Radiation Basics Made Simple

Segment 8: Responding to Radiation Emergencies

Many of you have heard the term CBRNE. It's an acronym for chemical, biological, radiological, nuclear, and explosive incidents. So, notice two of these letters stand for radiation emergencies: radiological and nuclear. And that distinction is really important. A nuclear incident involves a nuclear detonation, similar to what was detonated over Hiroshima and Nagasaki during World War II. All other radiation incidents are called radiological incidents. So even an incident involving a nuclear power plant would be classified as a radiological incident, because there is no nuclear detonation in there.

So, if an incident involves a nuclear detonation, it's a nuclear incident, and all others are called radiological incidents. And one reason for that is that the magnitude of destruction is so very different on these two types of incidents. A nuclear detonation causes an enormous number of casualties and injuries. It causes tremendous damage to infrastructure. There's widespread environmental contamination, and the response to such an incident is so large and involves so many response agencies to the extent it's not comparable to other types of radiation emergencies.

Radiological incidents can be devastating to the people and the environment in that immediate surrounding area. But the response to those incidents and the damage they cause is nowhere near the scale of even a small nuclear incident.

When we talk now just on nuclear incidents, even within that there are two types of nuclear incidents that we should know about. One type are strategic nuclear weapons. These weapons are very powerful, high-yield weapons, about 100 times more powerful than the bombs that were dropped over Hiroshima. And these were the types of bombs that we were concerned during the cold war because these types of nuclear weapons are developed and maintained by countries with advanced nuclear weapon technology. And it's not considered a likely threat today.

The other type of nuclear incidents are improvised nuclear devices; these are smaller nuclear weapons. This is a more plausible threat today. They're similar in size to the bomb that was dropped over Hiroshima in World War II. But these bombs, of course, can still produce an enormous number of casualties in an urban area.

Now shifting to radiological incidents, we have a range of different types of incidents that would fall into this category. We can have very localized, small transportation incidents. We could have incidents occurring at nuclear power plants, or we could

have acts of terrorism that involve radioactive materials. These could include what we call the radiological dispersal device; any device that's used to spread radioactive material.

It could include explosive and that we call a dirty bomb, because it's an explosive that has radioactive materials involved in it. Or it could be non-explosive in the form of liquid and spray radioactive materials– any form that's not explosive. Both are radiological dispersal devices; they disperse radioactive material in the environment. But as you can tell the extent of the damage is nowhere near what a nuclear incident would cause.

The other type of a potential act of terrorism is a radiological exposure device. That means when somebody hides a radioactive source someplace with the intention of causing harm to people. And that causes exposure, and of course panic. And that's the aim for any act of terrorism.

So, you can see when we talk about radiation emergencies, when we consider all these scenarios, we really have a wide range of scope in the type of radiation emergencies that we could potentially encounter. We might have small incidents that are handled locally, or we might have incidents that could require a large, national, and international response.

So how does public health respond to a radiation emergency? We can begin by looking at what public health does after any disaster, including natural disasters like hurricanes or earthquakes. Public health functions after any disaster include rapid assessment of health and medical needs of the community, providing mass care, making sure there's safe food and water, managing solid waste, handling of the deceased, and public service announcements, communication and so forth. These are all public health functions. And you can add many more to this list because public health has so many responsibilities after any type of emergency.

The difference here is that now we have to work in an environment that could be contaminated with radioactive materials, or an environment in which radiation levels could be higher than normal. And that complicates the response. So public health still has the same functions it does after any type of emergency, but now they have to offer it in an environment where there might be contamination or elevated radiation levels.

But sometimes, in some situations, radiation may not be the most important hazard. This is a picture of the federal building in Oklahoma City after the terrorist bombing in 1995. Now, imagine if this was a dirty bomb incident. Do you think radioactive contamination would be the major hazard to search and rescue personnel at a scene like this? Contamination would complicate the response, but in some cases hazards

like fire and structural stability will be a more pressing concern than radioactivity. And because we can measure radiation so well, it may be easier to manage than other hazards.

In the 2013 Boston bombing, the devices used were not dirty bombs. But if they were, many people would have been contaminated, including those seriously injured. In such a case, providing life-saving medical care takes precedence over decontamination. Additionally, people who left the scene would need to be screened for radioactive contamination.

To respond safely in a radiation emergency, emergency planners should work with radiation safety professionals to establish response protocols and train their staff and emergency responders. An additional process that public health officials will coordinate after a radiation emergency is population monitoring. Population monitoring is the process of screening people for radioactive contamination, providing decontamination services, registering people for long-term follow-up, and referring those who need it for medical treatment.

Population monitoring can be conducted in community reception centers that are established in communities around the impacted sites. This is certainly a community effort and would involve coordination among state and local public health, radiation safety professionals, emergency management and law enforcement, medical personnel, and organized volunteers.

Anyone in the area affected by a radiation emergency should follow protective action recommendations issued by public health and emergency management authorities. Depending on the location and type of incident, people may be told to stay inside for 12 to 24 hours, and possibility longer. If evacuation is necessary, people may be told to go to community reception centers for screening and evaluation. You can find more information about population monitoring, community reception center operations, and protective actions on our website.