Triage is initially on the severity of medical conditions and NOT on radioactive contamination. Primary attention should always be aimed at life-threatening conditions.

On-Site Management
Responders to an emergency must be prepared to deal with multiple hazards, including chemical, biological, radiological, and explosives.

1. Consider areas established by first responders who arrived earlier or establish action areas.
2. Notify the national health authority/agency responsible for the medical management of radiation emergencies.
3. Wear, as appropriate and if available, Personal Protective Equipments (PPEs), protective clothing, respiratory device, double gloves, boots, and personal dosimeters (electronic alarming dosimeters).
4. Follow guidance and instructions from radiation protection officers to protect yourself and victims from radiation exposure or contamination.

Reception Centre (RC)
1. Establish a RC away from the hospital and the emergency scene, to house a potentially large number of victims, ensure access and exit controls.
2. Fulfil the RC primary objectives by
   - Performing triage (first medical, then radiological);
   - Forwarding patients with life threatening injuries to the emergency departments;
   - Providing minor first aid as required;
   - Decontaminating those who need to be.
3. Staff
   - Triage;
   - Physicians and nurses;
   - Health physicists;
   - Security staff;
   - Psychologists;
   - Social assistants;
   - Administrators/Coordinators.
4. Supplies
   - Protective clothing;
   - Personnel dosimeter;
   - First aid kits;
   - Water (for decontamination);
   - Shower stalls;
   - Radiation survey meters;
   - Scrubs and shampoos;
   - Scrub brushes;
   - Scissors;
   - Nail clippers;
   - Supplies for taking samples;
   - Communication equipment;
   - Pens, paper, magic markers;
   - Gloves;
   - Tape;
   - Shoe covers;
   - Plastic bags (many sizes);
   - Boxes for waste;
   - Liquid collection containers;
   - Signs, insignia, labels;
   - Change of clothes.

Victims
Medical Triage
Not seriously injured or uninjured
Seriously injured
Stabilisation
Immediate contamination survey and decontamination (if possible)
Hospital
Contamination survey and decontamination
Hospital
Registration area
Inner cordoned area
Safety perimeter
Outer cordoned area
Security perimeter
Life-threatening injury
Injured
Uninjured

References:
# Medical Triage System

## Contamination Survey

A head-to-toe radiation survey technique is the standard radiation protection work practice. But for the first few hours after a mass casualty event, performing a screening survey of only the head, face, shoulders, and hands is acceptable, because these are the most likely locations of contamination.

### Primary Contamination Survey

**Categories:**

1. **Not contaminated**
   - No contamination with/without decontamination
   - Contamination but decontamination unnecessary

2. **Remains contaminated after decontamination**
   - Contamination remains after decontamination and cannot be removed

3. **Needs contamination and needs decontamination**
   - Contamination on face and/or hands or contamination above acceptable level on other area, and decontamination is necessary

**Decontamination**

- Perform field or full decontamination in the following way:

## Field Decontamination

1. **Remove contaminated clothing.**
2. **Wash hands and face with soap.**
   - Removal of outer clothing has been shown to eliminate approximately 90% of a person’s contamination.
   - A simple wash with soap and water typically removes at least 90% of the skin contamination.
   - Removal of the clothing and a quick wash remove about 99% of the total contamination.

## Full Decontamination

1. **Completely remove victims’ clothes and place them in a bag.**
2. **Shower with water and detergents (if available) that should be very carefully washed.**
3. **Provide decontaminated people with new clothing.**

## Transportation

- **Medical or paramedical personnel who have not entered the controlled area on scene should transport victims.**
- **Assume all victims are contaminated until proven otherwise.**
- **Cover victim by folding a sheet over a contaminated area.**
- **Place the ambulance stretcher on the clean side of the outer cordoned line and pass the victim across the outer cordoned line to the prepared stretcher.**

## Fatalities

- **1. On-Site**
  - No transport to a dead body to the hospital.
  - Officer: guidance from radiation protection professionals, local concern, and public health officials as to when, and where to transport bodies.
  - Remove bodies from the scene.
  - Bags moved to a body processing site.
  - Survey each body and label radioactive warning tags on the body and inside body bags.

- **2. Field Morgue near the Scene**
  - Choose a low dose rate area.
  - Set up clean and contaminated processing lines by consulting with an experienced radiation protection officer:
    - Open processing line: No contamination with/without decontamination
    - Contaminated processing line: count cor–2–3 times normal background
    - After covering, give a pass instruction (proper exposure) and graphs.
    - Carefully remove and bag all clothing and jewelry, documenting:
      -身份证和医疗证件
      - Bag bodies to a decontamination area and wash them after they are released by the morgue to the transport.
    - Consult with an experienced radiation protection officer for burial procedures.

- **Monitor the environmental risk in burial:**
  - A metal casket has a lead content and large apertures from entering the container and keeps liquids from exiting the container and should be used.
Radiation Emergency Alert

Once informed of the transfer of patients to the hospital, immediately notify the coordinator of the hospital's emergency department (ED) response team for radiation emergencies. Below is a list of personnel that should be contacted, along with the hospital's medical plan to respond to radiation emergencies:

- Command (Head of ED/Manager)
- Physicians
- Nurses
- Radiation safety/protective personnel (health physicists, medical radiation, radiology, radiation safety officers)
- Laboratory technologists
- Administrators, telephone operators, hospital security

Information

- Contains a list of names and phone numbers of personnel involved in the incident.
- Contains a list of equipment and supplies necessary for handling the incident.

Preparation

1. Wear Protective Personal Equipment (PPE)
   - Gown
   - Gloves
   - Face shields
   - Respiratory protection (only if necessary; in case of radiological and nuclear (CBRN) emergencies)

2. Supplies to be made available
   - Conventional medical equipment
   - Plastic bags (different sizes)
   - Containers for collecting liquid waste
   - Plastic bags for waste
   - Gloves for radioactive tasks
   - Tapes
   - Plastic and paper sheets
   - Charge of clothes (for contaminated patients)
   - Paper for paper; rubber for rubber
   - Plastic for plastic solutions
   - Her, magic, marking, labels
   - Scissors

Radiation detectors

- Determine and record in accordance with the hospital's medical plan to respond to radiation emergencies:

<table>
<thead>
<tr>
<th>Radiation detectors</th>
<th>Area control and contamination control</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Establish specific areas as below.</td>
<td>1. Establishment, triage, decontamination, medical assessment and initial management of injured individuals</td>
</tr>
<tr>
<td>Hot area: (hot zone)</td>
<td>No further decontamination until patient is stable.</td>
</tr>
<tr>
<td>Cold area: (cold zone)</td>
<td>Follow decontamination priority, wounds orifices, high</td>
</tr>
<tr>
<td>Buffer zone (between hot and cold areas)</td>
<td>Remove clothing, if that was not done at the scene. If visible pieces of</td>
</tr>
<tr>
<td>2. Cover floor from entrance to each area with wide plastic</td>
<td>the clothes on, if any, they were not removed at the scene.</td>
</tr>
<tr>
<td>3. Establish tissue typing and cytogenetic</td>
<td>Follow decontamination priority, wounds orifices, high</td>
</tr>
<tr>
<td>4. Cover floor of each area with wide plastic</td>
<td>Remove clothing, if that was not done at the scene. If visible pieces of</td>
</tr>
<tr>
<td>5. Whatsoever the kind of covering, it should be taped securely to the floor;</td>
<td>the clothes on, if any, they were not removed at the scene.</td>
</tr>
<tr>
<td>6. Restrict access to controlled area;</td>
<td>Follow decontamination priority, wounds orifices, high</td>
</tr>
<tr>
<td>7. Survey instruments should be checked and ready for use before entering</td>
<td>Remove clothing, if that was not done at the scene. If visible pieces of</td>
</tr>
<tr>
<td>8. Periodically check dose rate in all areas during the medical response.</td>
<td>the clothes on, if any, they were not removed at the scene.</td>
</tr>
</tbody>
</table>

Detection of radioactive contamination

1. Survey wound areas with a G-M survey meter. (If the surrounding area is contaminated, the survey will be performed on the clothes on, if any, they were not removed at the scene. If visible pieces of |
2. Make a G-M survey quickly over the entire body (with the clothes on, if any, they were not removed at the scene. If visible pieces of |
3. Remove the contaminated clothing and re-survey. |
4. Wrap a cotton- tipped applicator over the contaminated area and place in an envelope identified with the patient's name, date, time and G-M survey results. |
5. Get any external radios and check them for contamination (similar positive counting in both nostrils is very suggestive of internal contamination by inhalation). |
6. Follow the same procedure for wounds (positive results are highly suggestive of internal contamination). |

Initial management of uninjured individuals

A large number of possibly contaminated but uninjured individuals, may flock to the EDs of hospitals by themselves. Fortunately, this may deter the EDs to close and divert ED personnel away from patients needing urgent medical attention.

- Note a mass casualty event involving radioactive injury, a need for unity within the ED team to handle the situation.

1. Establishment, triage, decontamination, medical assessment and initial management of injured individuals
2. Observe whether the patient is injured or not. If the patient is injured, give first aid for the corresponding medical assistance.
3. If a patient is not injured, give first aid for the corresponding medical assistance.
4. Remove contaminated clothing and wash hands with soap and foam for 20 min.
5. If the survey indicates contamination, administer decontamination procedures on scheduled.
6. Assess the quality of ability to receive radiation from external sources and medical and clinical history.
7. Where was your patient building/house?
8. Did you have any medical attention.
9. How much time did it start?
10. If the patient is suspected of having cancer, prioritize manifest the ionizing radiation of the ARS, and immediately inform CBC (carefully observe differential count, marked lymphocytes).
11. Assess the possibility of internal contamination. If suspected, initiation collection of samples for analysis.
12. Get samples from body orifices and start 24 hour urine collection.
13. Consult with ARS or internal contamination is suspected. Discharge if ARS or radiological contamination is not suspected.

TABLE 1: PENDRUM PHASE, VOMITING AND DOSE ESTIMATIONS

<table>
<thead>
<tr>
<th>Time after exposure</th>
<th>Dose estimation (Gy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 – 1.0</td>
<td>4</td>
</tr>
<tr>
<td>1.0 – 2.0</td>
<td>4</td>
</tr>
<tr>
<td>2.0 – 3.0</td>
<td>4</td>
</tr>
<tr>
<td>3.0 – 4.0</td>
<td>4</td>
</tr>
<tr>
<td>&gt; 4.0</td>
<td>4</td>
</tr>
</tbody>
</table>

Initial medical management of injured individuals at the hospital level

- Treat life-threatening injuries and medical conditions first. Attend to ABCs and standard trauma resuscitation. Then, address contamination counter.
- Remove clothing. If not done at the scene. If visible pieces of metal are embedded in tissue, assume they are radiactive and promptly use long forceps to remove them. Store them in a labelled container in a shielded area away from people.
- Remove from contaminated area.
- Survey and document contamination.
- Collect samples for analysis.
- Decontaminate.
For a mass casualty event, containment of contamination should be considered. If the patient is suspected to have internal contamination, the internal burden assessment should be conducted, as directed by a health physicist (with whole body counting and bioassays). Contaminants can be removed from the skin through the following procedures:

1. Gross whole body contamination
   - Caution: Do not brush or rub clothing away from the face to contain the contamination.
   - Put contaminated clothing in a labelled plastic bag.

2. Decontamination of wounds
   - Drape contaminated wound with a waterproof material to limit the spread of radioactivity.
   - Irrigate the wound gently with saline solution or water. Save contaminated saline or water in specially marked containers.

3. Decontamination of body orifices
   - Eyes: roll back eyelid; irrigate the eye with saline solution or water from the inner to the outer canthus of the eye to avoid contamination.
   - Ears: rinse the external part of the ear; clean the opening of the ear canal with contaminated cotton-tipped applicator.
   - Nose: gently swab with a moistened cotton tipped applicator.
   - Mouth: encourage the patient to brush teeth with toothpaste and frequently rinse the mouth.
   - Mouth: rinse with a moistened cotton-tipped applicator.

4. Decontamination of hair
   - 1) Strip or position patient in order to avoid spread of contamination.
   - 2) Wash with soap and water all contaminated fluids in appropriately marked containers.
   - 3) Dry with clean uncontaminated towel.
   - 4) Cut the hair while above decontamination procedures are not successful. Do not shave hair and do not injure skin.

5. Decontamination of intact skin
   - Mark the area for skin contamination.
   - Begin decontamination from areas of highest contamination levels.
   - Do not injure or abrade skin.
   - Do not spread contamination to other skin areas. Wash the contaminated area gently under a warm stream.
   - Use a soap or surgical scrub soap if washing with plain water is ineffective. Scrub area for 3–5 times and blot dry.
   - Re-survey. Repeat steps 7 and 6 as necessary.

6. Stop decontamination when the radiation level cannot be further reduced or if skin irritation is evident.

Waste disposal
- Use a disposal waste in plastic bags or containers.
- Survey bags periodically to prevent high radiation levels in the work area.
- Follow laws and/or to distance to protect against radiation from radioactive waste.
- If a mass casualty event, containment of runoff used for decontamination is necessary.

Removal of PPEs
- Confirm all personnel to be surveyed before leaving the controlled area.
- Take off gloves and gowns.
- Take off cap and mask.
- Roll up surgical gown from inside to outside.
- Roll up shoe cover from inside to outside.
- Put foot wear on.
- Mark the area for skin contamination.

Hospital recovery
- Remove waste from the ICU and triage area.
- Survey hands and linens as necessary.
- Normal cleaning routines (mop, strip waxed floors) are typically very effective.
- Periodically reassess contamination levels.

Fatalties
- Perform in each situation as below:
  - 1. Autopsy: Carry out extensive handling of internal organs with gloved hands. An autopsy may result in far less high to the pathologist’s hands. Do not perform an autopsy if there is internal contamination, unless it is absolutely necessary.
  - 2. Shipping of contaminated remains: Ship in sealed containers and label the outside of the container for regulatory compliance. Do not cremate contaminated bodies. Surgical removal of radioactive material should be performed.
  - 3. Burial: A metal casket should be used because it seals and keeps gowns and liquids from entering the container and keeps liquids from exiting the container.