Potential Incidents

1. Unique Challenges of Radiation Events

a. Medical response infrastructure untested for major radiological event in the U.S.
b. Clinician inexperience with radiation injuries
c. Fear of radiation exposure expressed by public and caregivers
d. Large numbers of concerned people with little or no exposure
e. Could be an exceptionally large number of casualties

2. Differences Between Radiation and Biological/Chemical Exposure

a. Effects of radiation exposure have been extensively studied since WW II.
b. Radioactive contamination readily detectable with proper instrumentation
c. Radiation detectors widely available
d. Radiation detectors are reliable when properly maintained

3. Potential Terrorist Scenarios

a. Targeted attack on a nuclear installation
b. Radiological Exposure Device (RED), e.g., hidden radioactive source
c. Radiological Dispersal Device (RDD), e.g., "Dirty bomb"
d. Detonation of an Improvised Nuclear Device (IND)

4. Exposures From a Radiological Exposure Device (RED)	a. Radioactive devices stolen from industrial facilities/ hospitals b. Potential to expose people to lethal doses of radiation by hiding the source (s) c. Tens to hundreds of people could present with symptoms of acute radiation syndrome (ARS) d. Thousands could require monitoring: exposure and medical e. Case Study: Goiânia, Brazil, 1987 [1] • Radioactive source stolen from abandoned medical facility • Contamination spread throughout community • 249 exposed; 54 hospitalized, 8 with radiation sickness • Four people died • 112,000 people monitored (>10% of total population) Source: International Atomic Energy Agency (IAEA)
5. Can Terrorists Obtain Radioactive Sources?	a. 157,000 licensed users in U.S. b. 2,000,000 devices containing radioactive sources c. About 400 sources lost or stolen in U.S. every year
6. Radiological Dispersal Device (RDD)	a. Usually detonation of conventional explosive laced with radioactive material (“dirty bomb”) b. Significant radiation exposures not likely unless trapped near the source c. Tens to hundreds could present with conventional traumatic injury, external contamination and potential internal contamination d. Hundreds to thousands could present for radiological screening, counseling on health effects, or psychosocial trauma

7. Worst Case: Improvised Nuclear Device (IND)

a. Immediate national emergency would be declared with military disaster assistance
b. Could potentially kill/injure tens of thousands
c. Thousands could present with combined blast, burn and radiation injury
d. Hundreds of thousands could be displaced and require exposure and medical monitoring, decontamination, counseling
e. Major metropolitan hospital(s) could be destroyed or rendered inoperable
f. Energy release from improvised nuclear device
   - Radiation 15%
   - Heat 35%
   - Blast 50%
g. Examples of immediate effects of a one kiloton improvised nuclear device
   - Direct blast – Death to 200 yards
   - Thermal – 3rd degree burns to ½ mile
   - Radiation – 50% deaths to ½ mile

8. Electromagnetic Pulse (EMP) From a Nuclear Detonation

a. May result from detonation of an improvised nuclear device
b. Could affect area hundreds of yards or more away
c. Could damage or destroy electronic equipment, including computers, cell phones and power supplies

9. Summary

a. Radiation terrorist events are unique, but radiation is readily detected
b. A variety of scenarios exist for radiological and nuclear terrorism
   - These scenarios are possible, and radioactive sources are plentiful
   - Radiation exposures vary widely with different scenarios

Source: "Radiological and Nuclear Terrorism: Medical Response to Mass Casualties", a self-study training program for clinicians, developed by the Centers for Disease Control and Prevention, 2006.

For copies of this product, email cdcinfo@cdc.gov.

To learn more about responding to a radiological incident, visit http://www.bt.cdc.gov/radiation

[1] As a result of this accidental radiological dispersal event, 249 people were exposed to radiation or contaminated with Cs-137. Fifty-four people were hospitalized, 8 with radiation sickness, 4 of whom died. However, the important public health message to remember from this incident is that, although only 249 people in the city of Goiânia were significantly exposed by this incident, 112,000 people sought monitoring for contamination and screened for exposure. That is 10% of the total population of Goiânia.

Furthermore, it is important to note, that this event was first identified approximately 10 days after the powder was first released from the unit. And the person who made the discovery was a physician working in a public health clinic when a patient with radiation sickness came to him seeking treatment.