Transcript: "Just In Time" Radiation Training Video for Hospital Clinicians

Centers for Disease Control and Prevention
Radiation Studies Branch

Scene 1: Narrator Introduction

Narrator: I am Dr. Jim Smith, a health physicist and Assistant Director for Radiation at the Centers for Disease Control and Prevention. The purpose of this program is to provide in-hospital healthcare providers with on the spot, just-in-time training on caring for patients exposed to radiation. This program assumes that a radiological terrorism event has occurred, probably resulting in mass casualties. It also assumes that you are a clinician who has just responded to Emergency Services.

The program has three parts: an introduction…a discussion about principles of radiation…and three patient scenarios to see how these principles apply to patient triage and treatment.

Narrator: To begin, here are some important points to keep in mind.

First, terrorists seek to create fear and panic above all else. The threat of exposure to radiation is especially frightening to people. You can play a vital leadership role in minimizing this fear.

Narrator: Next, be aware that when appropriate Personal Protective Equipment is worn, there is minimal risk to hospital staff who are caring for patients after a radiological event. Even if a patient is contaminated, it is highly unlikely that the levels of radioactivity would be high enough to pose a significant risk to health care providers.

Narrator: The same standard guidelines routinely used in hospitals for protection from microbiological contamination are also used for protection from radiological contamination. Wear a waterproof apron, cap, booties, and gloves. Tyvek type suits, another form of waterproof protection, may be more practical for use in wet areas, such as the decontamination zone. Double glove and change gloves frequently. Surgical masks are adequate, but if available, N-95 masks are recommended. Due to fetal sensitivity to radiation, indicate if you are pregnant, or think you might be, so that an alternate assignment can be made.

Narrator: There is one instance in which additional staff protection precautions may be needed. Fortunately, it is a highly unlikely occurrence. It is possible that fragments of radioactive shrapnel could become imbedded in wounds, generating higher radiation levels. This rare condition would be quickly diagnosed by a radiological survey upon the patient's arrival. Radioactive fragments should be promptly removed with forceps and sealed in lead containers.

Narrator: Next, it is important to understand how radiological contamination influences patient treatment. Patients without life-threatening injuries should be decontaminated before treatment. However, for those patients with life-threatening injuries, medical stabilization should take priority over radiological decontamination.

Narrator: Now finally, as you know, your hospital has an Emergency Response Plan and you should follow it carefully. For example, follow procedures for moving in and out of warm and cold zones.

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Narrator: Don PPE prior to entering a warm zone. Remove PPE in the buffer zone between the warm and cold zones.

Narrator: Surveying for contamination is another important procedure. Radiological contamination cannot be detected by the human senses. However, its presence is quickly assessed by radiation detection devices, such as survey meters. Your body will be surveyed as you go from the warm to cold zone. Only trained staff, as designated by your hospital's emergency response plan, should perform the surveys. Consistent technique and equipment should be used. The radiation survey meters are highly sensitive and will make noise as they pick up what are considered normal levels of background radiation.

Narrator: Remember, your hospital's procedures and policies will dictate your exact response. Procedures may vary if other contaminants, in addition to radiation, are involved.

Narrator: Now, let's review some key principles.

Scene 2: Radiation Principles

Narrator: First, radiation exposure. Exposure occurs when a person is near a radiation source. An example is when a patient receives a chest x-ray. To prevent occupational harm, the radiology technician is protected through distance and shielding. To prevent harm to the patient, the duration of exposure is carefully controlled. People do not become radioactive after exposure to common radiation sources. For example, after a chest x-ray, a person does not pose a risk to others.

Narrator: Consider the impact of a terrorist incident involving an unshielded radioactive source in a public place. Similar to a chest x-ray, people would be exposed to radiation. Those closest to the source for the greatest time would receive the highest exposure. Although they may become ill if the exposure is high enough, they would not become radioactive or pose any risk to others.

Narrator: Next, let's look at the principle of contamination. To become contaminated, radioactive material must get on a person's skin or clothing, or inside the body. For example, people could become contaminated if they were near an explosion of a dirty bomb, that is an explosive, such as dynamite, laced with radioactive material.

Narrator: Radioactive material on the outside of the body is called external contamination. Simply removing the clothing may remove the majority of the contamination. Gently washing the skin and hair can remove most of the remaining contamination.

Narrator: If a person ingests or inhales radioactive material, it can become incorporated in the organs of the body, and this we refer to as internal contamination.

Narrator: When treating a radiologically contaminated patient, it is important to contain the radioactive material. It may be helpful to think of this radioactive material as mud. When caring for an injured patient covered in mud, you would first ensure medical stability. When cleaning up the mud, you would handle it carefully, containing it rather than contaminating wounds or the surrounding area.

Scene 3C: Introduction to Patient Scenarios

Narrator: With these principles in mind, let's look at three patient scenarios involving radiological terrorism and see how the patient would be assessed, triaged, and treated.

Scene 4: Sucking Chest Wound

Narrator: The patient in this first scenario was exposed to radiation and contaminated by radioactive material. When a patient is critically injured, stabilize life-threatening injuries first and then conduct decontamination.

Triage Nurse With Radio: Yeah looks like it's a dirty bomb. We've gotten 30 patients so far, all self-referred, mostly walking wounded. They were all contaminated with radiation, no sign of any chemical use. HAZMAT just contacted us to confirm there's radiation at the site but no chemical agent was detected. EMS just radio'd in about a critical contaminated patient with a pneumothorax. Ok, out.

EMS: This is the patient we called you about with the sucking chest wound. The needle decompression worked for a while, but now he's not responding very well.

HP: We've got contamination here, looks fairly low level.

EMS: BP's 90/60. Respirations 30 per minute and shallow with retractions. He was maybe 50 feet from the dirty bomb explosion. He's got a deep wound on the right calf. Sinus tachycardia around 130.

RN: He needs a chest tube stat. Let's get his clothes off before we get him into trauma.

Narrator: Remove clothes as soon as possible, carefully rolling them away from the face and wounds to avoid internal contamination. This may remove as much as 90% of the external contamination.

Narrator: For patients with life-threatening injuries, medical stabilization should take priority over radiological decontamination. Your hospital should have a policy and procedure for performing radiological decontamination inside the facility. Note that in this last scenario, the decontamination team was still wearing all hazards PPE, since the hospital had just received confirmation that radiation was the only contaminant.

Scene 4A: Sucking Chest Wound in the Trauma Room

RN: Mr. Jones, are you breathing better? [Patient nods.] The bomb was laced with radioactive material. Now we got most of the contamination off when we removed your clothes. We're going to take a close look all over and if there's any more contamination we're going to wash it off.

RN: Ok, sir, I have some important questions to ask you. What time did this happen?

Patient: About 11:00.

RN: Where were you?

Patient: I was walking up Main, had just turned onto 7th.

RN: Did you lose consciousness?

Patient: No.

RN: And you remember when the bomb exploded?

Patient: Uh, yeah.

RN: Did you ever feel nauseated?

Patient: No.

RN: No vomiting or diarrhea? (Patient shakes head no). Ok, sir, it's important that you let me know if you feel nauseated.

Narrator: Duration of exposure, location, and time of onset of nausea and vomiting are major diagnostic factors.

Scene 4B: HP Done Surveying

HP: Ok, background radiation in the room is 35 cpm, we've got 200 cpm from face, 700 cpm from right hand, 600 cpm from left hand, 1200 cpm from the wound on the right lower leg. Did you write all that down?

RN: Yes, got it.

Scene 4C: Patient Decon

RN: Ok, Mr. Jones. You've still got some contamination left in certain spots, this wound on your leg, your hands, your face, but we're going to get that off now. First I'll flush out this leg wound, then I'm going to wash your face, your eyes, your nose, your ears – any orifices where contamination may have gotten in. Then I'll clean your hands. Ok?

Narrator: Use gentle, repeated irrigations to cleanse wounds, controlling the spread of contamination.

Narrator: Intact skin serves as a barrier against contamination, so do not irritate the skin. Use gentle, repeated washings rather than forceful scrubbing.

HP: Write this down: reading on right lower leg is 45 cpm, 35 cpm on the hands, face is 45 cpm. Now that's no more than twice background levels, so you can stop washing. We'll test him later for internal contamination.

Narrator: Cease washing when readings on the survey meter are no more than twice background, or remain unchanged.

Scene 4D: Wrap-Up

Narrator: The patient in this first scenario was both exposed and contaminated. You've seen how a critically injured patient should be triaged, life-threatening injuries stabilized first, and then decontaminated.

Let's look at what could happen with another type of radiological incident.

Scene 5: Homeless Woman

Narrator: This patient was exposed to radiation but not contaminated. She will not need decontamination and there is no risk to caregivers.

EMS: This patient was on the subway where they found the bag with the radioactive source inside. The bag was hidden under a seat. She was sitting next to the bag. They haven't found any contamination at the scene. She's homeless; she's been riding the subway all day, maybe six hours, in the same car. She's been complaining of nausea. Vital signs are stable.

HP: Looks like the levels are just normal background.

RN: It just hit the news that a radioactive source was found. We're expecting to get flooded with patients from that subway. Let's get her into room three.

Scene 5A: Homeless Woman in Urgent Care Bed

MD: Ms. Falano, how long were you on the train?

Patient: I dunno, since this morning.

MD: Have you been nauseated?

Patient: Uh huh. It's been goin' on awhile now.

MD: Did you vomit?

Patient: Uh, maybe once.

MD: It's important to know exactly when that was. Do you remember?

Patient: Um, maybe an hour ago.

MD: Ok, let's get a stat CBC with differential. Monitor her vital signs and keep me posted.

Scene 5B: Homeless Wrap-Up

Narrator: As you can see, this patient was exposed to radiation but was not contaminated. She will not need decontamination and there is no risk to caregivers. Serious systemic radiation injury, or acute radiation syndrome, will always induce nausea and vomiting. Sequential CBC's showing progressive declines in lymphocyte levels are considered diagnostic. Refer to an Andrews Lymphocyte Nomogram if you have one.

Scene 6: Uninjured Patient With Exposure and Contamination

Narrator: The patient is this scenario was both was both externally contaminated and exposed to radiation.

Patient: Help me! I'm covered in radiation! Someone help me please!

RN: Ok, calm down. You're going to be all right. But we have to help you so you have to calm down first so we can help.

RN: Come with me. We need to wash this dust off. Ok? Are you hurting anywhere?

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Patient: No, I was inside during the explosion, but afterwards I came out and I walked through this cloud of dust. Everybody's saying that it's radiation! I've been breathing this stuff in! Please help me, I'm really scared!

RN: We will, we will. We're going to get the contamination off and you'll be fine. Ok?

Scene 6A: Ambulatory decontamination

RN: Ok, sir, please put your valuables in this red bag. Then take this white gown and put it over your clothes. I'm going to have you undress underneath the gown and put your clothes in this orange bag. Then you're going to go through the shower. I want you to scrub well especially where you had no clothes covering your body. Someone will help you on the other side.

RN: Are you ok, sir?

Patient: I'm worried. Look, there's radiation in this stuff, isn't there?

RN: You're going to be all right. I know this is very upsetting. We need for you to walk over to our staff member over here (pointing). They're going to survey your body and make sure the contamination is gone. Then they're going to take you to another area where other staff members will talk to you about all of this and about radiation.

Scene 6B: Wrap-Up

Narrator: This patient was obviously externally contaminated and exposed, and will need further long-term screening. Expect many individuals to self-refer to the hospital, perhaps *hundreds*, depending on the event. Many will need decontamination. Many may seek radiological screening, but will not be contaminated. Many will simply seek reassurance. As with this gentleman, psychosocial needs may be the primary medical care focus. Psychological assessment and post-traumatic counseling services will be needed, as well as counseling on potential long-term health effects.

Scene 7: Conclusion

Narrator: As you apply these principles of exposure and contamination in treating patients, remember, you can play a major leadership role in minimizing the typical public fear of radiation. It is highly unlikely that radioactivity associated with a contaminated patient would pose a risk to care providers. For those patients with life-threatening injuries, medical stabilization should take priority over radiological decontamination. Follow these principles, your hospital's plan, and assume your assigned role. Your assistance here is of great value, and you will be supported by staff who have trained for this situation.