

Virginia Department of Health
Radiation Injuries: Overview for Healthcare Providers

Agents/ Characteristics	Hundreds of radioisotopes are in use. Health risk varies based on level of exposure and chemical and physical properties of the isotope (biological and physical half-lives, type and energy of radiation emitted). Highly radioactive material is often contained within steel capsules or pellets; however, radioactive material may exist in any form (liquid, solid or gas). Certain radiation-producing machines, such as accelerators, cyclotrons and industrial x-ray machines can produce life-threatening injuries.
Dose	Acute whole body exposure > 50 rem may cause one or more of the acute radiation syndromes. Exposure to radiation at any level may increase long-term risk of cancer.
Potential Sources	Industrial radiography and irradiators, radiation teletherapy machines and brachytherapy devices, radioactive research material, dirty bombs and nuclear bombs
Route of Exposure	Radioactive material presents a hazard from either external or internal exposure through: <ul style="list-style-type: none"> • Exposure to energy beam emanating from radioactive material • Direct skin contact with radioactive material • Wound contamination from trauma caused by an explosion containing radioactive material • Inhalation of radioactive material dispersed into the air by explosion • Ingestion of food or water contaminated with radioactive material
Contamination/ Decontamination	Use standard precautions to prevent exposure to radioactive material from potentially contaminated patient clothing, especially outer clothing. However, contaminated clothing poses little health risk. <u>Contamination:</u> Contamination results when loose particles of radioactive material become airborne and settle on surfaces, skin or clothing. Internal contamination may result if the particles are inhaled, ingested or enter the body through breaks in skin. <u>Decontamination:</u> Treating life-threatening injuries takes priority over decontamination. When possible, decontaminate outside of hospital by clothing removal (double-bag) and soap and water rinse. Do not use irritants or methods that may abrade skin. Flush eyes with water or sterile saline.
Risk Indicators	Occupations involving the use of radioactive material or radiation-producing machines; proximity to a release of, or explosion containing, radioactive material
Case Fatality	Depends on dose, type, site, duration of exposure. Radiation exposures are rarely large enough to cause immediate death, and those limited to extremities are usually not fatal. High doses to the whole body over a short time cause the greatest risk, especially from external and penetrating sources. Fatalities may also result from trauma due to the fire/explosion associated with the radiation exposure.
Latency Period	Whole body exposure: dose dependent; usually 1- 6 hours Cancer: 10+ years for lung cancer and 30+ years for leukemia
Clinical Manifestations	First symptoms include nausea, vomiting, diarrhea, possibly skin damage. Symptoms may come and go. One or more of the following syndromes may develop, depending on dose: <ul style="list-style-type: none"> • Bone marrow: anorexia, fever, malaise, low blood cell counts, infection, hemorrhage. Most recover. • Gastrointestinal: fever, severe diarrhea, dehydration, electrolyte imbalance, infection. Few recover. • Cardiovascular/CNS: nervousness, confusion, seizures, coma, circulatory collapse. No one recovers.
Laboratory Tests/ Sample Collection	Measure CBCs on persons with symptoms, repeat every 6 hours for 72 hours if possible. Collect urine and feces if internal contamination is suspected. A trained hospital technician may perform a radiation survey. Government officials may request clinical, environmental or clothing samples for testing. Consult the radiation safety officer of patient's employer if occupational exposure is suspected.
Radiography	As clinically indicated
Treatment	Treat symptoms and wounds. Mental health support may be needed. Consult with public health officials and nuclear medicine specialist (if available). In cases where patient dose exceeds 5 rem, public health officials will refer physician to REAC/TS.
Post-Exposure Prophylaxis	Indicated only for internal exposures to high doses of specific radionuclides (e.g., iodine, plutonium). Consult with public health officials on these cases.
Public Health	All suspected radiation injuries should be reported immediately to the local health department. Other officials may be notified as appropriate.