

Simulation Exercise Paves Way for Nuclear Accident Preparedness in the NIS

BY BARBARA A. GABRIEL

In Tallinn, Estonia a young woman undergoing radiation therapy for a rare form of bone cancer accidentally receives a dangerous dose due to the outdated machinery's malfunctioning; in Chisinau, Moldova an electrical engineer is briefly exposed to radiation while attempting to fix a hospital radiotherapy device; and in Kiev, Ukraine a young boy exploring an abandoned warehouse plays with metal objects that are radioactive. According to Kirsten Levy, project manager of the Boston University Medical Center/Armenia Medical Partnership Program and the International Medical Education and Harmonization Program for Nuclear Accident Preparedness at the Boston University School of Medicine (BUSM), these small-scale incidents are currently the type of radiation exposure accidents most likely to occur in former Soviet countries populated with numerous eroding plants and warehouses dependent on nuclear power. "A radiation

accident can involve only one person," says Levy. "The idea of it conjures up huge numbers of victims, but accidents can be small. The Chernobyls are not currently the most risky situations."

The "International Medical Education and Harmonization Program for Nuclear Accident Preparedness" was established in 1997 to respond to the threat of such accidents. It is a joint effort of BUSM; Boston University Center for Educational Development in Health; the University of Massachusetts Medical School; the Radiation Emergency Assistance Center/Training Site (REAC/TS) in Oak Ridge, Tennessee; the Vienna-based International Atomic Energy Agency (IAEA); and AIHA. The program grew out of the Yerevan, Armenia/Boston, Massachusetts AIHA Hospital Partnership established in 1993. The mission of the Harmonization Program is to increase medical knowledge about nuclear accidents by creating teams of international instructors trained to

teach others in recognizing and treating radiation exposure victims.

These teams of instructors work at regional EMS training centers established by AIHA partnerships in many of the NIS and CEE countries. Personnel at each of the participating training centers were initially trained in Oak Ridge, Tennessee in 1997 with the support of AIHA and IAEA. Each participating center teaches a standardized curriculum meant to facilitate the work of first-response medical personnel when they are faced with an accidental radiation exposure scenario. These standardized responses help create a "common language" that medical and official personnel can use to communicate with one another and across borders in the event of a nuclear emergency. It was this "common language" that was tested in a recent radiation accident simulation exercise conducted in Yerevan and involving medical professionals in Moscow, Chisinau, Tallinn, and Kiev—all cities with AIHA-sponsored EMS training centers.

Harmonizing International Response Named "Harmony I," the simulation exercise took place from August 15–18 in the outskirts of Yerevan, where 20 family members, four from each of the five countries participating in the exercise, were gathered for a picnic family reunion.



Two young male Harmony I exercise participants find a box containing radioactive material in an abandoned warehouse and take it back to where their family is enjoying a picnic in Yerevan, Armenia.



An exercise participant in the family reunion scenario opens the box brought back by the young men and takes out two metallic objects.



A family member taking part in the exercise is transported to the emergency room after manifesting symptoms caused by radiation exposure.

During the course of the festivities, two boys explored an abandoned factory warehouse, where they found a wooden box and took it back to the picnic. With other family members standing by, some in close proximity, others farther away, one family member opened the box to find two shiny metal objects. After examining them, he threw them away. Later that day, the relatives dispersed to their homes,

ranging from a few minutes to a couple of hours took place with the “incident command center” in Yerevan. Although the simulation was scripted, participants only became aware of many events as the simulation unfolded. This element of surprise tested the ability of local and international agencies to follow the protocols necessary for responding to such an incident. Dr. Richard V. Aghababian, a

accomplish. These objectives were the collective responsibility of the over 70-member team of international participants.

- Recognize accidental exposure to a radioactive source and initiate the proper order of events by emergency medical personnel.
- Conduct medical assessment of potentially exposed individuals to rule out external and internal contamination, assess for evidence of acute radiation illness, perform appropriate laboratory tests, and consider therapy.
- Perform a radiation exposure assessment at the site of the accident.
- Report the accident to the proper authorities in Armenia, other participating countries, and appropriate international agencies.
- Demonstrate international coordination/cooperation in victim identification, assessment, and medical management.
- Employ telecommunications technology to connect medical responders in participating countries during the exercise.
- Carry out a debriefing teleconference immediately following the exercise.

Dr. Erwin F. Hirsch, director of trauma at Boston Medical Center’s Level I Trauma Center, chief of general surgery at Boston Medical Center, and professor of surgery

Standardized responses help create a “common language” that medical and official personnel can use to communicate with one another and across borders in the event of a nuclear emergency.

traveling back to the countries from which they came. The next day, the scripted simulation event began to unfold as various family members—unaware that they had been exposed to radioactive material—sought medical help for a variety of physical symptoms.

After the “actors” involved in the family reunion scenario returned home, a scripted international response involving persons from Armenia, Ukraine, Moldova, Estonia, and Russia played out their parts over the 70-hour exercise period, during which seven teleconferences

professor of medicine at the University of Massachusetts Medical School who directed the exercise in Yerevan, noted in his summary report that, “initially participants at one site indicated that they thought the exercise lacked sufficient sophistication. This opinion changed when they were asked to calculate the estimated radiation exposure for the simulated victims and correlate the calculations with the victims’ symptoms and findings on exam and laboratory results.”

The exercise’s planners identified seven essential objectives for the simulation to



After the source of the radiation exposure is identified, official personnel perform an assessment of the site to prevent further injury.



Hospital staff in Yerevan perform a radiation assessment on one of the scenario’s “victims.”



Medical and official personnel in Yerevan alert the International Atomic Energy Agency that a nuclear accident has occurred.

Photos courtesy of Educational Media Center of Boston University Medical Campus.

at BUSM, explains that the “common language” established and taught by the Medical Education and Harmonization program was key in facilitating the 70-hour simulated response exercise to the above scenario. “In order for a coordinated response to occur smoothly, it cannot be a random situation,” says Dr. Hirsch, referring to the international coordination necessary to respond to this event. “There has to be a pre-existing common denominator. That’s not language—you can always get someone to translate. The common denominator has to be some previously agreed-upon protocols to deal with certain things and what the expectations are. This exercise took place two years after we started this dialogue of common language, protocols, and expectations. If you don’t have this agreed upon

tried to make the scenario plausible. Several other events have taken place concerning the theft of materials that people did not know were radioactive. There are accidents that take place, so the idea was to construct something that could plausibly fit into the situation that exists in that part of the world.”

Although the event was mostly scripted, participants faced a variety of challenges, such as going through the process of elimination often required to make the diagnosis of radiation exposure. Symptoms of radiation exposure may manifest themselves hours or even days after the incident has taken place, often making it difficult to pinpoint their source. “The basic symptoms of an accidental radiation exposure like these people had is to a larger or lesser degree a combination of food

ipant assignments included calculating the amount of radiation individual victims were exposed to and filling out the necessary forms required by convention and treaty among these nations signatory to various IAEA conventions,” says Levy. “We gave them sample forms and they had to send them to us afterward, as well as their particular assignments from each teleconference. All of them supplied information about their patients and their protocols for alerting the responsible officials in due time.”

At times during the exercise, some countries’ unreliable telecommunications frameworks failed. Levy admits that in certain regions, technology is limited to analog telephone lines. “They can drop in and drop out—which sometimes happened in the exercise. But each center did participate for the duration. We are the ones who experience the most frustration with communication links; over there, they are so used to faulty service, they hardly mentioned it in the overall strengths and weaknesses of the exercise. They have adapted themselves to the systems they have.”

Exercises such as Harmony I are providing nuclear accident preparedness skills to medical responders for the first time in the NIS.

beforehand, then the definition of what the issues are becomes confusing.”

Dr. Hirsch explains that the family reunion scenario was created to test both the knowledge gained by the participating countries’ emergency response personnel and their ability to use existing protocols and communications frameworks. “Because the program is international, and because we were able to integrate these centers electronically, we felt that instead of doing a simulation exercise in each country, why not do something that incorporates them all? Since the curriculum and teaching techniques, and thus the knowledge base, in each of the countries is the same, we thought it would make sense to do a simulation that incorporated all five participating countries at the same time.” Levy adds, “We

poisoning or the flu,” says Dr. Hirsch. Although the limited time frame of the exercise had the simulated victims properly diagnosed within 12–18 hours and the source identified shortly afterward, Dr. Hirsch says that in reality, “It could take up to two weeks before such radiation exposure could be pinpointed.”

Communicating Across Borders

Exercise participants used a variety of telecommunications methods to coordinate their responses once the source of the radiation was identified. A US company periodically faxed new information on the situation to participants in each country so that they were able to do the work necessary for the information exchange that took place during each of the seven scheduled teleconferences. “Partic-

A Pioneering Program

Dr. Hirsch notes that exercises such as Harmony I are providing nuclear accident preparedness skills to medical responders for the first time in the NIS. “Over the years, the training to deal with these issues has always been reserved for highly technical people, and has not really extended to the initial providers,” says Hirsch. “The whole purpose behind this program is to take existing knowledge—nothing that we are teaching has not been known for years and years—and package it in such a way that it is available to average first responders, so they can be ready to recognize and treat patients and not to panic.”

Although she says that the number of nuclear accidents that have occurred in

these countries is relatively small thus far, Levy emphasizes the importance of exercises such as Harmony I. “The threat is real. There are over 60 Soviet-style power reactors in use in this part of the world. Some of these countries obtained about 70 percent of their energy needs through these reactors, and now they don’t have the money to retrofit them, much less maintain them.”

Both Dr. Hirsch and Levy agree that the International Medical Education and Harmonization Program for Nuclear Accident Preparedness can be an effective model for replication in other areas of the world, such as West Asia and Latin America. As for other former Soviet countries, Levy says, “We have requests and demands from neighboring countries to institute the program there. The sign-up sheet is getting very long. High-level officials such as Deputy Ministers are becoming aware of grassroots programs that aim to teach basic-level responders these skills.” According to AIHA Executive Director James Smith, who attended the Yerevan exercise, AIHA and IAEA are currently discussing strategies to extend the harmonization training program to AIHA-sponsored EMS training centers in other NIS and CEE countries next year.

In the meantime, the program will continue to build its team of trained instructors in participating countries through educational seminars and team-building exercises. Future exercises built on the lessons learned from Harmony I are currently being discussed, paving the way for more comprehensive preparedness programs in regions of the world where the threat of a nuclear accident is very real.

Barbara A. Gabriel is a staff writer at AIHA.

In the print version of *CommonHealth*, the text on this page was found on page 52 as a jump.