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LESSON LEARNED

Radiological Incident Response: Post-Release Psychological Management

SUMMARY

Emergency managers should establish psychological support mechanisms for victims, emergency responders, hospital personnel, and the public following an incident involving the release of radioactive material. Teams of mental health experts should be integrated with other responders following radiological events.

DESCRIPTION

On September 13, 1987, two men stole an orphaned radiotherapy unit source from an abandoned medical clinic located in downtown Goiânia, Brazil. The unit consisted of approximately 20 grams (1,375 curies) of Cesium-137 (Cs-137) in the form of cesium chloride salt. The material was sealed in two nested stainless steel containers to form a 5-cm diameter containment capsule.

The men were unfamiliar with the international radiation symbol and did not know that the source was radioactive. They dismantled the unit before selling it to a junk yard as scrap metal. In the process, they ruptured the container and released the Cs-137 contaminating themselves, family members, and the environment. A number of people became fascinated by the radioactive powder that glowed blue and rubbed it on their skin.

Goiânia is the capital of the Brazilian state of Goiás. The city is located 1,000 miles from Rio de Janeiro and 600 miles from Sao Paulo. It had approximately 1 million inhabitants at the time of the incident. The incident occurred in one of the poorest sections of the city, where adult literacy was limited.

On September 29, the junkyard owner's wife grew concerned about her sick relatives and took a bag of the powder to the local hospital by bus, contaminating additional people and facilities in the process. A local physician recognized the symptoms of acute radiation syndrome and alerted the Comissão Nacional de Energia Nuclear (National Nuclear Energy Commission, or CNEN). The CNEN, in turn, requested assistance from the International Atomic Energy Agency (IAEA) after realizing the magnitude of the incident.

The Goiânia incident resulted in the highest levels of Cs-137 contamination ever clinically recorded. Two hundred forty-nine people were found to be contaminated out of 112,000 people monitored. Four people died in the weeks after the release. One of the deceased was Leide das Neves, a six-year-old girl who played with the radioactive material for several days and had to be buried in a lead coffin sealed in concrete.

Psychological Impact

The Goiânia accident had an immediate and profound psychological impact on the population, the victims, and emergency responders. Brazilian authorities did not establish psychological support mechanisms for people affected by the Cs-137 release. Categories of people distressed by the release included:

- Victims showing symptoms of radiological exposure who were hospitalized at selected facilities;
- Hospital personnel directly involved in the treatment of contaminated victims;
- Emergency personnel involved in first response and decontamination operations; and
- The public at large.

The IAEA report, *The Radiological Accident in Goiânia*, maintains that "the accident in Goiânia had a great psychological impact on the Brazilian population owing to its association with the accident at the Chernobyl nuclear power station in the USSR in 1986. Many people feared contamination, irradiation and damage to health; worse still, they feared incurable and fatal diseases."

Hospitalized Victims

Goiânian authorities did not establish psychological support mechanisms for the hospitalized victims. Without this support, victims reacted with fear, anxiety, and aggressive behavior. Contaminated victims were hospitalized at one of three healthcare facilities based on their level of contamination and severity of their symptoms:

- **The State Foundation for the Care of Minors (FEBEM)** treated victims with light external or internal contamination. These victims were mostly teenagers who became increasingly aggressive as symptoms started manifesting. Many of these patients threatened to contaminate others out of fear of rejection and death.
- **The Goiânia General Hospital (HGG)** treated people with light to moderate symptoms. As confinement became more oppressive, several patients attempted to harm nurses and doctors or to escape through windows. In many cases, patients had to be restrained and heavily sedated.
- **The Marcilio Dias Naval Hospital (HNMD)** in Rio de Janeiro treated victims with severe symptoms. The psychological condition of these patients deteriorated when the severity of their illness became evident. For instance:
 - On October 15, Roberto Santos Alves, one of the two men who had stolen the radioactive Cs-137 source, had his arm amputated after a series of tests. Several patients became uncooperative and refused medical tests thereafter.
 - On October 23, six-year old Leide das Neves Ferreira and another young woman died. After that, many patients stopped eating or sleeping, refused medications, and became violent.

Medical Personnel

Authorities did not establish psychological support mechanisms for medical personnel working with contaminated victims. As a result, anxiety and psychosomatic symptoms became common among doctors and nurses working with these patients.

Goiânian Medical Personnel

Many local doctors and nurses refused to assist contaminated patients due to fear of radiation exposure. The local medical personnel who volunteered to work with contaminated patients were often called "suicidal" by their colleagues and worked for almost six months in isolation.

Some doctors and nurses started presenting psychosomatic symptoms after the first two days of uninterrupted work with contaminated victims. These symptoms mimicked radiation syndrome, which includes headache, fever, and vomiting. Behavioral disturbances, depression, insomnia, and gastric problems also became common among hospital staff working with contaminated patients.

CNEN Medical and Radiation Protection Staff

The CNEN deployed medical personnel and radiation protection staff in support of local medical personnel on September 30. CNEN personnel had theoretical knowledge of radiation exposure. However, they did not have enough medical experience or understanding of psychological management principles to handle a radiological mass casualty event.

CNEN medical personnel had to work under stressful conditions with little assistance from the local healthcare community. Three CNEN physicians arrived at HGG on September 30 and discovered that twelve victims had been isolated in a hospital ward since the previous day. HGG medical personnel had left these patients without food, water, or medical assistance for fear of contamination. In addition, another patient with severe dermatitis had been left naked inside an ambulance near the hospital.

CNEN radiation protection staffs were often forced to serve as nurses and guards due to lack of personnel. CNEN personnel were isolated inside the hospital wards with the patients, often establishing close relationships with the victims. Consequently, CNEN staff were strongly affected by patients' injuries and pain and found their autopsies unbearable.

Emergency Response Personnel

Emergency response personnel were overworked, understaffed, and generally overwhelmed by the size of the event. Many responders were radiation specialists trained to respond to accident scenarios in radiation laboratories or reactor plants.

As a result, they were psychologically unprepared to deal with the complexity and magnitude of this accident. They did not know how to respond to the population's panic and sorrow. Several technicians found it especially distressing to dispose of toys, other children's items, photographs, and objects of sentimental value.

Extreme environmental conditions exacerbated responders' psychological stress. CNEN teams often worked for 15 hour shifts in 104 degree temperatures. Response personnel frequently had to wear protective clothes and perform strenuous manual work while giving moral and psychological support to the population. They were constantly surrounded by people asking for reassurance and information. Over time, many responders started manifesting psychosomatic symptoms resembling acute radiation syndrome.

The Public

Large segments of the Goiânian population panicked at the news of the release because they did not understand ionizing radiation principles. As a result, 40,000 people self-evacuated in four days. Many took off their clothes and burned them. A few people left the city altogether and tried to change their identities.

Some people became openly aggressive, believing that emergency responders and victims' families might spread the contamination. Victims, their families, and emergency response personnel were often discriminated against and treated with hostility.

- **Victims:** Approximately 600 people tried to stop the first two victims' funeral in a local cemetery. They blocked the hearse, stoned the caskets, and wrenched crucifixes and tomb stones in frustration.
- **Victims' Families:** Victims' families and people living near the contamination foci were ostracized after being evacuated. They were refused accommodation in many hotels or by their families and friends. At times, they had to resort to sleeping in the streets.
- **Emergency Response Personnel:** The public responded to the workers in protective suits with suspicion, fear, and, in some cases, even physical threats to the responders. Workers were instructed to accept offers of drinking water and food from people's houses to increase public confidence.

Screening the Public

On September 29, Goiânia's authorities set up a triage area in the Olympic stadium. Approximately 112,000 people demanded to be screened in the two weeks that followed. Five thousand of the first 60,000 people screened presented severe psychosomatic symptoms that mimicked acute radiation syndrome such as skin reddening and blisters, vomiting, and diarrhea. Some Goiânia residents showed up every day to be monitored. Over 8,000 people demanded to receive a "Certificate of Non-Contamination" following the examination. Many panicked and fainted while waiting in line.

Lesson Learned

Psychological support mechanisms should be available for victims, the public, emergency response personnel, and medical personnel working with contaminated patients after a radiological release. Teams of mental health experts should be integrated with these groups in any radiological emergency from the onset of incident response.

CITATIONS

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