

Note

Report on a Civil Protection Training Exercise in Aomori Prefecture with a Dirty Bomb Scenario

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This article describes our participation in a civil protection training exercise with a dirty bomb scenario that was held jointly by the Japanese government (Cabinet Secretariat), Aomori Prefecture and Hirosaki City on November 7, 2013. Our missions took place mainly in an evacuation area (safe shelter) and included a surface contamination survey, decontamination, risk communication, and interviews on participants' symptom and history. In total, 40 members of our faculty played important roles in this exercise in cooperation with staff from other organizations. About 240 evacuees were transported to an evacuation area for surface contamination surveys, interviews, group risk communication and filling out registration forms. Decontamination or personal consultation was also performed if necessary. Despite some confusion caused by multiple staffs from different organizations working together and many casualties coming in one after another, we believe that most of our tasks were successfully implemented as a result of our faculty's experience with the project for radiation emergency medicine (REM) professions. Although nuclear disaster is considered rare, its effects are serious, and we must prepare a system to enable an effective response. Our project which involves developing human resources for REM is considered essential for this purpose.

Key words: civil protection training exercise, dirty bomb, surface contamination survey, risk communication, radiation emergency medicine

1. Introduction

Joint exercises for civil protection have been implemented by the national and local governments since 2005¹⁾. Civil protection involves measures for the protection of people against unexpected armed attack or terrorism and does not include natural disasters. The objectives of these

exercises are to facilitate cooperation between related organization, to check each organization's capabilities, and to raise awareness regarding civil protection. The training scenarios include not only simple explosions but also biological, chemical, and nuclear terrorism (dirty bombs). Two types of training—namely, actual training exercises and map exercises (desktop drills)—are carried out every year in different prefectures¹⁾. In 2013, an actual civil protection training exercise involving a dirty bomb scenario was carried out in Aomori Prefecture. The exercise was held jointly by the Japanese government (Cabinet Secretariat), Aomori Prefecture, and Hirosaki

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Table 1. Outline of Civil Protection Training Exercises

Site	Missions	Tasks	No. of participants from our faculty	Organization
Hirosaki Athletic Park and Sports Recreation Center	<ul style="list-style-type: none"> • Rescue • Emergency first response • On-site command post 	<ul style="list-style-type: none"> • NBC detection • Rescue • Triage • First aid • Decontamination • Air-dose rate monitoring • Transportation 		<ul style="list-style-type: none"> • Aomori Prefecture • Hirosaki City • Police • Self-Defense Forces • Local Fire Department • Japanese Red Cross Society etc.
Hirosaki University Hospital	<ul style="list-style-type: none"> • Admission of injured • Medical treatment 	<ul style="list-style-type: none"> • Triage • External contamination survey* • Medical treatment • Decontamination 	5	• Hirosaki University Hospital
Hirosaki City Hospital	<ul style="list-style-type: none"> • Admission of casualties • Medical treatment 	<ul style="list-style-type: none"> • Triage • External contamination survey* • Medical treatment • Decontamination 	5	<ul style="list-style-type: none"> • Hirosaki City Hospital • Disaster Medical Assistance Team (DMAT)
Evacuation area (Gymn. of a primary School)	• Management of evacuation areas/safe shelter	<ul style="list-style-type: none"> • Screening survey* • Decontamination* • Interview : symptoms and history check* • Risk communication* • Registration of evacuee • Meal supply 	30	<ul style="list-style-type: none"> • Aomori Prefecture • Hirosaki City • Local public health centers • Hirosaki University School and Graduate School of Health Sciences • Hirosaki Medical Association • The Aomori Association of Radiological Technologists
Aomori Prefectural Central Hospital	<ul style="list-style-type: none"> • Admission of casualties • Medical treatment 	<ul style="list-style-type: none"> • Triage • Contamination survey • Medical treatment • Decontamination 		• Aomori Prefectural Central Hospital
Aomori airport	• Staging care unit (SCU) management	<ul style="list-style-type: none"> • Second triage • Medical treatment • Transportation 		<ul style="list-style-type: none"> • Self-Defense Forces • DMAT

*tasks we were involved in

City; the main training sites were located in Hirosaki City. It was the second actual training exercise with a dirty bomb scenario; the first exercise was held in 2011 in Ibaraki Prefecture.

Because several nuclear-related institutions are located in Aomori Prefecture, prefectural government has designated Hirosaki University Hospital as the local tertiary radiation emergency hospital. In 2008, our university initiated the Radiation Emergency Medicine Project²⁾ and in 2010, established the Institute of Radiation Emergency Medicine³⁾ and Emergency and Disaster Medical Center with radiation emergency medicine facilities in Hirosaki University Hospital⁴⁾. Moreover, our faculty (i.e. Hirosaki University Graduate School of Health Sciences) has been developing human resources for radiation emergency medicine (REM) since 2008²⁾. Two radiation-related subjects were included in the curriculum of liberal arts undergraduates. Radiation coursework and 15 new subjects related to REM were added to the graduate curriculum. Moreover, since 2010, we have been offering a short-term annual educational program aimed at training current nurses and radiological technologists on basic knowledge and techniques related to REM⁵⁾. In addition, our faculty members contributed to a screening

survey in Fukushima Prefecture after the accident at the Fukushima Dai-ichi Nuclear Power Plant⁶⁻⁹⁾. Currently, our faculty members are supposed to take part in the management of evacuation areas (safe shelter) in cases of nuclear emergencies in Aomori Prefecture. Based on the above, Hirosaki City could be considered suitable for such an exercise. Our faculty members as well as personnel at Hirosaki University Hospital and the Hirosaki University Institute of Radiation Emergency Medicine, were asked to participate in this training, subsequently making a significant contribution. The following is a brief report on these activities.

2. Civil protection training exercise

2.1. Outlines of the civil protection training exercise

2.1.1. Date and sites

The training exercise was carried out on November 7. The main site of this exercise was Hirosaki Athletic Park and Sports Recreation Center (Fig. 1).

2.1.2. Scenario

The scenario was as follows: A radiological explosion (dirty bomb) with ¹³⁷Cs occurred in Hirosaki Athletic

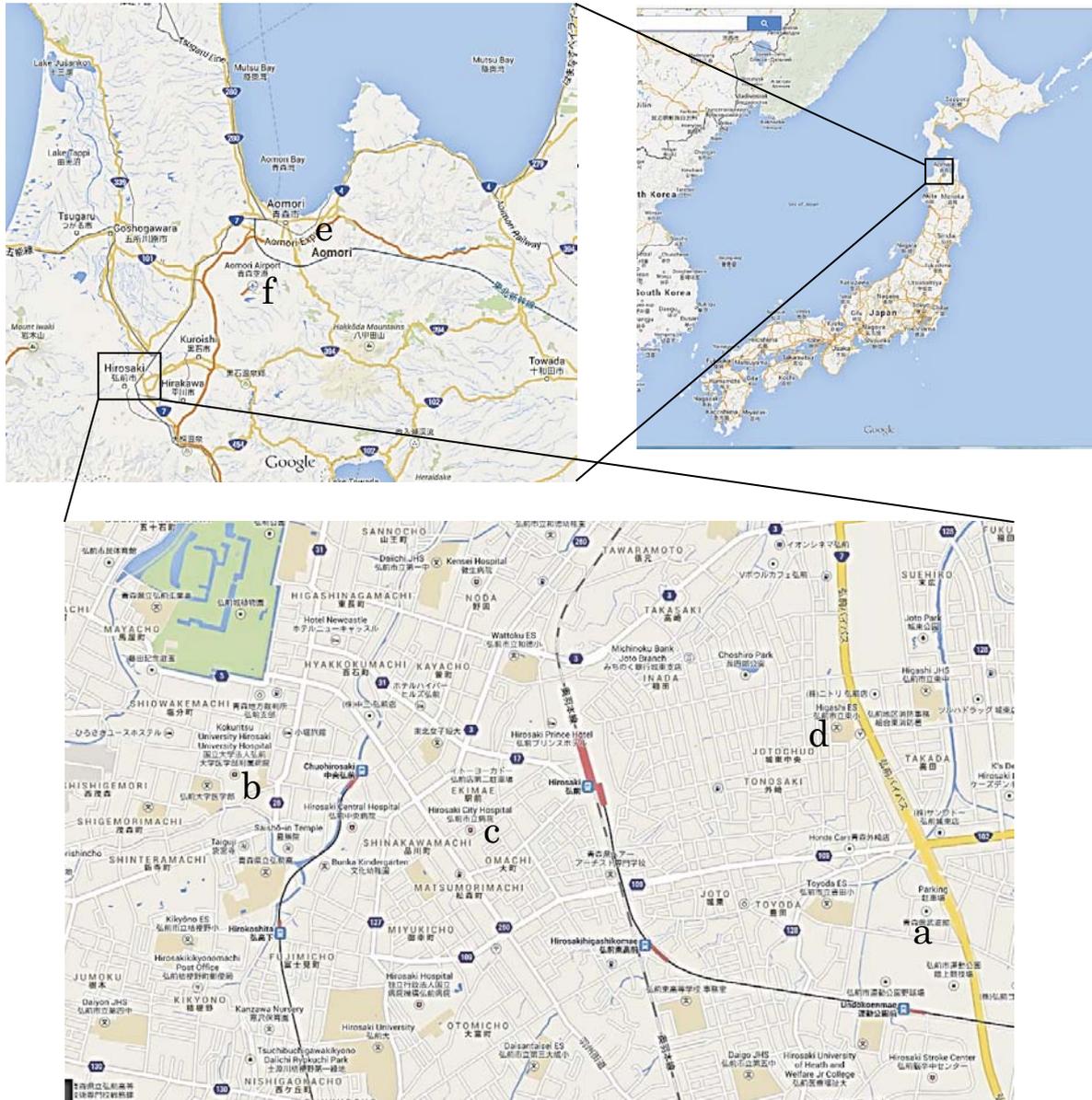


Fig. 1. Map of sites in civil protection training exercise.
 a. Hirosaki Athletic Park and Sport Recreation Center (Dirty Bomb Explosion) b. Hirosaki University Hospital c. Hirosaki City Hospital
 d. Hirosaki Higashi Elementary School (Evacuation Area) e. Aomori Prefectural Central Hospital f. Aomori Airport (Staging Care Unit)
 *base map : Google maps



Fig. 2. Circumstances of evacuees.
 Left: Evacuee with special makeup on the cheek
 Right: Evacuee with fracture on her right arm after first aid

Park and Sports Recreation Center during an event, and about 300 people attending were killed or injured and supposedly contaminated. About 240 people (comprising by students from one university in Hirosaki City) were transported to the evacuation area including people with minor injuries (Green Triage Tag = delayed), external contamination, and suspected contamination. The others were transported to hospitals. To increase realism, some evacuees applied moulage to their arms or legs and special makeup on their faces (Fig. 2). In total, about 1100 staff members from 56 organizations participated in this civil protection exercise¹⁰. The outline of this training

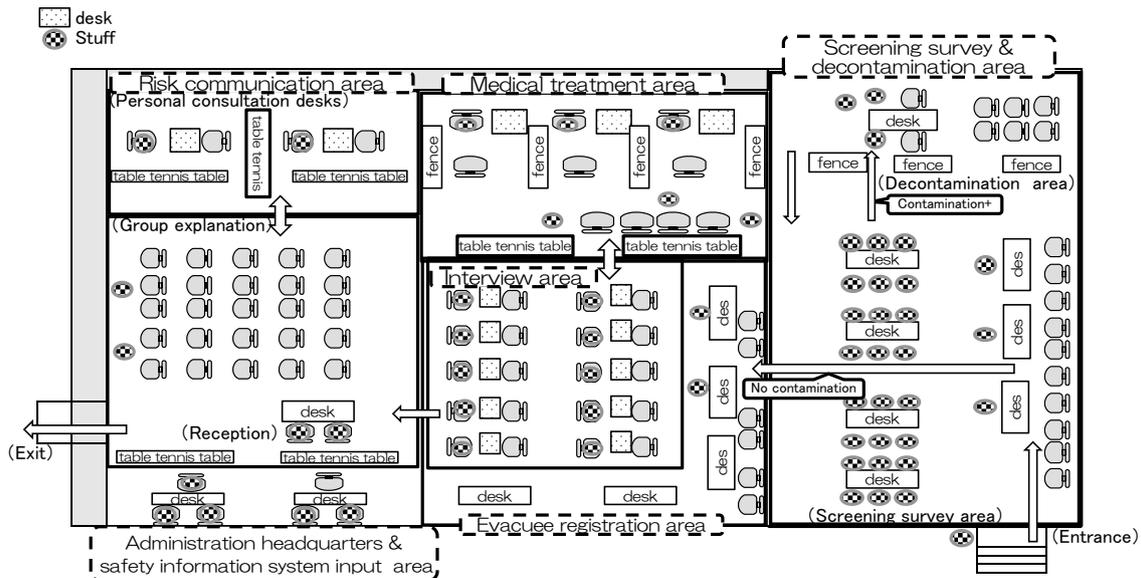


Fig. 3. Floor plan of the evacuation area.

exercise is demonstrated in Table 1 and map shown in Figure 1.

2.1.3. Our missions

Our faculty members were asked not only to participate in but also to help plan and be responsible for the training exercises in the evacuation area. Before the exercise, two of us attended meetings, completed the arrangement of the floor plan (Fig. 3), and created a list of the necessary materials and equipment.

A total of 18 faculty members, 4 graduate students, and 8 undergraduate students participated in this training and two office employees were included to record the process. The mission of the exercise in the evacuation area was the management of evacuation areas; Specific tasks were as follows: A surface radioactive contamination survey, decontamination, a symptom and history check, risk communication, evacuee registration, and meal supply. Our members were in charge of the external contamination survey, decontamination, a symptom and history check, and risk communication, in cooperation with other staff from the Hirosaki City office, Aomori Prefectural office, local public health centers, Hirosaki Medical Association, and the Aomori Association of Radiological Technologists. Our staff was solely in charge of the decontamination and risk communication areas.

2.2. Training exercises at the evacuation area

2.2.1 Time schedule

The explosion occurred at 11:30 am and the exercise headquarters decided to set up an evacuation area in an elementary school at 12:30 pm. Following a request from



Fig. 4. The surface contamination survey
Each evacuee was surveyed with GM survey meters from head to feet.

headquarters, our team was dispatched to the school, where we started setting up the evacuation area. The team started with covering the floor, tables and chairs with polyvinyl alcohol sheets or big plastic bags in the survey area and then set up the other areas. After setting up, staff members in the survey and decontamination areas installed personal dosimeters and put on protective clothing. The air dose rate was measured using the NaI scintillation survey meter (TSC-171, Hitachi Aloka Medical, Ltd., Japan) before and after the survey of evacuees. Measurements were carried out 1 m above the floor. The time constant was set to 30 seconds and measurement was performed for 90 seconds.



Fig. 5. Surface decontamination
Contamination on intact skin was decontaminated with wet tissue.



Fig. 6. The interview (symptom and history check)
Evacuees were interviewed for symptoms and past histories, which were noted on the document form.

2.2.2. Screening survey area

This activity involved 28 participants, 13 of whom were from our faculty. A screening survey was carried out on the evacuees (Fig. 4). Because no radioactive materials were used in this training, assumed values of contamination were documented on the backs of identification tags for each surveyed individual. We used Geiger-Muller (GM) survey meters (TGS-146B, Hitachi Aloka Medical, Ltd, Japan) to examine each subject from head to feet for three minutes, as required. The contamination sites and values were written down on the document sheets. If the value was higher than 40kcpm, then the subject was guided to the decontamination area. Almost all evacuees were wearing blankets after taking off their outer garments at the explosion site, they were told to remove their blankets and hold them in their hands during the survey.

2.2.3. Decontamination area

This area was managed by four of our members. Because all contaminations were supposed to be present on intact skin, wet tissues were used for decontamination (Fig. 5). After decontamination, the subjects were again surveyed to ensure successful decontamination. Decontaminated evacuees were then informed that decontamination had been completed and that they should move to the interview area.

2.2.4. Interview area

Evacuees were interviewed for symptoms and past histories, which were noted on the document form (Fig. 6). Because bombs would consist not only of radioactive materials but also of biological compounds and chemicals, many related symptoms were checked. Staff in this area interviewed and filled in the symptom check sheets. The 11 interview area staff members included eight of our

faculty members.

2.2.5. Registration area

The Japanese government had previously established a dedicated registration form for such acts of terrorism. The form includes the name, age, gender, address, phone number, and information relating to each evacuee's family. Staff in the interview area also helped evacuees to fill in these sheets.

2.2.6. Risk communication area

Risk communication was performed in groups to provide precise information about the incident and to relieve evacuees' anxiety and fear (Fig. 7). Government-provided handouts were used, and personal consultation desks were available for further consultation (Fig. 8). This area was managed by five of our members.

2.2.7. Medical treatment area

Some evacuees were meant to be injured on their faces or upper or lower extremities. Medical treatment such as fixation or debridement was provided for casualties who were meant to be suffering from fractures, contusions, or bruises (Fig. 9). Doctors and nurses dispatched from Hirosaki Medical Association were in charge of this area.

2.3. Training exercise at other sites

2.3.1. Hirosaki University Hospital

In the case of nuclear accidents, many casualties will be transported to Hirosaki University Hospital, which is a tertiary Radiation Emergency Hospital in Aomori Prefecture. In this training exercise, about 40 casualties were transported to or visited the emergency section. Contamination surveys and medical treatment were provided. In addition to hospital radiological technologists, five third-year students from the Department of



Fig. 7. The group risk communication
Risk communication was performed in a group setting to enable the provision of precise information about the incident and to relief evacuees' anxiety and fear.



Fig. 9. Medical treatment
Medical treatment such as fixation was provided to casualties who were meant to be suffering from fractures.



Fig. 8. Personal consultation (risk communication)
Personal consultation desks were also available for further consultation.



Fig. 10. Training exercises in Hirosaki University Hospital
In this exercise, about 40 casualties were transported to or visited the emergency section of Hirosaki University Hospital. Contamination surveys and medical treatment were provided.

Radiological Technology, Hirosaki University School of Health Sciences, joined this exercise as screening survey members (Fig. 10).

2.3.2. Hirosaki City Hospital

Although Hirosaki City Hospital is not a radiation emergency-related hospital, 15 casualties were transported there for this exercise and contamination surveys and medical treatment were provided. (Fig. 11). In real situations, some casualties might be transported to or visit non-radiation emergency hospitals, so it is essential to conduct training in these facilities, too. Surveys were conducted by one of our faculty members and one graduate student enrolled in a REM course, along with a hospital radiological technologist. In addition, three third-year students from the Department of Radiological Technology who were undergoing a clinical training at the hospital joined this exercise as screening members.

3. Results and Discussion

Our faculty started the REM project in 2008²⁾. In our faculty, we educate undergraduate and graduate students, as well as train working professionals. In addition, several of our members have participated in annual training exercises for nuclear power plants or nuclear facilities in Aomori prefecture. These exercises and contributions to the Fukushima Dai-ichi Nuclear Power Plant accidents were assessed, and we were asked to be responsible for the training in the evacuation area. Even though we had previously been involved in annual training exercises for nuclear power plants or nuclear facilities in Aomori Prefecture, we had never been involved in civil protection exercises. In addition, few of us were familiar with civil protection. Although, joint civil protection exercises have, thus far, been conducted for several years, seemingly, not much is known about them. Before this exercise, we



Fig. 11. Training exercises at Hirosaki City Hospital
Fifteen casualties were transported to this hospital (non-radiation emergency-related hospital). Contamination surveys were conducted and medical treatment provided.

solicited participation in the training exercise from faculty staff and graduate and undergraduate students through announcement, and subsequently received a large number of responses. According to the questionnaire completed by the participants, many had never heard of exercises for civil protection before; they also regarded public information on civil protection exercise as necessary. Our faculty members and students received plenty of information related to civil protection and the participants gained valuable experiences during training. These information and experiences might help us meet one of our objectives, which is to raise awareness regarding civil protection. Currently our faculty members are supposed to collaborate in the management of evacuation areas (safe shelter) in cases of nuclear emergencies in Aomori Prefecture. We are now going to develop an emergency response measure for implementation during a nuclear accident.

Although we contributed to this training, some problems became evident. 1) Information was not provided effectively, and communication was insufficient. For example, some staff members did not receive information about evacuees' name cards. Furthermore, some survey members did not notice the documentation on the back of evacuees' name holders because the letters were too small. Because no radioactive materials were used in this training, the GM survey meters only registered the background level, and some evacuees who were supposed to be contaminated were not informed and went directly to the interview area without decontamination. The letters should be large enough to be read easily. These confusions also might be due the fact that information and orders from the commander of the evacuation area were not passed on to us and, in addition, team leaders had not been assigned. Moreover, we had

much to do in a short period of time and were forced to work with many staffs from different organizations. Therefore we had no time to check one's procedures with each other. Because these exercises should be performed under the leadership of the commander or team leaders, the mean of communication should be reconsidered. The use of a microphone or a large whiteboard should also be considered. In addition, meetings prior to the exercises might help with the sharing of information and confirmation of REM procedure. 2) Materials and equipment were limited because of the emergency setting. We were ordered to use mainly the equipment available in the school. There were not enough panel screens available, and table tennis tables were not high enough to separate medical treatment and personal consultation areas. Some evacuees might have hesitated to request personal consultation. It is important for local governments to prepare sufficient panel screens as disaster preparation measure, in order to protect evacuees' privacy. Moreover, few tables were available. 3) The principles related in controlling contamination were not always followed. For instance, some survey team members told subjects to put their blankets on the floor. Some screening members might have been upset because they did not expect subjects to wear blankets. Even given the lack of tables, nothing should have been put on the floor as it might have been contaminated. Thus, it may be necessary to regularly review basic expertise on REM procedures. Repeated training exercises are thought to be necessary for staff to maintain expertise and familiarity with techniques. On these grounds, frequent training or training exercises beyond prefectures should be considered.

During the current training, evaluations were conducted by external experts. These evaluations were not published, however we were informed of these shortly thereafter at a review meeting held on February 17, 2014. Comments regarding the evacuation area were as follows: It was good that evacuees were asked if they were feeling well when they arrived. A guide map and route should be displayed to help evacuees to move around easily. Though risk communication was performed appropriately, more detailed information regarding the incident and the radiation dose would be provided. At the meeting, some participants from other organizations indicated that their organizations' capabilities were not sufficient and acknowledged the necessity of repeated trainings. Some of them might be suitable for our training course.

The main difference between the dirty bomb terrorism scenario and the settings of our annual training course⁵⁾ is that dirty bombs may cause a larger number of casualties. In such a setting, it is necessary to deal with many people in a short period of time. However the basic concepts are the same. The Civil Protection training exercise will not

be conducted in Aomori Prefecture in the near future. We should participate in the annual training exercises for nuclear power plants or nuclear facilities in Aomori Prefecture and maintain contact with local governments. In addition, the annual REM training course that we had been providing to paramedical personnel is considered relevant for staff members in charge of nuclear-related emergencies. Close relations between our faculty and related organizations would be established, through the provision of REM training course and participation in nuclear-related accident exercises.

4. Conclusions

We were asked to participate in the civil protection training exercise held in Hirosaki City. Given our faculty's experience with the Project for REM professions, our staff and students played important roles in this exercise.

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