with a contract for disaster priority

phone were the most effective communication method, but we felt the necessity to prepare cellular phones of various carriers since the number of phones that were able to have such a contract was limited. There was also a problem that the disaster priority phones could not be used in Miyagi, although they could be used in Yamagata.

Other than the above, we felt that it was important to confirm the status of communication continuously by trying to use various communication methods (fixed phone, public phone, cellular phone, PHS, and TV conference system, etc.) at the time of emergency.

Recently in our prefecture, the introduction of satellite phones has been considered in major hospitals. Based on the expected communication failure, our blood center also needs to have multiple methods to have guaranteed contact with medical institutions and the central blood centers, such as the introduction of satellite phones and the use of existing radio communications for disaster prevention and administration. It may be considered that measures can be taken not only by our blood center but also in collaboration with the government.

Based on the data for four days after the quake, the number of hits to our center's website increased sevenfold. This indicates the effectiveness of the website for information transmission in case of a disaster. However, there were complaints from donors since the announcement on the website regarding the shortening of hours for the acceptance of blood donations was inadequate. Precise management is necessary for information transmitted on

the website. We considered that a contact person should be designated.

3. Shortage of fuel

One of the major obstacles in this disaster was a shortage of fuels. We never thought that we would have difficulty in obtaining fuel for as long as two weeks. In the morning on the day following the quake, based on an employee's observation of gas stations in the area, vehicles in the branch that needed to be filled up with gasoline, including goods delivery trucks, headed to a gas station. Only gas stations with a private power generator were open, and emergency vehicles and vehicles for electric/gas construction of the affected areas were waiting to be refilled with gasoline. Though gasoline was supplied quite smoothly on the day following the quake, the queue became longer day by day due to restrictions on the amount to be refilled, and as a result, there was a queue of dozens of vehicles from the previous day waiting to be refueled

on the following day.

Business vehicles of the JRC Yamagata Chapter and our blood center were able to manage to refuel on a preferential basis outside of business hours at first. However, four or five days after the quake, we got boos and jeers, even though we went to the gas station designated by the contracted gas station marked with an emblem of the Red Cross, and wearing relief clothing of the Japanese Red Cross. Moreover, there was one case when a gas station worker was assaulted. Therefore, we decided we had to wait for several hours to refuel along with the citizens.

However, as a result of the delivery of whole blood to the Niigata Blood Center, we found that refueling was available at a gas station contracted by the Niigata Blood Center. After that, we decided to obtain gasoline in cash at the gas station every day on the way back from the Niigata Blood Center. Since we did not have portable gasoline cans, we borrowed

more than 20 cans from the JRC Niigata Chapter.

A lot of fuel was necessary, since our facility was a relay point of the Japanese Red Cross relief teams in other prefectures; this was in addition to our operations and relief activities of the JRC Yamagata Chapter. However, we dealt with these problems using fuel secured on the Niigata route, and from the Miyagi Blood Center.

In consideration with the situation in Niigata which has oil factories and the fact that shortage of fuel was solved about two days sooner along the coastal areas of the Sea of Japan, we felt it necessary to collect information frequently and widely in case of an emergency.

As for the future, negotiation with gas stations for priority refueling in case of a disaster, preparation of emergency materials and equipment such as portable gasoline cans, establishment of a system to pass on the materials and equipment between facilities, and stock, procurement,



Loading goods (in front of the entrance)

and transportation of the Japanese Red Cross as a whole are all measures that should be considered.

4. Vehicles

Allocation of our blood center's vehicles is based on our regular operations, but it was found that the number of vehicles was not enough, and the availability of the large-capacity vehicles that we needed for the delivery of whole blood to the Niigata Blood Center and the collection of blood products, could only be ascertained each morning. Rental cars were used at that time, but we consider that vehicles with different fuel specifications and capacities should be introduced at the time of renewal of vehicles in the future. Moreover, improvement of vehicles that can be shared within the region may be considered under the wide-area management system.

Other than the above, passes for disaster emergency vehicles were issued to all blood-delivery vehicles we owned. The passes allowed

vehicles to drive on expressways where public vehicles were not allowed. We obtained this permission at the prefectural police headquarters, which is institutionalized in case of a large-scale disaster. Since it takes only a short time to obtain permission, it is effective to specify it on the risk management manual, etc.

5. Employees

As described above, we cooperated as much as possible with the requests of the JRC Yamagata Chapter in addition to the regular operations of the blood center. Therefore, we created a work schedule for all employees, including employees at branch offices, and assigned daily work with the uniform management. This lasted until mid-April, when the operations in the Miyagi Blood Center resumed, and the dispatch of support staff was completed. Some employees had to work irregular work shifts.

Our employees must have been confused, since most of the tasks

requested by the JRC Yamagata Chapter were operations they had no experience in, such as heavy work as described above. However, we thought that we should be an organization and act decisively in this emergency. We asked five people to join us as employees in April for support work, because we considered that this would be a good experience for them. As a result, most of them that joined us have gained valuable experience.

In this situation, although only nurses with clinical experience were selected for the relief teams, we felt that nurses working in a blood center in a prefecture without the Japanese Red Cross Hospital (like our blood center) should be comfortable participating in relief activities alongside doctors, in addition to their blood collection skills. Moreover, administrative staff should be capable of operating large vehicles and forklifts, in order to perform a wide range of activities in emergency situations.



Unloading relief blankets

VI. Postscript

Reading newspaper reports about the handling of the nuclear accident, I felt that it had been impossible to achieve complete co-ordination between the nerve center that gives instructions and on-site staff attempting to fulfill those instructions, in a situation that changes rapidly.

Blood services will soon make a transition to the wide-area management system. However, whatever the system is, there will be a lot of matters that can be understood only by on-site staff, and should be judged immediately by on-site staff in case of an emergency. Most of the matters will require the judgment and actions of personnel directly facing each decision. In view of this, we must not be a local blood center that only awaits instructions, as a result of transition to the new system.

Blood services are important services that affect lives. We

consider that the blood centers must prepare for future disasters by following the many issues highlighted this time and improving their "on-site ability" with careful preparation.

For some time after the quake, a TV commercial on the activity of the Japanese Red Cross Society was frequently broadcasted, and a poster for the promotion of blood donation with AKB48 putting on relief clothing was shown. It may have been the case in past disasters as well, but at the time of the quake, the majority of citizens should have had an image that the Japanese Red Cross is an organization that takes action at a time of huge disasters, wearing relief clothing.

It is true that employees of the Japanese Red Cross Society facing the disaster at that time made efforts to take action in their formal positions as the public citizens imagined, but on the other hand, there is doubt that the organizational manpower could be fully exercised.

Though each organization is small, 60,000 employees of the Japanese Red Cross living all over the country should be able to have a big impact.

In the Act Governing the Japan Red Cross Society, the specified purpose and ideology of the Red Cross is the achievement of humanitarian missions. Operations in the case of an emergency or disaster are specified in the employment regulation of each facility. In our blood center, the number of new employees has been increasing over the past few years. They are young and pure of heart, willing to realize the missions set by the Japanese Red Cross.

In order to respond to the awareness and expectations of the public citizens and young employees, we should use all possible means to perform disaster relief preparations during normal operations, sort out each employees' individual missions, prioritize humanity and humanity's relationship with the missions.



Preparation for a meal in Sendai City

Fukushima Prefecture: Report of the Damage to the Blood Center

Takashi Ogata, Senior Director, Fukushima Blood Center

I. Outline

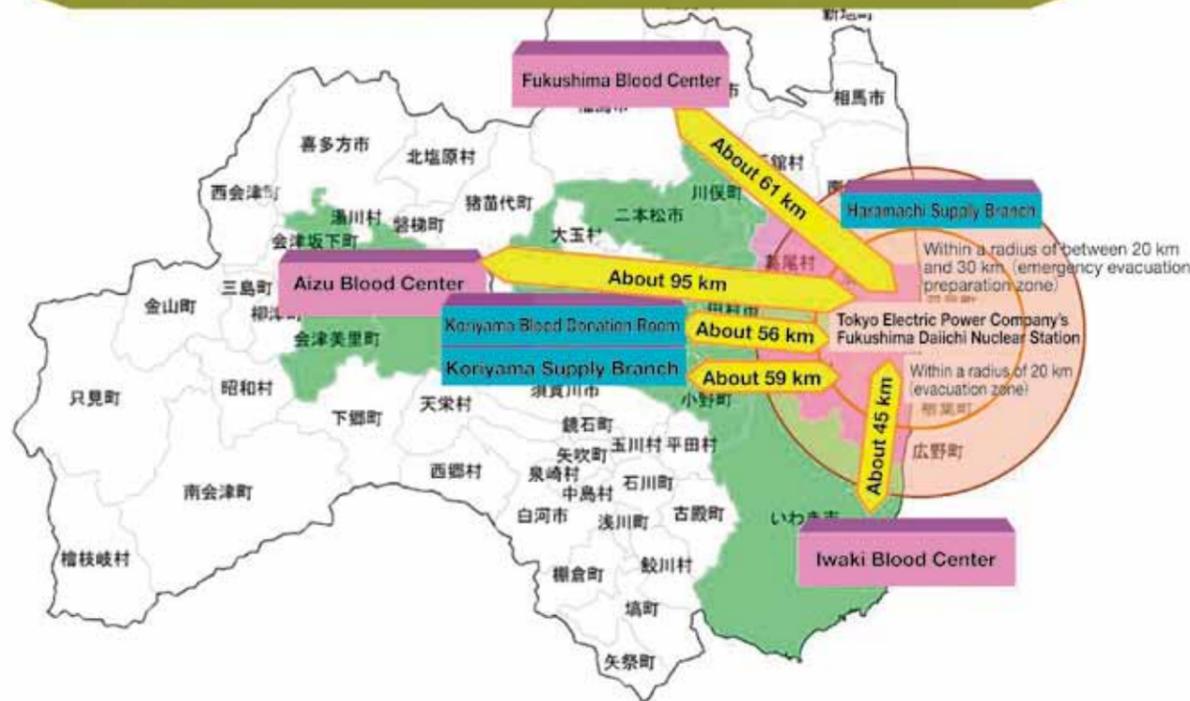
At 2:46 p.m. on March 11, 2011, the Great East Japan Earthquake occurred with its epicenter in the Pacific Ocean off the Sanriku coast. Damage associated with the quake, including the subsequent tsunami and the accident at Tokyo Electric Power

Company's Fukushima Daiichi Nuclear Station, surpassed the quake itself, and were positioned together with it as a "combined wide-scale disaster." Even now, about seven months after the quake, the situation of the nuclear accident has not yet settled, and there is an incalculable impact on the blood services in our

Fukushima prefecture.

Described in this report, are the situation at the time of the disaster, our actions, and issues to be considered in the future.

Blood centers, related facilities, and nuclear stations in the prefecture



Most blood centers and related facilities in the prefecture were near the nuclear reactor disaster site.

II. Situation immediately after the quake

1. Lifelines (electricity, natural gas, and water)

- Fukushima Blood Center
Electricity: No electric outage
Gas: No impact
Water: Water outage
→ Restored on March 18
- Aizu Blood Center
No impact on lifelines
- Iwaki Center
Electricity: No electric outage
Gas: No impact
Water: Water outage
→ Restored on April 14
- Koriyama Station Branch (Koriyama Blood Donation Room)
Services suspended due to prohibition of entering the station yard, a facility they rented (Resumed on May 9)
- Koriyama Supply Branch
Electricity: No electric outage
Gas: No impact
Water: Water outage
→ Restored on March 15
The building cracked (relocated on March 5)

III. Actions for the restoration of services

An "emergency response headquarters" was immediately established at this blood center to collect information and confirm the safety of the employees. The security of all the employees was confirmed on March 13.

1. Distribution

As for actions concerning the nuclear accident, it was decided to close the Haranomachi Supply Station on March 12 on instruction from the Blood Service

Headquarters, and all reserve products were transferred to the Fukushima Blood Center. After that, we tried to assure smooth distribution of blood for blood transfusion by having a blood-delivery vehicle with emergency blood ready in the parking lot of Soma General Hospital. As part of those actions, we also transferred fresh frozen plasma that had been preserved at the Iwaki Blood Office to the Fukushima Blood Center (for products) and the Kyushu Blood Center (for storage) on March 18. Other distribution stations were able to maintain their original distribution system because there was no impact such as adverse road conditions on their normal distribution functions. To secure stock blood, there was no impact on the distribution (no product shortage, etc.) thanks to the support of blood centers across the nation under the emergency wide-area supply and demand management system that had simultaneously been implemented.

2. Production and quality control

Separation and preparation of blood collected on March 11 was completed throughout March 11 and 12. Due to the damage at the Miyagi Blood Center, instructions were given from the Manufacturing Management Division of the Blood Service Headquarters, to send test samples to the Osaka Blood Center. Regular operations were resumed at the Miyagi Blood Center on April 18, when the function of the facilities had been restored.

3. Blood collection and promotion

After assessing the condition of utility lifelines at each facility, the safety inspection of equipment, and the impact of aftershocks, it was

decided to resume blood collection at fixed facilities sequentially after April 18 (Aizu Center: from April 25, Iwaki Blood Office: from April 26, Koriyama Donation Room: from May 9) and by collection with bloodmobiles from May 1.

4. Safety measure for employees

Nobody predicted that such a radiation accident would occur. Geiger counters were provided by the Blood Service Headquarters, though we did not necessarily use them because the radioactive level is not so high outside the evacuation area. At first, pocket dosimeters were provided by the JRC Fukushima Chapter, which were used on-site at base from March 14th, 2011, then later, electronic film badges to monitor the individual cumulative dose of radiation were provided, which enabled us to check dosage every two weeks.

Protective clothing was not used because the radioactive level is not so high outside the evacuation area.

Some of our staff faced a situation of needing to assess radioactive material before full information was received, partly because neither the national nor the prefectural government published SPEEDI (System for Prediction of Environmental Emergency Dose Information) data (the reference was transported from those obtained at round table discussion).

IV. Issues and measures

1. Electricity (private emergency power generator)

Consideration should be given to changing the fuel of private emergency power generators at the facilities in terms of risk reduction when comparing various

fuels (light oil, heating oil, and gasoline, depending on the facility) to light oil that can be shared with bloodmobiles.

2. Water

Consideration should be given to using wastewater, such as rainwater, etc., efficiently, because water outage commonly occurs in the case of a wide-scale disaster like this.

3. Fuel for vehicles

Consideration should be given to arranging for preferential fuel supply for emergency vehicles at gas stations.

4. Communication

Consideration should be given to introducing satellite phones (however, satellite phones did not work at the time of this disaster.)

5. Expressways

Consideration should be given to blood delivery methods (use of helicopters, etc.)

6. Public highways

Consideration should be given to using alternative roads (back roads etc.) and motorbikes for delivery. In Fukushima, the evacuation zone, the planned evacuation zone, and the emergency evacuation preparation zone were designated due to the accident at Tokyo Electric Power Company's Fukushima Daiichi Nuclear Station. The emergency evacuation preparation zone was abolished on September 30, 2011, but other zones remained designated.

7. Demand for blood for blood transfusion

There is an issue with the decrease in the number of medical staff, including doctors and nurses, due to closure or a drastic reduction

Status of Fukushima nuclear emergency response center (OFC)

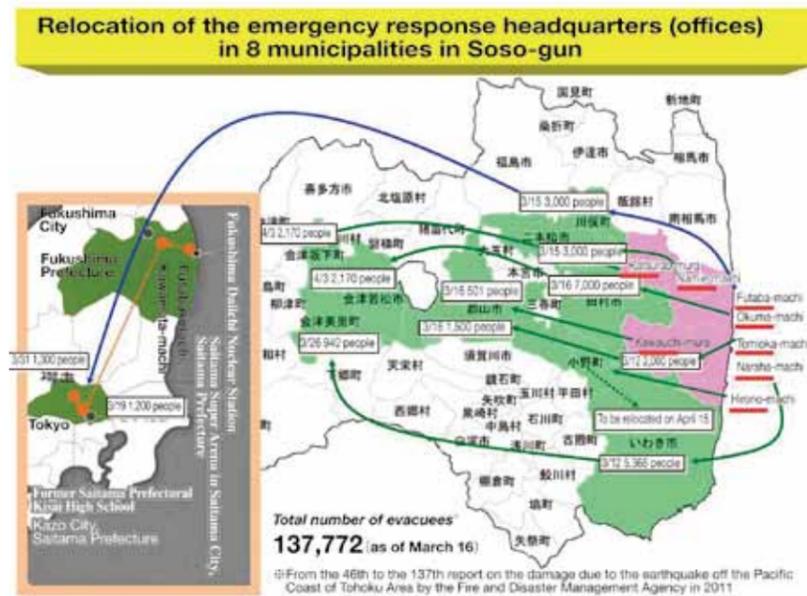
Located 5 km from the Fukushima Daiichi Nuclear Station

Friday, March 11 The earthquake off the Pacific Coast of Tohoku Area occurred at 14:46. External power supply stopped. The power generator was activated but stopped within an hour.

Saturday, March 12 Power supply was restored around 3:00

Tuesday, March 15 to Wednesday, March 16 The Nuclear Agency decided to relocate the on-site countermeasures office to Fukushima City, about 60 km from the original location, due to an increase in the amount of radiation caused by a series of hydrogen explosions from the 12th to the 15th.

The nuclear emergency center did not work.



Due to the quake, many municipal offices were forced to relocate to other areas.

of medical institutions in the prefecture. The current situation is still serious and it is not expected that the demand for blood will be restored.

8. Securing donors

There is an issue with a future long-term decrease in the number of donors due to the following reasons, arising from the quake:

- There are still many people

who have lost their local infrastructure and who have evacuated outside the prefecture. The administrative functions of 9 municipalities in Hamadori have also been forced to relocate.

- Blood donation cooperation from nuclear station-related workers, that provided substantial donation amounts in the past (2,263 units from 1,222 people

in FY 2010), has become unavailable.

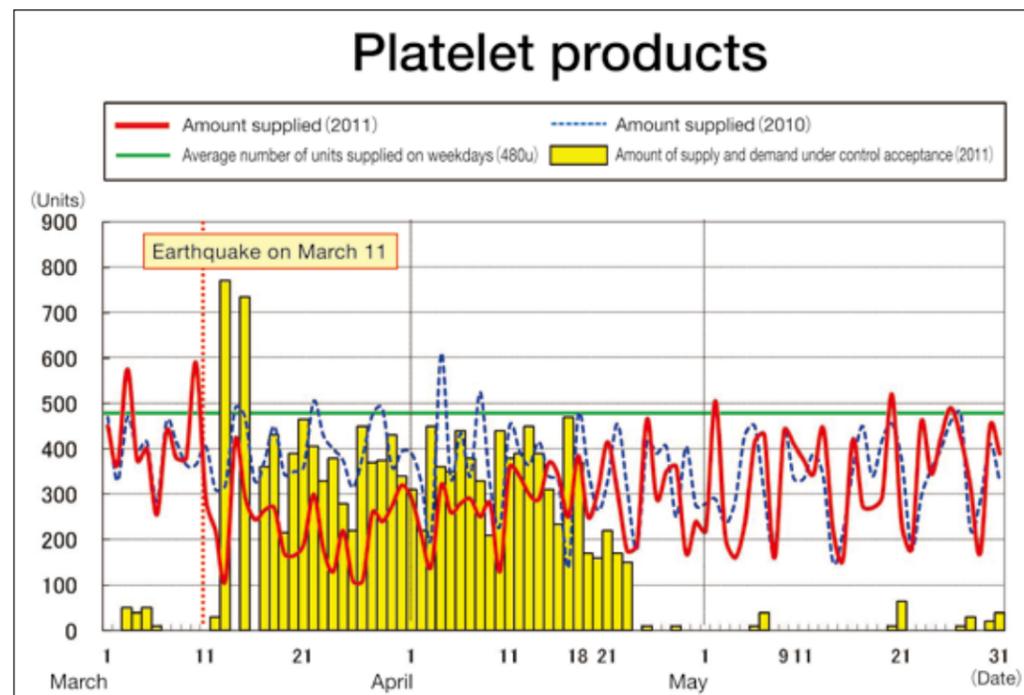
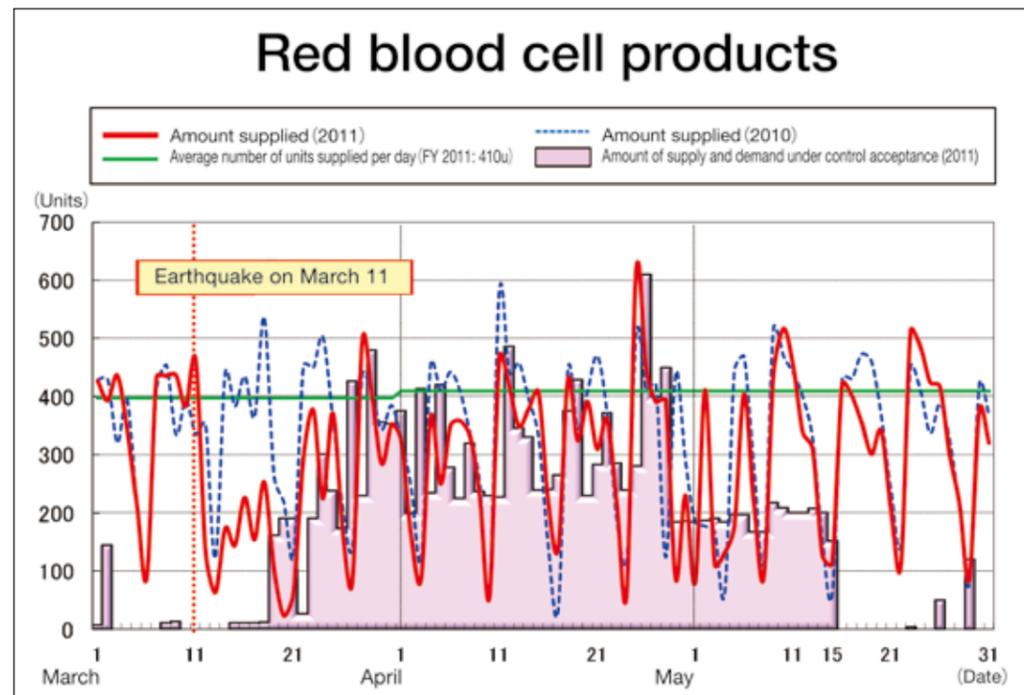
9. Safety measures for employees

There is an issue about safety measures for employees depending on the region, such as wearing a dosimeter (also as to whether quality management measures for products are necessary or not).



Fukushima Nuclear Power Station (Photo: Kyodo News)

Status of supply and acceptance at the Fukushima Blood Center



Blood donation was suspended from the day following the quake. However, it was resumed on April 18 at the Fukushima Blood Center and on May 1 by bloodmobiles, and was sequentially resumed in the other affiliated blood centers and blood donation rooms. Due to this resumption of operations, the number of red blood cell products accepted from other centers decreased from May 15, and platelet products decreased from April 24.

Additional material

Hyogo Prefecture: Report on the Damage Conditions of the Great Hanshin-Awaji Earthquake

Yoshihiro Osaka, Senior Director, Hyogo Blood Center

On January 17, 1995, the largest-scale earthquake with a vertical shock, occurred in the southern part of Hyogo, which has been named the Great Hanshin-Awaji Earthquake.

Our blood center had damage involving employees, facilities, equipment, vehicles, and blood, and we had to conduct operations under those damaged conditions. We report the situation at that time as follows:

I. Scale and characteristic of the quake

On Tuesday, January 17, 1995 at 5:46 a.m., an earthquake with a magnitude of 7.3 hit the Kansai-Awaji area. The epicenter was located in the northern part of Awaji Island in Hyogo.

The characteristic of the quake was an inland earthquake directly beneath the urban area.

The seismic intensity of the quake was 7, a severe earthquake, affecting Osaka and Kobe, and part of Awaji Island. Hyogo, Osaka, and Kyoto were damaged.

In particular, the coastal area of Kobe City (near the epicenter) had tremendous damage, including many fires, collapsed buildings and expressways, and disrupted utility lifelines. This was the largest damage in Japan since World War II, and the largest seismic disaster at that time.

II. Damage of the Hyogo Blood Center

1. Damage involving employees

A part-time doctor died when he was buried under a collapsed house, and eight employees were slightly injured, 38 houses collapsed completely/partially, and 92 houses were partly damaged. 14 employees had to live in evacuation shelters. It was therefore very difficult to secure employees immediately after the quake.

2. Damage of the facilities

The building of our blood center had relatively minor damage, but the blood preservation equipment (refrigerator, blood preservation cooling cabinet, etc.), examination equipment, vehicles, furniture and fixtures had much damage.

Blood donation services were cancelled due to collapse of the upper floor of the building, where the "Sannomiya San-Plaza Donation Room," (a central blood donation room in the Hyogo prefecture) was located. Other blood donation rooms such as Akashi Driver's License Center and Tsukaguchi Sansantown could also not accept blood donations for the time being due to cracks and damage to their buildings.

3. Impact on lifelines

(1) Electricity

Electricity was cut off for 18 hours and 17 minutes starting immediately after the quake to 12:03 a.m. the next

day. The private power generator was activated just after the electric outage but it stopped at 10:15 a.m. on the 17th. We therefore made efforts to maintain the temperature of the blood preservation facility by using ice and dry ice.

(2) Water

Water was cut off for 8 days from immediately after the quake. During this period, the functions of the blood preservation facility were maintained by water supplied by the Nagano City Waterworks Bureau.

(3) Gas

Service was disconnected for 48 days starting immediately after the quake to March 6.

(4) Telephone

The telephone lines were disconnected from around 2:20 p.m. on the day of the quake to around 5:30 a.m. on the 18th. We could not receive calls for blood requests from medical institutions, nor anywhere outside the Hyogo Blood Center.

4. Damage to blood

(1) In the blood center

There was no damage to whole blood, red cells, and plasma products because we could control the temperature using ice and dry ice. However, a total of 103 platelet products (1,125 units) became unusable due to various reasons: falling, stoppage of the shakers, or failure to preserve them at an appropriate temperature.

(2) In medical institutions

At that time, a total of 1,495 of the 2,926 medical institutions including clinics in Hyogo Prefecture stopped their services (51.1%). A total of 491 different products (640 units), namely 33 whole blood products (39 units), 299 red blood cell products (382 units), and 159 plasma products (219 units), that had been preserved at the medical institutions became unusable.

III. Initial action immediately after the quake

Immediately after the quake, the alarms of all blood preservation facilities were activated. An employee on duty reported the situation to the deputy director of the supply division and received instructions to maintain the blood preservation facilities.

Afterwards employees who could work arrived at the blood center one after another to confirm the status of each section and take initial action as far as possible.

The damage conditions in the prefecture could not be sufficiently recognized because the information was only obtained from the radio, and our blood center was in such a condition that we could not conduct regular operations. We therefore started distribution of blood ordered on the previous day with 2 employees who went together in the vehicle for safety, after established a distribution-priority operation system.

We reported the situation to the Blood Service Headquarters in Tokyo, and waited for instructions from them. We also requested the Tokushima Blood Center and the Fukuchiyama Blood Center to

supply blood to Awaji Island and the northern part under the jurisdiction of the blood center, respectively.

We then asked for blood, food, water, and gasoline from the Osaka center, the Himeji Blood Center, and the Okayama Blood Center.

In the evening on the day of the quake, we could not accept orders from medical institutions since phone lines were completely cut. Therefore, we started to distribute blood by visiting the major medical institutions in our jurisdiction.

IV. Status of blood supply after the quake

For some time after the quake, we were exclusively engaged in supplying blood since we could not conduct regular operations due to the difficulty of securing staff, damaged equipment, and problems with the transportation system.

1. On the day of the quake

The amount of blood supply on the day of the quake was 107 containers in total (1,637 units), namely 87.0% compared with the 1,882 units, the average number of blood units supplied on weekdays in January before the quake.

Among these, 72 different sets of bloods (1,069 units) for 56 hospitals were supplied by visiting the medical institutions at our own discretion because phone lines were disconnected, and accounted for 65.3% of the blood supplied on the day.

2. January to March after the quake

The total amount of blood supplied in January after the quake (January 17 to 31) was 66.9% compared to

that in the previous year, since a lot of blood was not used due to the damage to medical institutions in our blood center's area. The total amount of blood supplied in comparison to the previous year was 77.5% in February and 92.6% in March.

Since blood collection was not restored to the normal levels for some time after the quake, we supplied blood by accepting 18,385 units, 20,376 units, and 6,813 units of blood from other prefectures in January, February, and March, respectively.

V. Resumption of blood collection

1. Resumption of blood donation room operations

First of all, the blood donation rooms in Akashi Driver's License Center and Tsukaguchi Sansantown, which had relatively minor damage, resumed operations twenty days after the quake. Employees living near the blood donation rooms were assigned to work there.

2. Resumption of collection with bloodmobiles

Thirty-four days after the quake, 3 bloodmobiles were dispatched to the northern area where there was relatively little damage, and two months later, the bloodmobiles were dispatched to the northwest area. After the resumption of the collection with of bloodmobiles between Osaka and Kobe after three months (partially) and the Awaji area after four months, the number of dispatched cars was restored to 90% of the target.

The number of donors at blood donation rooms significantly increased after the quake, but the average number of cooperators per

blood collection bus was about the same as the number of cooperators secured in normal years due to the circumstances of cooperation groups and road conditions.

3. Relocation of Sanno-miya San Plaza Donation Room (collapse of the building)

As the upper floor of the building of the blood donation room had collapsed and the building became unusable. The blood donation room was relocated to Sanno-miya San Plaza West Building, which is next to Sanno-miya San Plaza, and blood collection was resumed 205 days after the quake.

VI. Actions taken at the time of the quake

1. Proper preservation and supply of blood products

Quality control of blood products, maintenance and control of the temperature of the blood preservation cabinet, supply-priority work system, round visiting for medical institutions, and securing of gasoline for delivery vehicles, etc.

2. Securing of manpower

Confirming the safety of employees and damage concerning them, the formulation of a work system, securing of commuting methods, securing of waiting and napping rooms, and securing of food and drinking water, etc.

3. Maintenance and management of facilities and equipment

Maintenance of equipment related to the blood preservation cabinet, restoration of the unified system, waste disposal, and contact with and maintenance at concerned companies.

4. Report to the Blood Service Headquarters

Reporting the status and waiting for directions

5. Network and collaboration with neighboring/nationwide blood centers

Support system for blood, manpower, ice/dry ice, food, water, and gasoline, etc.

6. Collaboration with the chapter

Status confirmation and confirmation of the support system as a facility and an employee of the Red Cross, etc.

7. Others

Recording of damage/action status and responding to the media, etc.

VII. Reflections at that time and subsequent actions

1. Establishment of communication methods with medical institutions

⇒ Increase in number of emergency priority lines (total of eight phones and two fax machines for receiving orders for supply, general affairs, public relations, Himeji, and Toyo-oka)

2. Development of the Emergency Response Guideline by each regional blood center

⇒ Formulation of the Risk Management Guidelines by the Blood Service Headquarters
⇒ Formulation of manuals by each local blood center (Our center revised the manual in November 2008).

3. Securing of manpower for initial actions

⇒ Implementation of training concerning order transmission and emergency convocation (creation of a phone trees by district of residence).

*Continuous implementation of trainings is important.

4. Implementation of disaster countermeasures drills

⇒ Participation in trainings of the JRC Hyogo Chapter (prefectural disaster trainings, trainings at central hospitals, and basic/practical trainings, etc.)

5. Collaboration and support system with the JRC Hyogo Chapter

⇒ Registration of relief personnel (blood transportation, ERU, instructors), mutual cooperation for various events and Public Information (PR), liaison council, etc.

6. Narrowness and damages of the facility

⇒ Need to build a new facility
⇒ Starting a project
⇒ Completion of construction: April 2003, Opening of the new facility: July 2003

VIII. Future issues

1. Measures against tsunami

Since the construction site of the new facility is in the Kobe port bay area, measures against liquefaction have been taken, but measures have not been taken against a tsunami.

It is necessary to consider measures for temporary evacuation and preservation of blood, plus measures for evacuation and the

securing of manpower and vehicles in case of a tsunami.

2. Continuous training in the initial actions

To secure manpower for first responders in case of disaster, training in order transmission and emergency summons were implemented by creating a phone tree, organized by district of residence. However, it is necessary to conduct the training continuously to improve and maintain the awareness of the employees.

3. Securing stable donors

The number of donors tends to increase significantly immediately after a quake, but it is necessary to take measures not to collect too much blood and then have a blood shortage afterwards.

4. Performance of duty in collaboration with the JRC Hyogo Chapter

The duties of our blood center's employees in case of a disaster are the proper preservation of blood products and the delivery of blood. However, it is necessary to raise awareness and conduct training of the employees on a regular basis, and to collaborate sufficiently with the JCR Chapter in case of a disaster, since it is expected that the employees (including nurses and other employees) will engage in duties to further the missions of the Red Cross, as appropriate to the situation.

IX. Postscript

In March 2011, a huge disaster caused by an earthquake and tsunami in eastern Japan caused damage beyond our imagination, surpassing that of the Great Hanshin-Awaji Earthquake.

To prepare for a Tokai/Tonankai earthquake and other earthquakes

occurring directly beneath the Tokyo Metropolitan Area, which are predicted in the future, and to fulfill the missions of the blood center and employees of the Red Cross in each and every instance, it is important to fully review the status of actions, reflections, problems, and issues, in order to improve the system.



Buildings had collapsed throughout the city. Kobe-Municipal Nishi Hospital had devastating damage due to collapse of the 5th floor. The employees of our blood center made efforts to supply blood in the darkness.



Many fires occurred immediately after the quake and Kobe was surrounded by smoke. A total of 7,483 houses were completely/partially destroyed by the quake and fire.



Railways (Japan Railways, Hankyu, Hanshin, and Sanyo) had tremendous damage, including the collapse of stations and train derailments. Moreover, due to the collapse of the underground Daikai Station on the Kobe Rapid Transit-Railway line, a national expressway above the station caved in. Although alternative transportation was provided immediately after the quake in collaboration with the railway companies by using buses, there were large-scale traffic jams in many parts of the city.



The Hanshin Expressway was closed, because of the 640 meter-long collapse around Fukae-honmachi in Higashinada Ward area, Kobe City which is on the No.3 major Kobe highway. Five bridges collapsed and this caused tremendous traffic jams on neighboring expressways.



Nagata Ward area had a huge fire, creating a tragic situation similar to war damage. It is said that the huge fire was caused by electrical leakage when electricity was temporarily restored after the power shortage. Sufficient fire extinguishing activities could not be conducted due to the water outage.