

## LOUISIANA STATE UNIVERSITY HEALTH SCIENCES CENTER

### **RADIATION ACCIDENTS / EMERGENCY PROCEDURES**

Purpose: It is essential that emergency room personnel are familiar with LSUHSC procedures relevant to the handling of a radiation emergency situation involving contaminated/potentially-contaminated patient(s). The purpose of this policy is to see that the decontamination of such patient(s) is handled in the most effective manner possible to insure that the radiation dose received by the patient is as low as possible, and the dose received by other treating staff is less than the maximum permissible dose suggested by the NRC and Louisiana Radiation Program, and the hospital facility and the environment will not be contaminated.

Policy:

- I. Notification  
Emergency Room personnel shall receive notification of the pending arrival by phone or radio of a radioactive contaminated patient(s). The individual receiving the call shall obtain the following information from the notifier:
  1. Location of the accident
  2. How many people involved.
  3. How much radioactivity is involved, type, and form – example: 1 curie, I-131, liquid.
  4. Condition of patient
    - a. Has any trauma injury occurred other than radiation exposure.
    - b. Ambulatory or non-ambulatory.
    - c. Nausea and vomiting
  5. Get the name and phone number of caller in case more information regarding the incident is needed.
  6. Instruct caller/or ambulance service to bring patient to designated decontamination unloading area to be determined.
  7. Emergency Room will notify Switchboard of expected arrival of radiation contaminated person. Switchboard will immediately notify at work or home the following individuals:
    - a. Administrator / Administrator on-call
    - b. Safety Officer / Safety Officer on-call
    - c. Physicist
    - d. Nuclear Med Tech on-call
    - e. UPD
    - f. Environmental Services
- II. Authority to Deploy Decontamination Tent

1. The purpose of deploying decontamination tent is such that decontamination can be done outside of the hospital facility. Care must be taken to ensure the hospital entrance, hallway, etc., will not be contaminated and the hospital can continue to function normally.
  2. The Hospital Administrator / Administrator on call or the Emergency Room physician has the authority to have the decontamination tent set up if the possibility exists we might receive contaminated patients. Whoever gives the order to set up the decontamination tent shall notify the following:
    - a. Environmental Services –
      - i. Supply trained personnel to set-up decontamination tent on side of ER circular driveway.
      - ii. Tend and decon supplies are located in the Hospital Power Plant, room SG-11. Water and electrical connection are located inside Hospital Power Plant.
      - iii. Safety will unlock side door and equipment room in Hospital Power Plant during normal hours. After hours and weekends, UPD will unlock the decon supplies and tent room.
      - iv. Obtain decon tent and set-up between white and yellow painted stripes on driveway. Lay foundation, set tent and inflate.
    - b. University Police –
      - i. Unlock north door of Power Plant and then open supply room door (labeled decontamination supplies) in Power Plant.
      - ii. Unlock south door leading into Radiology Oncology and ER drive door leading to elevator and bring elevator door down to ground level and lock out.
      - iii. Block off ER drive and allow only EMS vehicles access to ER.
      - iv. Allow only authorized personnel (those in PPE and patient waiting to be decontaminated) into disrobing and decontamination area.
      - v. Assist with set-up of tent.
- III. Personal Protective Equipment & Location
1. Carts containing proper PPE will be brought the ER Conference Room on the ground floor. The ER Conference Room will be used as a changing area. Barrels containing PPE will be brought to the area by the decontamination tent set up team. Staff that works in the decontamination area will not put on PPE until the first patient

has arrived. All employees working the decontamination area will wear full PPE as follows:

- a. Tyvex suit
- b. Gloves
- c. Boots
- d. Full face PAPR Respirator

IV. Responsibility of Decontamination Team

1. Emergency Room Physician – Takes charge of medical problems of patient.
2. Physicist/Nuclear Medicine Tech will immediately determine if the patient(s) is contaminated (internal and/or external) with radioactive matter. This will be determined with a portable Geiger-Mueller type survey meter.

If no radiation hazard exists, the patient will receive appropriate medical care without radiation precautions.

If significant detectable radiation is present, Physicist/Nuclear Medicine Tech will measure and record the radioactivity (milliroentgens per hour 1, 3, and 6 feet) for each patient.

All gowns and gloves worn by attending personnel are to be placed in bags, labeled and removed to an isolated area for radiation monitoring. After removing gowns and gloves, attending personnel will be monitored for radioactivity prior to leaving the treatment area.

If the patient has inhaled or ingested radioactive matter, the hazard to attending personnel will be determined and appropriate precautions established. Special procedures for collecting and dispensing of urine and feces will be initiated.

All patients will be observed for development of radiation effects and appropriate therapy administered.

3. Emergency Room Nurse – Assists physician and is responsible for collecting all specimens:
  - a. Laboratory (blood for complete blood cell count, typing and cross-matching, urine for analysis, etc.)
  - b. Swabs of contaminated area.
  - c. Monitors vital signs and records data.
4. Circulating Nurse – Assists team as needed:
  - a. Labels all specimens
  - b. Obtains all needed supplies from outside decontamination room from person stationed at door.

- c. Records on chart areas and levels of contamination as measured by the Chief.
- V. Decontamination Team
1. Emergency Room Physician
  2. Emergency Room Nurse
  3. Circulating Nurse
  4. Medical Physicist
  5. Nuclear Medicine Technologists
- VI. Instructions to Decontamination Team
1. Attach pocket dosimeter to clothes. Pocket dosimeter badge should bear your name.
  2. Primary physician will attach dosimeter at neck so it will not become easily contaminated. Check the reading and estimate exposure time to remain under 5 roentgens of exposure. Before reaching 5 roentgens the physician should then withdraw and attach the dosimeter to the next physician to take care of the patient.
- VII. Patient(s) Arrival
1. Physicist will check patient in ambulance on arrival for radiation levels.
  2. Physician – determines if patient is critically injured.
    - a. If so, he is immediately brought to Emergency/Decontamination Room whether or not his clothes have been removed.
    - b. If patient is not critically injured, his clothes are removed in the ambulance.
  3. Emergency Room Nurse – will bring a decontaminated stretcher, patient is transferred to stretcher and covered with plastic or cloth sheet.
  4. Ambulance Attendants – Stay by the ambulance until they and the ambulance have been monitored for contamination.
    - a. If non-contaminated, release for duty
    - b. If contaminated, follow Nuclear Medicine Physician instructions for decontamination
- VIII. Procedures for Decontamination of Patient
1. Physician – If the victim is critically injured, proceed first with life-supporting procedures with disregard to any radioactive contamination. Airway, breathing and cardiovascular status must be attended to before initiating decontamination.
    - a. Physical examination done by the physician
    - b. Required laboratory materials, electrocardiograms, and radiographs obtained as required by patient's condition.

- c. Procedures, fluid and drug administrations done as required to stabilize patient's condition.
2. Nurse – Patient evaluation
  - a. Remove patient's clothes. If removed in ambulance place in a plastic biohazard or radiation bag and seal.
  - b. Cotton swab samples of ear canals nose and mouth. Place each in plastic test tubes labeled with patient's name, the site and time. Stopper test tubes and place them in lead container for later analysis.
3. Physicist/Nuclear Medicine Tech –
  - a. Monitors entire patient, including back.
4. Circulating Nurse –
  - a. Notes in record, areas and amounts of contamination.
  - b. Obtains cotton swab samples of all contaminated areas and stores as above.

#### IX. Physical Decontamination of Radioactive Areas"

1. Gross Whole Body Contamination –
  - a. Remove patient's clothing
  - b. If areas of high levels of radioactivity are found, mark and localize.
  - c. Seal open wounds with plastic and/or waterproof adhesive tape to prevent contamination being washed into the wounds
  - d. Shower and wash with warm water and soap, taking care that the contamination from high-level areas is washed off rather than spread over the rest of the body. Do not abrade the skin. All contaminated water must be kept in appropriately marked barrels.
  - e. As soon as body contamination is lowered, begin wound treatment or, if no wounds are present, shift to localized skin decontamination.
2. Contaminated Open Wounds (These have first priority)  
Wipe separate sterile, moistened cotton-tipped applicators over the wound and area around the wound prior to treatment.
  - a. Encourage bleeding when possible.
  - b. Wash with copious amounts of normal saline for three minutes. Save contaminated saline in specially marked barrels.
  - c. Monitor with end-window G.M. Survey Meter; repeat step C as needed.
  - d. If contamination persists
    - Wash with 3% hydrogen peroxide
    - Consider surgical debridement

- Save and monitor all applicators and tissue removed. List the patient's name, date, time and location wiped.
  - e. Do not wash skin contamination into the wound.
  - f. Decontaminate skin around the wound.
  - g. When wound and skin are decontaminated, seal area with plastic or waterproof adhesive tape.
3. Contaminated Eyes
- a. The only treatment for cornea contamination is copious irrigation with water - stream should go in temple direction, away from medial canthus.
  - b. Sample irrigation fluid at frequent intervals, label samples and save for counting. Save irrigation fluid specially marked barrels.
  - c. After decontamination, treat irrigation-induced conjunctivitis.
4. Contaminated Ear Canals
- a. Be sure the canals are really contaminated and not the surrounding area.
  - b. Rinse gently with small amount of water; suction frequently.
  - c. Monitor and repeat step B as needed.
5. Contaminated Nose or Mouth
- a. Turn head to side or down, as patient's condition permits.
  - b. Rinse gently with small amounts of water; suction frequently.
  - c. Prevent water from entering stomach as much as possible.
  - d. Insert nasogastric tube into stomach; suction and monitor contents. If contents are contaminated:
    - Lavage with small amounts of normal saline until contents are clear of contamination
    - Begin decorporation.
6. Contaminated Intact Skin
- a. Mark the area of skin contamination.
  - b. Begin treatment of area of highest contamination.
  - c. Wash with soap and tepid water, gently scrubbing, using a gauze pad or a soft brush for three minutes.
  - d. **DO NOT INJURE OR ABRABE SKIN.** Avoid the reddening or irritation of skin with hot water or harsh scrubbing.
  - e. Survey frequently, using a G-M counter and record results. Put gauze pads used for decontamination in a plastic bag and label.
  - f. If contamination persists:
    - Use Lava soap or
    - Use mixture of ½ tide and ½ cornmeal

- If those fail to remove contamination, use Clorox either full strength for small areas or diluted for large areas.

7. Contaminated Hair

- a. Survey and record results
- b. Wrap or position patient to avoid spread of contamination.
- c. Shampoo with mild soap for three minutes and rinse. Save all contaminated fluids in appropriately marked barrels.
- d. Monitor and repeat step C as needed.
- e. If contamination persists:
  - Clip hair off
  - DO NOT SHAVE SCALP OR OTHER HAIR AREAS

X. Removal of Patient from Decontamination

Once the patient has been treated for both trauma and contamination:

1. Dry patient thoroughly.
2. Re-swab all previously contaminated areas and label stored swabs with patient's name, site, time and "post-contamination."
3. Give swabs to Medical Physicist for future analysis.
4. Monitor patient's entire body with G-M Counter.
5. Place new floor covering from door to patient and, if needed, from door to clean stretcher outside Decontamination Room to door of ER entrance.
6. Bring clean stretcher into Decontamination Room.
7. Transfer patient to new stretcher.
8. Monitor stretcher and wheels as it leaves Decontamination Room for an appropriate area within the hospital.
9. Collect all urine for 24 hours in a properly labeled container.
10. Collect patient excreta in properly labeled container.

XI. Exit of Decontamination Team

Each team member goes to clean line at door and removes protective clothing and places all of it in a plastic container marked "contaminated."

1. Remove outer gloves first, turning them inside out as they are pulled off.
2. Remove all tape at trouser cuffs and sleeves.
3. Remove outer surgical gown, turning it inside-out; avoid shaking.
4. Remove surgical shirt.
5. Remove head cover.
6. Pull surgical trousers off over shoe covers.
7. Remove shoe cover from one foot and let Medical Physicist monitor shoe; if shoe is clean, step over clean-line, then remove other shoe cover and have other shoe monitored.
8. Take off inner gloves.
9. Have feet and hands monitored for final time.

10. Take shower.

XII. Responsibilities of Medical Physicist

1. Monitoring
  - ambulance and attendants
  - route from ambulance entrance to Decontamination Room
  - Decontamination Room, patient, and personnel
2. Decontamination:
  - any area found in monitoring
  - any contaminated equipment
3. Analysis:
  - all specimens taken of potentially contaminated area
4. Radioactive Waste Disposal:
  - any contaminated item or water
5. Radiation Exposure:
  - examination of film badges and dosimeters and proper follow-up if indicated

XIII. Patients Exposed to High Levels of Gamma Rays or X-rays

In these accidents, the patient, as such, is not radioactive and no radiation will be detected on his body or clothes. Any tissue damage during the exposure will manifest itself in time. Any early symptoms, such as nausea, anorexia, and vomiting, tell the severity of radiation exposure and these should be noted in the patient's chart. If their symptoms are:

1. Anorexia, nausea and vomiting delayed by five or more hours after accident – the victim has been exposed to low levels of radiation.
2. Vomiting within one to five hours – the victim has been exposed to significant radiation with possible serious sequelae.
3. Vomiting within one hour – the victim has received a near-lethal radiation dose.
4. Vomiting within minutes of exposure – the victim has probably been exposed to a lethal dose of radiation.

Obtain a complete blood-cell count and differential count as soon as possible and again after six and twenty-four hours. If the lymphocyte count does not fall below 1200 per cu mm within twenty-four hours, the patient will require no clinical support. If the lymphocyte count does fall below 500 per cu mm, a severe course can be anticipated. If the lymphocytes disappear within six hours, the dose of radiation was fatal.

XIV. Notification of Appropriate Authorities

Radiation Safety Officer will notify authorities as required.