HOSPITAL PREPARATION

Hospital Care Provider 1

Radiological Exposure & Contamination

The hospital staff's incident operations is key to the success of the setup, management, recovery, and public information for the incident. Assigning staff positions to perform the specific tasks needed to care for and treat the patient is the primary goal. Listed below are three assignment functions that can be used as guidance for the preparation, setup, and management of a radiologically contaminated patient. The hospital support staff from any or all of the following departments can be assigned the preparation, setup, and patient management tasks (Maintenance, Engineering, Nuclear Medicine, Security, Housekeeping, Administration, Physicians, Nurses, Radiation Safety Officer, and Public Information Officer).

Preparing the Radiation Emergency Area (REA)

As needed, initiate an Emergency Department Information System (EDIS).

The steps listed below are suggested to minimize the spread of contamination:

Outside REA

- Provide bullhorn or megaphone
- Setup portable structure and establish a water supply
- Ensure the following equipment is available to receive the patient(s):
  1. Gurney(s) with multiple sheets
  2. Emesis basins/collection containers
  3. Survey meter(s) and, as available, dosimetry
  4. Waste container(s) lined with plastic bags

Inside REA

- Identify the location of treatment room(s)
- Protect the floor surfaces with paper covering along the patient receiving area and pathway to treatment room(s)
- Remove unnecessary equipment/carts from the treatment room(s)
- Cover wall/ceiling mounted equipment with plastic sheeting or butcher type wrapping paper
- Cover light switch(es) with plastic sheeting/tape
- Cover floor and wall for splash protection
- Establish a water supply and a drainage system. A morgue/embalming type table for containment and easy draining is a good option
- If room is not designed for negative air pressure, consider HVAC operations as a possible spread of contamination; close or seal off conditioned air supplies

Preparing the Primary Care Providers to Treat the Patient

The steps listed below should be used to select, stage, and dress up/dressdown in the necessary personal protective clothing.

Establish a clean area for the personal protective equipment (PPE) staging area and care provider dress up area. The clean area should be marked and easily identifiable.

Select/inspect and dress up in the appropriate PPE:

- Disposable coveralls with headcover/hood
- Eye protection/face shield
- Respiratory protection
- Various colors and sizes of medical exam gloves
- Foot protection (boots or shoe covers)
- Masking type tape

Establish a decontamination dressdown area where care providers leaving the treatment room can stand and conduct a stand-in-place self-decontamination.

Dressdown from head to toe, carefully placing removed protective clothing in appropriate waste container(s).

Once all PPE has been removed, use a contamination survey meter to conduct a whole-body survey.



Preparing Supplies to Treat the Patient

Select and stage necessary supplies for treating/decontaminating contaminated patient(s).

Supplies needed include:

- Cotton tipped applicators
- Sterile saline/water
- Bleach
- Iodine solution or other surgical soap
- Hydrogen peroxide
- Soft scrub brushes
- Medical equipment (suction, oxygen, IV solutions, airway intubation)
- Sharpie type pens
- Various sized plastic bags
- Sheets, blankets, towels, patient gowns
- Gauze of various sizes
- Masking/medical tape
- Five gallon bucket



This Quick Reference Sheet was produced by the U.S. Department of Energy Transportation Emergency Preparedness Program

For additional information, visit the TEPP website at: www.em.doe.gov/otem or phone (208) 528-8895

CONTAMINATED PATIENT CARE

Radiation Survey Techniques

Select and protect the appropriate instrument/probe/detector.

- Contamination survey instrument typically read out in units of CPM
- Hold the probe ½ inch from the surface being surveyed and move the probe slowly, approximately 1 - 2 inches per second
- If the count rate increases while surveying, pause for 5 - 10 seconds over the area to provide adequate time for instrument response
- If contamination is found, note the location, activity level/reading and continue surveying
- Become familiar with the jurisdiction's or state's guidelines for when an individual or object is considered contaminated. Often, an individual or material is considered contaminated if it reads 100 CPM or more above background

For radiation surveys remember exposure rate survey instruments usually measure radiation in units of milliroentgen per hour (mR/hr) or roentgen per hour (R/hr)

Cutaneous Radiation Injury (CRI) - CRI is injury to the skin from acute exposure to a large external dose of radiation. Presentation of CRI can include itching, tingling, or a transient erythema or edema without history of exposure to heat or caustic chemicals. Damage to the basal cell layer of the skin will result in inflammation, erythema, and dry or moist desquamation. In addition, radiation damage to hair follicles can cause epilation. Transient and inconsistent erythema (associated with itching) can occur within a few hours of exposure and be followed by a latent, symptom free phase lasting from a few days to several weeks.

Dose	Effect
300 Rem	Epilation (loss of hair)
600 Rem	Erythema (redness of skin)
1,200 Rem	Dry desquamation
3,000 Rem	Blistering or wet desquamation
5,500 Rem	Chronic Radionecrosis (long term)

Generalized Acute Dose-Response Effects - The whole body doses and effects listed are generalizations and a great deal of variability exists among people.

Dose	Effect
50 Rem	Blood count changes
100 Rem	Vomiting threshold
150 Rem	Mortality threshold
320 - 360 Rem	LD 50/60 (with minimal supportive care)
480 - 540 Rem	LD 50/60 (with supportive care)
800 Rem	100% mortality (with treatment)

Adapted from CDC Cutaneous Radiation Injury Fact Sheet for Physicians

Patient Decontamination Considerations

Survey the patient to determine the locations and levels of contamination, the isotope(s) involved, and provide documentation regarding the contaminant.

Save all solutions, foreign bodies, and swabs for isotopic analysis. Patient contamination can occur/be found in the following ways:

- **External Contamination** is contamination that is deposited on the surface of the patient, such as on their skin, hair or clothing
- **Internal Contamination** occurs when radioactive material is ingested, inhaled, injected (impaled), or absorbed
- **Incorporation** contamination is taken into the cells, tissues and organs. Specific organs such as liver, bone and thyroid can be involved, depending on the material absorbed

To prevent internalization/incorporation, the portals of entry (wounds, mouth, eyes, nose, and ears) should be addressed before intact skin.

Wound—Survey the wound with an appropriate instrument, survey dressings, exudate, and/or debride tissue for radioactivity.

Lacerations—Gentle irrigation will remove most of the contamination. Sometimes hydrogen peroxide or betadine surgical scrubs will be necessary. Often residual contamination will be found on the jagged edges of a wound and debridement may be necessary to remove it.

Puncture Wounds—Scrub the opening surrounding the wound. If that is not effective, a tourniquet or incision may be used to induce bleeding. Then scrub and cleanse.

Foreign Bodies—Treat as usual, locate and remove appropriately. Survey for radioactivity.

Thermal and Chemical Burns—In most cases, normal burn care in the Emergency Department will remove most of the radioactive material.

Orifices—Remove foreign bodies, swab, and irrigate.

Intact Skin—Wipe or irrigate the skin and gently scrub the skin with warm soapy water using a soft brush, such as a surgical scrub.

Medical Countermeasures for Internally Contaminated Patients

The most effective method of treatment is to prevent the internalization of the radioactive material. The method of treatment depends, in part, on the isotope and its chemical nature.

- **Decrease Absorption from Gut**—By decreasing the solubility of a radioisotope, the absorption of ingested radioactive material can be reduced and the material passed with the stool
- **Isotopic Dilution**—Administering large amounts of the stable isotope of the same element will increase excretion of the radioactive isotope
- **Block Incorporation**—Saturating the target tissue/organ with the stable isotope will reduce uptake of the radioisotope
- **Mobilizing Agents**—Chemicals that enhance elimination of the radioisotope from the body

More specific information about patient assessment and treatment can be found at: teppinfo.com/hospitalcare