

RADIOLOGICAL DISPERSION DEVICE (“DIRTY BOMB”): Health Care Information

A radiological dispersion device, or “dirty bomb,” is a traditional explosive device that is wrapped in, or attached to, radiological material. The majority of injuries produced will be traumatic and the contamination is that of radiological particles on the skin and clothing. Radiological particles emit radiation that produces free radical damage to tissues and alters DNA, protein and cell membrane structure.

Health care workers are not at risk of radiation burns or sickness, as long as the particles are not inhaled/ingested or left in close proximity to their skin for a prolonged period of time.

Recognition and Triage: Victims of a “dirty bomb” will not have radiation-related injuries upon arrival to health care. Symptoms in the initial health care setting will depend on the extent of their traumatic injuries. Radiation-related injury may develop over hours to days and is dependent on the amount of particles that are both incorporated into the patient’s body (by ingestion, inhalation or traumatic wound) and the amount of time particles remain in close proximity to the skin and mucous membranes (amount of contamination).

Patients should be triaged according to their traumatic injuries. Patients with significant trauma can be treated in the ED after clothing removal without water decontamination. A surgical cap should be placed on the patient to protect health care workers from contamination. These patients should be stabilized, surveyed for contamination and then decontaminated with copious water if necessary.

Those patients with stable injuries or without symptoms can be screened for radiation particles and should be decontaminated only if the radiation is higher than two times the area’s baseline or if focal contamination is found.

Personal Protective Equipment (PPE) (at the health care site): Health care workers handling contaminated patients require splash protection to prevent exposure of skin and mucous membranes to radioisotope particles (e.g., cap, gown, booties, surgical mask, eye shield and gloves). Gloves should be taped to the gown and booties taped to the gown or pant to prevent runoff of contaminated water into gloves and boots. A second pair of gloves should be worn and changed frequently. Healthcare workers handling patients who have been surveyed and have no contamination require only universal precautions.

Decontamination (at the health care site): Patients may be surveyed with a Geiger-Muller counter to determine if they are contaminated. Contaminated patients should have all clothing and jewelry removed, and exposed skin should be thoroughly washed with soap and water for 3 to 5 minutes. After this initial decontamination, the patient should be surveyed with a Geiger-Muller counter to determine that they are clean.

Because contamination is a very low risk for health care workers, patients with life-threatening traumatic injuries can be treated prior to decontamination. They should have their clothing removed and a surgical cap applied to their head. They should then be stabilized, then undergo a more thorough decontamination with copious water until Geiger-Muller counter readings are less than two times the area baseline and no focal contamination is found.

While removing clothing from a contaminated patient, the clothing should be CUT OFF and rolled in a direction away from the patient’s face. This is done to decrease the amount of particles that the patient inhales and to avoid making particles air-borne. Clothing should be double-bagged and stored outside of the ED.

When decontaminating a patient with water, their head should be thoroughly washed first while the patient bends forward, if possible. This allows the particles to run off the patient and not onto their skin or into their mouths. The face is washed next, then any open wounds. Wounds need thorough cleaning to prevent incorporation of the particles in the body. The body may then be showered until Geiger-Muller counter readings are less than two times the area's baseline. Clean towels that are used to dry the patient should be double bagged and stored outside the ED.

The treatment area will most likely become contaminated. Entrance and exit from the area should be monitored. The hospital radiation safety officer can help with this monitoring and surveying. Entrance into the dirty area requires personal protective equipment to prevent contamination, including gown, gloves, boots (with gloves and boots taped to the gown), mask and splash shield.

Diagnosis and Treatment: Radiation is not detectable without a Geiger-Muller counter and patients will have no signs from radiation on arrival. Patients must be surveyed in order to make the diagnosis. Treatment will be dictated by the victim's traumatic injuries.

The hospital radiation safety officer and the Radiation Emergency Assistance Center/Training Site (REAC/TS: phone 1 865 576 3131) should be contacted. If internal contamination of patients is suspected, then samples of patient feces, vomitus and urine should be collected to determine the isotope. If the patient was exposed to airborne radiological particles, a nasal and pharyngeal swab should be surveyed with a radiation survey instrument (e.g., Geiger Muller counter) to determine if the patient has inhaled or ingested isotope. Pulmonary or gastrointestinal decontamination and admission to the hospital may be required for patients with significant internal contamination. If radiological particles are detected on the skin (by a radiation survey instrument), they should be washed off with soap and water for 2 minutes, followed by a re-survey.

Once the isotope is identified, particular treatment protocols may be helpful; discuss the case with REAC/TS (1 865 576 3131) or the Poison Control Center (1 800 222 1222) to determine if a patient requires additional antidotes.

<u>Radionuclide</u>	<u>Antidote/Medication</u>
Iodine	Potassium iodide 130 mg PO x 1
Uranium	Bicarbonate (2 amps NA Bicarb in 1 L NS at 125 cc/hour)
Cesium/Thallium	Prussian blue 1 gram PO TID
Tritium	IV normal saline
Plutonium/Yttrium	Ca-DTPA (or Zn-DTPA) 1 gram in 250 cc D5W over 1 hour

Patient Monitoring: Monitoring is based on the patient's traumatic injuries, not on radiation.

Disposition Criteria (when to send patient home): Patients with traumatic injuries that warrant admission should be admitted to the hospital. Patients who have no internal or external contamination (either by history or survey) and do not require admission for traumatic injuries may be discharged to home.

Reporting/Coordination Link: Call the Poison Center (1 800 222 1222) for information on specific patients. Contact the local or state public health authority to report a mass casualty incident (see attached contact list).