

RADIOLOGICAL TERRORISM

Rapid Response Card for EMS Personnel

This guide provides Emergency Medical Services (EMS) staff and other health care providers with basic information to manage radiologically-contaminated patients, or patients who received a large dose of radiation from an external radiation source. This guidance is applicable in all radiological incidents, including terrorism. The format is designed to be a quick reference guide for use during emergencies, but it is important to become familiar with the information in advance. While this rapid response card is directed at those who would provide medical management, the concepts discussed will be of practical use by all first responders.

PHONE NUMBERS:

New York State Department of Health (NYSDOH)

Bureau of Environmental Radiation Protection	518-402-7550
Wadsworth Center Laboratory	518-473-4854
After hours: NYSDOH Duty Officer	1-866-881-2809
After hours: SEMO State Warning Point (SEMO – State Emergency Management Office)	518-457-2200

New York City Department of Health

Bureau of Radiological Health	212-676-1572
After hours:	212-764-7667

Your County Health Department

Consult phone book blue pages under “County Offices”
Poison Control Centers **1-800-222-1222**

MEDICAL PREPAREDNESS REFERENCES AND RESOURCES

<http://www.orau.gov/reacts/guidance.htm>
<http://www.afri.usuhs.mil/>

Management of Persons Accidentally Contaminated with Radionuclides.
National Council on Radiation Protection. NCRP Report No. 65 (1980).

*Management of Terrorist Events Involving
Radioactive Materials.* National Council on Radiation Protection.
NCRP Report No. 138 (2001).

EXPOSURE VS. CONTAMINATION

External Radiation Exposure: Radiation exposure occurs when a person is near a radiation source. Persons exposed to a radiation source do not become radioactive. For example, an x-ray machine is a source of radiation exposure. However, you do not become radioactive when you have an x-ray taken.

Contamination: Radioactive contamination results when loose particles of radioactive material settle on surfaces, skin, or clothing. Internal contamination may result if these loose particles are inhaled, ingested, or lodged in an open wound. Contaminated people are radioactive and should be decontaminated as quickly as possible. However, the level of radioactive contamination is unlikely to cause a health risk to another individual.

RADIATION EXPOSURE AND CONTAMINATION EVENTS

There are four types of radiation accident victims:

1. **A person who has received a significant dose from an external source(s).** This includes an exposure to a large radiation source over a short period of time or exposure to a smaller radioactive source over a longer time frame. Such exposure will cause symptoms that depend on the amount of exposure. This includes nausea, reddening of the skin and fatigue. An extremely high exposure may result in death of the victim. These symptoms may not appear immediately; it may take several days or weeks before symptoms are observed. (See Recognizing Radiation-Related Illnesses) ***Externally exposed patients do not become radioactive and therefore they do not pose a risk to EMS or other first responders. Do not delay medical attention.***
2. **Internal contamination from inhalation and/or ingestion of radioactive material.** Patients are not likely to exhibit any symptoms related to radiological contamination. Internal contamination needs to be assessed and treated in a clinical setting (emergency department). It is extremely unlikely that the level of internal contamination would be sufficient to cause an external exposure hazard from the patient to EMS and other first responders. A person who has inhaled and/or ingested radioactive material is very likely to also have external contamination (see the next item).

3. **External contamination of the body surface and/or clothing by liquids or particles.** Patients are not likely to exhibit any symptoms related to radiological contamination. A person who is externally contaminated is likely to also have internal contamination from breathing contaminated dust/dirt/air. (Internal contamination needs to be assessed and treated in a clinical setting). The amount of radioactive material expected to be on the surface of the victim is not likely to cause a radiation hazard to EMS or any first responder. In most cases, external skin contamination is not life threatening and can be removed with soap and water.

Use of Universal Precautions will help prevent the spread of contamination to emergency responders. *Emergency responders should not delay treatment of victims due to fear of becoming contaminated with radioactive materials.* The victim should be handled in a manner that will reduce the potential spread of contamination to other individuals and medical equipment (e.g., stretcher, ambulance).

External contamination is likely in the situation with a radiological dispersal device – a so-called “dirty bomb.” In a dirty bomb event, the major hazard to health and safety is the explosion itself and/or injury from shrapnel. An exception would be when a fragment of a high activity radiation source pierces the victim. In that situation, an external exposure hazard may exist.

4. **A combination of the above.** In this situation, using the guidance for external contamination is warranted.

PRECAUTIONS

Contamination: UNIVERSAL PRECAUTIONS should be used in any situation where the presence of radioactive materials is suspected. Persons entering a radiological area, sometimes referred to as a “Hot Zone”, may be directed to wear overshoes and a dust mask. Rescuers (i.e., fire department) should move victims out of the hazard area (for example a fire, compromised structure or vehicle) to a location where EMS can attend to the victim’s medical needs.

External Radiation Exposure: The three cardinal rules of radiation protection for external radiation exposure (not contamination) from a radiation source are time, distance and shielding.

- **TIME** – The less time you spend near the radiation source, the lower your exposure will be.
- **DISTANCE** – The greater your distance from the source, the less your exposure will be. Radiation exposure decreases with distance according to the inverse-square law. That is, if you triple your distance from the radiation source, your exposure will decrease by a factor of 9 (three squared).
- **SHIELDING** – External exposure to radiation can be partially blocked by the use of shielding. Traditionally, shielding is made of lead or concrete. However, staying behind vehicles, buildings, or other objects will also decrease exposure.

HEALTH AND SAFETY RISK TO EMS

It is important to understand that a person who has been exposed to radiation is unlikely to pose a radiological health risk to any other person. However, if a relatively high activity gamma source (external exposure) is present at the emergency site, it is possible for an individual to receive a radiation dose that could pose a health risk. It is anticipated that hazardous materials (HAZMAT) personnel will have made an initial radiological assessment, and specific safety precautions will be given.

RADIOLOGICAL ASSESSMENT

First responders, fire fighters, or HAZMAT, may have performed an initial assessment or screening for the involvement of radioactive materials. Ask the incident commander (IC), or fire/HAZMAT Chief, if radioactive materials have been identified or are suspected. If contamination is identified or suspected, assume that the victim has external contamination.

The IC will likely have set up a “Hot Zone” to limit access to a contaminated area. Responders working in the hot zone should limit their time in this zone to what is necessary to assist victims. The incident commander should position EMS outside of the hot zone so that patient triage/treatment can be done safely. Patients should be decontaminated prior to delivery to EMS, if possible.

RECOGNIZING RADIATION-RELATED ILLNESSES

Determining that someone has been exposed to radiation can be difficult in situations other than catastrophic events (nuclear detonations and severe nuclear power plant accidents). Effects of exposure and/or contamination will not appear immediately following exposure. It can take days or weeks to see symptoms. Some symptoms can be similar to those for chemical exposure.

In most cases, there will be no immediate symptoms of radiation exposure or contamination. The following clinical clues suggest a possible radiological terrorist event:

- The acute radiation syndrome follows a predictable pattern that unfolds over several days or weeks after substantial exposure or catastrophic events. See below for specific symptom clusters.
- Victims may present individually over a longer period of time after exposure to unknown radiation sources.
- Specific symptoms of concern, especially following a 2-3 week period with nausea and vomiting, are:
 - thermal burn-like skin lesions without documented heat exposure;
 - a tendency to bleed (nosebleeds, gingival (gum) bleeding, bruising);
 - hair loss.
- Symptom clusters as delayed effects after radiation exposure:
 - Headache, fatigue, weakness
 - Partial and full thickness skin damage, epilation (hair loss), ulceration
 - Anorexia, nausea, vomiting, diarrhea
 - Reduced levels of white blood cells, bruising, infections

GUIDELINES FOR EMERGENCY MEDICAL MANAGEMENT

1. **USE UNIVERSAL PRECAUTIONS** to help prevent the spread of contamination from injured victims to emergency personnel.
2. **Assess and treat life-threatening injuries immediately.** Treatment of such patients takes priority over all other activities, including decontamination. Do not delay advanced life support if victims cannot be moved, or to assess contamination status. Perform routine emergency care during extrication procedures. Do not delay medical attention for victims with life-threatening injuries.
3. **Move victims away from the radiation hazard area, using proper patient transfer techniques to prevent further injury.** Stay within the controlled zone if contamination is suspected.
4. **Expose wounds and cover with sterile dressings.** Priority efforts should be directed to decontamination of open wounds.
5. **Victims should be monitored at the control line for possible contamination only after they are medically stable.** Radiation levels above background indicate the presence of contamination. Remove the contaminated person's clothing, provided removal can be accomplished without causing further injury.
6. **Contaminated patients who do not have life-threatening or serious injuries may be decontaminated on site.** Removal of the patient's clothing may reduce the contamination by up to 90%. Place such items in a plastic bag (double bag if possible) and label with the person's name and location (incident site). These items may be analyzed later to determine the specific isotope and extent of contamination. These items may also be legal evidence.
7. **Flush eyes with water or sterile saline. Irrigation or washing of skin with tepid water and a mild soap is effective for initial decontamination.** Do not use irritants or methods that may abrade the skin, as this could cause internal contamination. It is not necessary to collect the water that was used for decontamination. However, do not let that water contaminate other persons or equipment.

8. **Move the ambulance cot to the clean side of the control line and unfold a clean sheet or blanket over it.** Place the victim on the covered cot and package for transport. Do not remove the victim from the backboard if one was used.
9. **Package the victim by folding the stretcher sheet over and securing the patient in the appropriate manner.** This prevents spread of contamination to the ambulance.
10. **Before leaving the controlled area, rescuers should remove protective clothing at the control line.** If possible, the victim should be transported by personnel who have not entered the controlled area. Ambulance personnel attending victims should wear gloves.
11. **Notify proper authorities and hospital.** Let the hospital know that you are dealing with radiological victims, and provide an estimate of how many persons, their medical conditions, any known radiological information and an estimate of your arrival time. Ask for any special instructions the hospital may have. You may be directed to an entrance other than the routine emergency department entrance for the purposes of radiological contamination control.
12. **Transport the victim to the hospital.** Follow the hospital's radiological protocol upon arrival. Hand-off patients in a manner which reduces the likelihood of spreading contamination. Wrap the patient in a second clean sheet for transfer at the hospital.
13. **The ambulance is considered contaminated until proven otherwise or decontaminated.** However, you may be directed to use the same ambulance for additional trips to the same event site prior to being "clean-released."
14. **Have yourself surveyed and decontaminated as necessary.**

DECONTAMINATION GUIDELINES

Proper decontamination of patients is important to prevent contamination of facilities and equipment and to prevent exposure to other individuals. Immediate removal of the patient's clothing can remove up to 90% of the contaminant. Removed clothing, bagged and sealed to prevent spread of contamination, should be retained as possible evidence.

After clothing is removed, the patient's skin and eyes may need to be decontaminated. In most cases, decontamination of the skin can be accomplished by gently washing with soap and water followed by a thorough water rinse. It is important not to abrade the skin during washing or rinsing, as this can lead to internal radioactive contamination of the patient. For eyes, flush with plenty of water.

TREATMENT AND DECONTAMINATION RULES

- Patient with life-threatening condition: treat, then decontaminate.
- Patient with non-life-threatening condition: decontaminate, then treat.
- Uninjured contaminated persons should **NOT** be directed to medical facility; they should be decontaminated on site.
- Externally irradiated patients are not contaminated.
- Exposure without contamination requires no decontamination.
- Treating contaminated patients before decontamination may contaminate equipment, vehicles and the facility. Plan for patient decontamination before arrival if not medically contraindicated.
- For contaminated patients, **use Universal Precautions**, remove patient's clothing, and decontaminate with soap and water.
- For internal contamination, contact the Radiation Safety Officer and/or a Nuclear Medicine Physician at the hospital. Internal contamination will have to be assessed and treated at a hospital.

USE OF POTASSIUM IODIDE

In the event of a severe nuclear power plant accident, health officials may direct the use of potassium iodide (KI) tablets to protect the thyroid from exposure to radioactive iodine. KI saturates the thyroid with non-radioactive iodine to minimize the uptake of radioactive iodine isotopes. It must be taken within the first few hours after exposure to be effective. Persons allergic to iodine or shellfish should not take KI.

Note: KI is only effective for protecting the thyroid gland from radioiodine exposure.

