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POLICY STATEMENT

North York General Hospital is committed to providing emergent care and treatment to casualties in an external disaster.

The overall goal of a Code Orange is to:
- enable NYGH to receive and treat a sudden influx of casualties requiring emergent treatment
- establish triage and treatment areas to ensure incoming patients, current patients and staff are safe
- adjust operation of hospital to increase availability of staff and beds to manage the number of casualties arriving at NYGH
- establish an Emergency Operations Centre, as needed, to assist with meeting increased demands on the organization by being the central location to receive essential information (internally and externally) and disseminate this information appropriately
- set up a Family Information Support Centre, as needed, that will provide support to family members of casualties of the external disaster

DEFINITIONS

Code Captain: The individual who is designated as being responsible for coordinating and assigning personnel to carry out procedures/instructions during a Code Orange on indirectly affected areas; this role would usually be assumed by the Charge Nurse in the Emergency Department until a more senior individual arrives.

Code Orange: A term used to indicate that an external disaster has occurred resulting in a significant number of patients that will be arriving to NYGH for emergent care and treatment. The hospital will respond by taking steps to provide staff and services to treat and care for casualties and their families.

Code Orange Alert: A term used to alert all staff in the hospital that NYGH has been notified of an external disaster that has/may result in mass casualties. Upon hearing this alert, staff should consult their departmental/unit emergency preparedness manual and prepare for the actual code orange.

Emergency Operations Centre: A separate designated location in the hospital that serves as the central information centre to provide support, leadership and
Family Information Support Centre: An area that is set up on a temporary basis designed to provide patient information, support, and updates on the disaster to families of patients that have been injured in the external disaster.

Fan Out: Process by which all off-duty staff within a defined group are contacted to determine their availability to report to work, if requested, during an emergency situation.

Health Care Worker: (HCW) is defined as employees, physicians, volunteers, students, medical staff, and contract workers.

Incident Manager: Upon notification of a Code Orange, the Charge Nurse of the Emergency Department is designated as the Incident Manager. Upon the arrival of a more senior individual, this role is transferred to him/her.

Media Centre: An area that is set up on a temporary basis designed to provide updated information related to the activities within NYGH in relation to the external disaster.

ROLES AND RESPONSIBILITIES

ALL STAFF:
Healthcare workers (HCW) responding to a code will take care to assess the environment during the response to protect their own health and safety.

1. Once Code Orange is called, all staff are to remain on site until dismissed by their Manager/delegate or otherwise directed.
2. All staff called in are to report to the Academic Centre at the General site.

PERSON RECEIVING NOTIFICATION ON AN EXTERNAL DISASTER CALL

1. Obtain the following necessary information:
   i) name and official capacity of the caller
   ii) nature of the disaster
   iii) location of disaster
   iv) estimated number, type and nature of casualties
2. Route call to Charge Nurse in Emergency Department.
3. Call Charge Nurse in Emergency Department to confirm information received.

**CHARGE NURSE/CODE CAPTAIN IN EMERGENCY DEPARTMENT**

1. Obtain appropriate information:
   - i) name and official capacity of the caller
   - ii) nature of the disaster
   - iii) location of disaster
   - iv) estimated number, type and nature of casualties
   - v) mode of transportation
   - vi) estimated time of arrival
   - vii) call back number
   - viii) time of call

2. In consultation with the Emergency Department Physicians On-Duty decide whether or not to call “Code Orange” or “Code Orange Alert.”
3. Emergency Charge Nurse calls Telecommunications to activate “Code Orange” or “Code Orange Alert.”

4. If Code Orange is called, the Emergency Department Charge Nurse notifies:
   - The Emergency Department Clinical Team Manager or Delegate and Clinical Team Manager On-Call
   - The Emergency Department Program Director or Delegate
   - The Emergency Department Program Medical Director (Chief) or Delegate

5. Inform Emergency Department staff of information regarding status of incoming casualties and assign tasks as indicated.

6. In consultation with Emergency Department Clinical Team Manager or Delegate, Emergency Department Program Director and the Emergency Department Program Medical Director (Chief), determine additional number of staff required and assign Unit Secretary to initiate the Emergency Department Fan-Out.
7. Consult with all Emergency Department Physicians on duty to determine admission/discharge status of emergency patients to prepare for incoming casualties.

8. Arrange for urgent inpatient admissions (through Bed Control) for patients who cannot be safely discharged.

**TELECOMMUNICATIONS**

1. Page “**CODE ORANGE**” or “**CODE ORANGE ALERT**” when directed by Emergency Department Charge Nurse.

2. Notify:
   a. Security
   b. Senior Administrator-on-Call

3. Page first and second on-Call Physicians:
   i) 2nd on-call Emergency Physician
   ii) Surgeon-on-Call
   ii) Anaesthetist-on-Call
   iii) Internist-on-Call
   iv) Paediatrician-on-Call

4. Page on-Call Registered Nurses for Operating Room and Post Anaesthetic Care Unit for the General Site (Evenings, Nights, Weekends, Holidays)

5. Notify:
   - Peri-Operative Services Clinical Team Manager
   - Pharmacist on-Call
   - Manager of Medical Imaging
   - Manager of Laboratory Services
   - Manager of Building Services (For immediate assistance call Shift Engineer at Extension 6711)
   - Corporate Communications and Public Affairs
   - Manager Telecommunications & Protection Services
   - Manager or Supervisor of Environmental Services, Portering, and Linen
   - Manager of Purchasing
   - Corporate Risk Manager
   - Any other affected person as directed by the Charge Nurse/Code Captain

Page “**CODE ORANGE**” or “**CODE ORANGE ALERT ALL CLEAR**” upon direction of the incident manager.

* For Code Orange CBRN notify Program Director ED/CrCU or Designate
EMERGENCY DEPARTMENT CLINICAL TEAM MANAGER DELEGATE OR CLINICAL TEAM MANAGER ON-CALL

1. Proceed directly to hospital if not present.
2. In collaboration with Emergency Department Charge Nurse and the External Disaster Coordinator, assess all potential resource needs.
3. Assist Emergency Department Charge Nurse with overall coordination and flow of patients and families.
4. Assist with coordination of urgent in-patient admissions through Bed Control.
5. Communicate with Clinical Team Managers or Delegates from inpatient units to identify the need for urgent discharges.
6. Arrange for immediate transfers of admitted patients to inpatient units or alternate designated locations.
7. Provide Emergency Department Program Director and Chief with regular status updates (i.e., staffing needs, additional beds/care area requirements).

EMERGENCY DEPARTMENT PROGRAM DIRECTOR OR DELEGATE

1. Proceed directly to hospital if not present.
2. In coordination with the Emergency Department Medical Director (Chief)/Delegate, assume overall responsibility for the coordination of the Code Orange in the Emergency Department.
3. Act as a resource to the Senior Administrator on-Call.
4. In collaboration with Emergency Department Medical Director (Chief), Charge Nurse and Physician On-duty, assess when Code Orange can be terminated.
5. Act as a liaison with community partners as needed.

EMERGENCY DEPARTMENT PROGRAM MEDICAL DIRECTOR (CHIEF) OR DELEGATE

1. Proceed directly to hospital if not present.
2. In consultation with Emergency Department Physician On-Duty, determine the number and type of additional physicians required.
3. Contact the Vice President and Chief Medical Executive and inform them of the number of additional physicians required.
4. In coordination with the Emergency Department Program Director, assume overall responsibility for the coordination of the Code Orange in the Emergency Department.
North York General Hospital Policy Manual

Code Orange/Code Orange Chemical, Biological, Radiological and Nuclear (CBRN) External Disaster
NUMBER: XIII-50

CROSS-REFERENCE: Corporate Fan-Out (I-150)

5. Assist with medical care as necessary.
6. In collaboration with Emergency Department Program Director, Charge Nurse and Physician On-duty, assess when Code Orange can be terminated.

VICE PRESIDENT MEDICAL ACADEMIC AFFAIRS OR SENIOR ADMINISTRATOR ON-CALL

1. Contact all Physician Chiefs to assess their availability, inform them of the number of physicians required from their specialty and ask that they initiate their fan-out procedure.
2. Inform Physician Chiefs to contact the Command Centre and provide names of physicians that will be coming in and when these physicians will be arriving.

ALL PHYSICIANS ON DUTY

1. In consultation with Charge Nurses/Code Captains expedite consults, discharge decisions, and identify patients designated as “Alternate Level of Care.”
2. Notify Command Centre to let them know when they will be available to provide medical assistance to areas in need.

INCIDENT MANAGER (SENIOR ADMINISTRATOR ON-CALL)

1. Establish Emergency Operations Centre in:
   - General Site: McGowan Board Room
   - Branson Site: The Board Room
   - Seniors’ Health Centre: Conference Room
   (See Emergency Operations Centre Section of Emergency Preparedness Manual)
2. Refer to and complete the Incident Management System Job Action Sheet
3. Responsible for overall management of situation.

* Note: See page 13 for Role of Incident Manager in CBRN Event

CORPORATE COMMUNICATIONS AND PUBLIC AFFAIRS (PUBLIC INFORMATION OFFICER)

1. Establish a Media Centre (Location as per Departmental Plan) staffed by Corporate Communications Personnel and Volunteers.
2. Prepare statement and key messages in preparation for any media releases.
3. Ensure that staff members and families of staff members are informed of the well-being of their family members.

**PROFESSIONAL PRACTICE LEADER FOR SOCIAL WORK/DIRECTOR OF PASTORAL SERVICES OR DELEGATE**

1. Establish Family Information Support Centre in cafeteria.
2. Work with Dietary/Catering Services to provide refreshments to families.
3. Assess staffing and resource needs and notify Emergency Operations Centre of staff required.

**CODE CAPTAIN/CHARGE NURSES**

1. Follow departmental/unit specific Code Orange procedures upon hearing Code Orange Alert” or “Code Orange” overhead page.
2. Notify Clinical Team Manager of Code Orange status.
3. Ensure adequate support and appropriate information is being provided to admitted patients and their families who may have questions.

**POST EVENT DEBRIEFING**

The team will have an informal debrief amongst themselves within the shift that the Code Orange/Code Orange CBRN occurred as organized by the Team Leader/Incident Manager.

The Manager of the affected unit/department will discuss with the Corporate Risk Manager the need for a corporate debriefing, and will assemble the appropriate individuals within 10 days of the event to review and assess:

- The effectiveness of the response
- Requirement for additional documentation
- Opportunities for improvement

**POST EVENT DOCUMENTATION:**

Person who first identifies a Code Orange/Code Orange CBRN will complete a SLIP electronically within 48 hours.

If a patient/visitor is injured, a SLIP will be completed within 48 hours.
In the event that an employee is injured, the employee will be provided with aide or medical treatment, if needed, either in the Occupational Health and Safety Department or the Emergency Department. The manager or designate will be informed of the injury immediately and within 24 hours, the employee will complete an electronic Employee Incident Report. If the employee is sent to seek medical care for their injury, the manager or designate is to email the Occupational Health and Safety Department and provide details of the injury/incident. If there is a critical injury or fatality, ensure that the Occupational Health and Safety Department is notified immediately.
Code Orange-CBRN

POLICY:

Code Orange CBRN is to be used in case of a chemical, biological, radiological and/or nuclear event. The primary goal of the hospital in a hazardous materials event is to:

- Protect the facility and its personnel from being contaminated.
- Facilitate the triage, decontamination and medical treatment of contaminated or potentially contaminated patient arriving to the hospital as rapidly as possible.

This response plan identifies the hospital response to an event involving chemical, biological, radiological, or nuclear hazardous materials. The plan provides algorithms, identifies personal protective equipment needs, donning and doffing procedures and medical management guidelines for patients exposed to chemical, biological, radiological and/or nuclear contaminants.

DEFINITIONS

CBRN: CBRN is an acronym for Chemical, Biological, Radiological & Nuclear event.

PPE: Personal Protective Equipment, worn by the responding staff to decontaminate incoming casualties that have been exposed to a Chemical, Biological, Radiological or Nuclear contaminant.

Hot Zone
The Hospital Hot Zone is the area outside of the decontamination set-up area that casualties will gather in prior to decontamination.

Warm Zone
The Warm Zone is the decontamination set-up area where patients will be decontaminated prior to entry into the Emergency Department.

Cold Zone
The Cold Zone is the CLEAN TRIAGE AREA where patients who have been decontaminated wait to be triaged. The inside of the Emergency Department is
part of the Cold Zone. It is imperative that the Emergency Department remain the Cold Zone and no contaminates enter.

**Decontamination Equipment:** Equipment identified to assist responding staff to decontaminate incoming casualties in a safe environment. Decontamination equipment will be stored in an area adjacent to the Emergency Department at the General site and in the Emergency Preparedness Equipment Room at the Branson site in close proximity to the Urgent Care Centre.

**CBRN Fanout List**

See Appendix Y (Page 79). Current copies of the CBRN Fanout List will reside in Telecommunications and in the Emergency Department.

**ROLES and RESPONSIBILITIES**

**Incident Manager**

Upon notification of a chemical, biological, radiological and/or nuclear event, the most senior administrative person in the hospital is designated as the Incident Manager. Upon the arrival of an individual with more expertise, this role is transferred to him/her. The Incident Manager will decide whether a full scale CBRN response and CBRN trained staff fan-out is to be implemented in consultation with emergency service providers.

**Decontamination Team Leader**

The Decontamination Team Leader (See CBRN Fanout) will be in overall command of the Decontamination area. They will be responsible in consultation with the Safety Officer delegation of roles/responsibilities within the Decontamination area. He/she will report to the Incident Manager. In addition to overall command of the Decontamination area the Decontamination Team Leader will be responsible for:

- Designating a group of 4-6 initial responders as the Decontamination Setup Team and coordinating the setup of the Decontamination Area and decontamination tent.

**Decontamination Response Team**

The Decontamination Response Team will consist of approximately 25 CBRN trained staff, including Physicians, Nurses, Security, Support Services, and Maintenance. In the event of a radiological or nuclear incident, include Nuclear Medicine staff and Radiation Safety Officer.
Decontamination Team Leader (1)
Radiation Safety Officer (1)
NYGH Safety Specialist (1)
Occupational Health Nursing Staff (2)
Decontamination Triage Nurse (Dirty Triage) (2)
Decontamination Coordinator (2)
Decontamination Physician (2)
Decontamination Staff for Non-ambulatory Casualties (6)
Decontamination Staff for Ambulatory Casualties (4)
Technical Decontamination Staff (2)
Post Decontamination Staff (3)
Post Decontamination Triage Nurse (Clean Triage) (2)
Maintenance(2)
Security Crowd Control (2)
Security Traffic Control (To be determined depending on scale of event)

NYGH Safety Specialist
The Occupational Health and Safety Specialist or designate will assume the role of Safety Officer. The Safety Officer is responsible for the safety of the staff responding to the decontamination site. The Safety Officer will determine who can and cannot respond as well as determine the length of response for each person. The Safety Officer will report to the Decontamination Team Leader.

Radiation Safety Officer
The NYGH Radiation Safety Officer provides guidance to staff in the setup and use of radiation detection devices/equipment. He/she is also responsible for providing guidance to staff to ensure staff safety in their management of patients in a radiological and/or nuclear event. The Radiation Safety Officer will determine who can and cannot respond as well as determine the length of response for each person. The Radiation Safety Officer will report to the Decontamination Team Leader.

Decontamination Set-up Team
The Decontamination Set-up Team consists of 4-6 CBRN trained staff that arrives first at the CBRN decontamination setup area upon initial notification of a Code Orange CBRN. They will set up the tent, connect the power and water supply, and ensure everything is in good working condition. Once the tent is up and functioning they will be assigned other duties by the Decontamination Team Leader.

Internal Tent Set-Up
2 individuals from the Decontamination Set-Up Team will be responsible to ensure all components on the inside of the decontamination tent are functional prior to the first patient being sent through.

**External Tent Set-Up**
- 2 individuals from the Decontamination Set-Up Team will be responsible to ensure all components on the outside of the decontamination tent are functional prior to the first patient being sent through. They will also set up the Decontamination area as set out in Appendix B (Procedure for Setting Up Decontamination Area)

**For Actual or Potential Radiological or Nuclear events** the Mini-Sentry (portable portal gamma radiation monitor) would be required to be assembled in the warm zone in front of the entrance to the decontamination area.

---

**Decontamination Triage Personnel (Dirty Triage)**
The Decontamination Triage Nurse working with the Decontamination Triage Physician is responsible for the Warm Zone area, and will be assessing and tagging all patients based on triage acuity before they enter the Decontamination Area.

**Decontamination Coordinator**
The Decontamination Coordinator will be responsible for the Warm Zone area, ensuring all patients entering the decontamination area, in order of triage classification, are directed through the proper showering procedures. He/she will also be coordinating the technical decontamination of decontamination personnel in the warm zone.

**Decontamination Physician**
The Decontamination physician is responsible for any immediate life threatening procedures that must be done prior to decontamination (eg. Intubation or IM Atropine). If the physician elects to intubate the victim prior to decontamination, that physician must assist the victim through the decontamination procedure and transfer care to the physician in the cold zone.

**Decontamination Staff for Non-ambulatory Casualties**
The Decontamination staff are responsible for decontaminating non-ambulatory patients in the center lane of the decontamination shower system. They must always work in groups of 3 to 4 to ensure the decontamination process is completed safely using the roller
system. The Decontamination Staff are responsible for the removal of the victims clothing and log-rolling the victim to ensure all surfaces of the victim are decontaminated using soap and water for a **minimum of 12 minutes**. They are also responsible for decontaminating the board under the patient.

**Decontamination Staff for Ambulatory Casualties**
The Decontamination Nurse is responsible for assisting and ensuring the decontamination of ambulatory patients using soap and water for a **minimum of 5 minutes**.

**Technical Decontamination Staff**
The Technical Decontamination Staff are responsible for conducting technical decontamination of staff when they are ready to leave the Warm Zone.

**Post Decontamination Staff**
The Post Decontamination Staff are responsible for directing ambulatory patients through the proper showering procedures and ensure they are safe to enter the Cold Zone. They are also responsible to assist in the transfer of non-ambulatory patients who have been decontaminated to a clean stretcher in preparation for transfer to an assessment or treatment area within the Cold Zone.

**Post Decontamination Triage Nurses (Clean Triage)**
The Post Decontamination Triage Nurse is responsible for the Cold Zone area, and will be assessing all patients to ensure decontamination is completed and possible re-triage classification if warranted before they enter the Emergency Department or designated assessment/treatment area.

**Maintenance**
A CBRN trained maintenance personnel will respond to assist in the initial setup of the Decontamination Area and tent. A maintenance person will remain available during the incident and be prepared to dress in PPE and enter the warm zone to troubleshoot any mechanical, electrical or plumbing needs that might occur during the decontamination phase.

**Security Crowd Control**
Security Crowd control will be responsible for crowd control in the Warm Zone and assist the Decontamination Triage Physician and Nurse in that respect.
In a Radiological or Nuclear event Security Crowd Control will be responsible for monitoring and controlling the traffic of patients through the Mini-Sentry radiation monitoring device for contaminated individuals as they pass through the monitor. Security will also be responsible for ensuring that people waiting to be monitored are at a suitable distance (3 m) away from the monitor to avoid any possible contamination from affecting screening results.

**Security Traffic Control**  
With the assistance of the police department Security Traffic Control will be responsible for locking all access points to the hospital when Code Orange CBRN is activated and for controlling traffic and access into the hospital during the CBRN event. Security Traffic Control will direct non-contaminated patients and ambulances to the Non-Contaminated Patient Entrance between Health Records and the Emergency Department. They will also be responsible for diverting non-essential traffic away from the Decontamination Area.

**Occupational Health Nurses**  
The Occupational Health Nurses are responsible for the pre-entry and post-entry medical screening and documentation of Decontamination Staff. This includes vital signs monitoring, and rehydration of Decontamination Staff during the CBRN event and for completion of the Decontamination Staff Medical Monitoring Form.

**Potential Hazards to Healthcare Workers**  
The hazard of chemical and biological exposure to healthcare workers is strictly from secondary exposure and "depends largely on the toxicity of the substance on the victims' hair, skin, and clothing; the concentration of the substance; and the duration of contact with the victim." The quantity of contaminant that healthcare workers might encounter can be dramatically less than the amount to which the victim was exposed. Gas or vapor releases can expose victims to toxic concentrations, but tend to evaporate and dissipate quickly.

Respiratory protective equipment, if correctly selected, fitted, used, and maintained, reduces significantly the effective exposure level that an employee experiences. An employee wearing a respirator that offers a protection factor of 1,000 will breathe air that contains no more than 1/1,000 (or 0.1 percent) of the contaminant level outside the respirator.
Additionally, proper techniques for the donning, decontamination and doffing of personal protective equipment are designed to protect the worker from contamination relating to the contaminant.

Heat and cold stress for healthcare workers required to wear the protective equipment during a CBRN event is another potential health hazard. Efforts will be made to prevent healthcare workers from heat and cold stress symptoms by ensuring that personal protective equipment is worn for specific durations of time whereby an individual removes the personal protective equipment in advance of potential heat stress symptoms. Occupational Health nursing staff will be present to monitor all healthcare workers required to don CBRN personal protective equipment.

Healthcare workers responding to the code are reminded to take care to assess the environment during the response to protect their own health and safety and inform the Occupational Health and Safety Officer/Radiation Safety Officer of any health and safety concerns.

**Potential Radiation Protection Regulations Exposure for Healthcare Workers**
(Radiation Protection Regulations)

The Government agency which is responsible for Radiation safety is the Canadian Nuclear Safety Commission (CNSC). One of their mandates is to set standards and limit people from exposure from ionizing radiation. They have implemented the ALARA principle which limits the DOSE that a person is exposed to with regards to ionizing radiation safety. ALARA stands for: As Low As Reasonably Achievable and is the main principle used in any radiation protection program. The ALARA principle uses TIME-DISTANCE-SHIELDING.

The CNSC has set limits called radiation protection regulations for emergency responders to a radiation event. The maximum dose a first responder may receive in an emergency is 500Sv. (Sv is the measure of the risk of damage to living tissue) This is a whole body dose. This dose may be exceeded if the person voluntarily acts to save a human life.

**Water Containment and Run Off**

Contaminated runoff should be avoided whenever possible, but should not impede necessary and appropriate actions to protect human life and health. In a mass
casualty emergency, staff should dispose of the water used to decontaminate patients via the sewer system. Once the victims are removed and safe from further harm and the site is secured and stable, the first responders should be doing everything reasonable to prevent further migration of contamination into the environment“

Authorities suggest that 75% to 90% of the hazardous agent may be removed by disrobing. The remaining skin contaminant may be minuscule and can be diluted further during the decontamination washing and passing into public wastewater systems. Appropriate water authorities should be notified at the time of the event.

**POST EVENT DEBRIEFING**

The team will have an informal debrief amongst themselves within the shift that the Code Orange/Code Orange CBRN occurred as organized by the Team Leader/Incident Manager.

The Manager of the affected unit/department will discuss with the Corporate Risk Manager the need for a corporate debriefing, and will assemble the appropriate individuals within 10 days of the event to review and assess:

- The effectiveness of the response
- Requirement for additional documentation
- Opportunities for improvement

**POST EVENT DOCUMENTATION:**

Person who first identifies a Code Orange/Code Orange CBRN will complete a SLIP electronically within 48 hours.

If a patient/visitor is injured, a SLIP will be completed within 48 hours.

In the event that an employee is injured, the employee will be provided with aide or medical treatment, if needed, either in the Occupational Health and Safety Department or the Emergency Department. The manager or designate will be informed of the injury immediately and within 24 hours, the employee will complete an electronic Employee Incident Report. If the employee is sent to seek medical care for their injury, the manager or designate is to email the Occupational Health and Safety Department and provide details of the injury/incident. If there is a critical injury or fatality, ensure that the Occupational Health and Safety Department is notified immediately.
PROCEDURE/ GUIDELINE

See Appendix A to X for chemical, biological and radiological decontamination procedures
North York General Hospital Policy Manual

Code Orange/Code Orange Chemical, Biological, Radiological and Nuclear (CBRN) External Disaster
NUMBER: XIII-50

CROSS-REFERENCE: Corporate Fan-Out (I-150)

REFERENCES


Canadian Emergency Preparedness College, Government of Canada CBRN Incident Recognition, Decontamination and Treatment”.


Ministry of Health and Long-Term Care “Guidelines for Chemical, Radiological, & Unknown Agents for Hospital Staff”.

Radiation Emergency Assistance Centre “Radiation Patient Treatment”.

University Health Network (2009) Code Orange CBRN Policy
Appendix A

Algorithm for Chemical/Biological Decontamination
Appendix B

Procedure for Setting-Up Decontamination Area
(Chemical/Biological/Unknown Substance Decontamination)

* Same decontamination setup for stable patients requiring radiological/nuclear decontamination

<table>
<thead>
<tr>
<th>Procedure for Setting Up Decontamination Area</th>
<th>Staff Responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>Lock all access and egress</strong> from the Hospital.</td>
<td>Security Traffic Control</td>
</tr>
</tbody>
</table>
| 2. **Assign roles** to staff members to Warm Zone  
  1. Security Crowd Control (2)  
  2. Dirty Triage Personnel (2)  
  3. Clean Triage Personnel(2)  
  4. Decon Coordinator (1)  
  5. Decon Staff for Ambulatory Patients (2)  
  6. Decon Staff for Non-Ambulatory Patients (3)  
  7. Technical Decon Staff (2)  
  8. Safety Officer (1) | Decontamination Team Leader |
| 3. **Set up zone** delineation:  
  • Hot Zone  
  • Warm Zone  
  • Cold Zone | Decontamination Team Leader |
| 4. **Close EMS Garage Doors** and post a security guard at doors | Security Crowd Control #1 |
| 5. **Set up Pre-decontamination Area** in **ED Parking Lot** (Hot zone)  
  • This area will contain patients as they await decontamination availability. | Security Crowd Control #2 |
| 6. **Set up Dirty Triage** Outside EMS garage | Decontamination Setup Team |
| 7. **Set up Mini Sentries** between Pre-decontamination Holding Area and Dirty Triage Area | Decontamination Setup Team |

<table>
<thead>
<tr>
<th>Procedure for Setting Up Decontamination Area</th>
<th>Staff Responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. <strong>Set up decontamination area (inside the EMS garage)</strong> this area is considered the hospital <strong>warm zone</strong>. It will consist of:</td>
<td>Decontamination Setup Team</td>
</tr>
</tbody>
</table>
**Patient flow in Decontamination Area**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.</td>
<td>Direct arriving patients to <strong>Dirty Triage Area</strong> (outside EMS garage)</td>
</tr>
<tr>
<td>10.</td>
<td>Direct contaminated patients to <strong>Dirty Triage Personnel</strong></td>
</tr>
<tr>
<td>11.</td>
<td>Mark patient’s back of left hand with “C” (contaminated)</td>
</tr>
<tr>
<td>12.</td>
<td>Set up the <strong>decontamination line</strong> in front of EMS Garage Doors</td>
</tr>
<tr>
<td>13.</td>
<td>Allow <strong>up to 4 ambulatory patients</strong> into <strong>Warm Zone</strong> at any one time</td>
</tr>
</tbody>
</table>
| 14.  | Direct patient to entrance area of Decontamination Tent  
   - Instruct to remove clothing and place in bag provided  
   - Place clothing in **Contaminated Clothing Area** in Warm Zone  
   - **REFER to Patient Decontamination Checklist (Appendix H)** | Decon Staff in Warm Zone |

**Patient Flow After decontamination is complete**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.</td>
<td>Instruct ambulatory patients to dress in gown and direct them to <strong>CLEAN TRIAGE AREA</strong></td>
</tr>
<tr>
<td>16.</td>
<td>Direct patients through <strong>EMS entrance</strong> (if non-ambulatory) or <strong>Main ED Entrance</strong> (if ambulatory)</td>
</tr>
</tbody>
</table>
Appendix C

Diagram for Setting-Up Decontamination Area (Chemical/Biological/Unknown Substance Decontamination)

* Same decontamination setup for **stable patients** requiring radiological/nuclear decontamination
## Appendix D

### Procedure for Setting-Up Decontamination Tent (Chemical/Biological Decontamination)

<table>
<thead>
<tr>
<th>Step by Step Instructions for Internal Setup</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Place storage bag flat. Unzip. Remove collapsed shelter from storage bag.</td>
<td><img src="image1" alt="Diagram" /></td>
</tr>
<tr>
<td>2. Place tent with thick side down.</td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
<tr>
<td>3. With center doors open, pull to make the “pancake” grow from about 3 feet to 8 feet.</td>
<td><img src="image3" alt="Diagram" /></td>
</tr>
<tr>
<td>4. Tilt the expanded “pancake” onto its thick corner that will become the floor.</td>
<td><img src="image4" alt="Diagram" /></td>
</tr>
<tr>
<td>5. Using the handles at each end, pull apart and out from the pack and the front to that the tunnel grows both longer and wider.</td>
<td><img src="image5" alt="Diagram" /></td>
</tr>
<tr>
<td>6. When the floor is near flat, walk down the inside to set it completely flat.</td>
<td><img src="image6" alt="Diagram" /></td>
</tr>
<tr>
<td>7. Lift and walk the tent into position ensuring the exit is on a higher elevation than the entrance.</td>
<td><img src="image7" alt="Diagram" /></td>
</tr>
<tr>
<td>8. Install end support poles and anchor with weight on the floor and guys and pegs.</td>
<td><img src="image8" alt="Diagram" /></td>
</tr>
<tr>
<td>9. Strap lane divided curtains around end wall poles.</td>
<td><img src="image9" alt="Diagram" /></td>
</tr>
<tr>
<td>10. Install water collection basin. Clip all 4 corners of the basin to the sidewall. Ensure there are no folds or ridges in the basin that will obstruct flow to the drain hose connection.</td>
<td><img src="image10" alt="Diagram" /></td>
</tr>
<tr>
<td>11. Ensure all curtains are draped inside the basin.</td>
<td><img src="image11" alt="Diagram" /></td>
</tr>
<tr>
<td>12. Check the orientation of the showerheads to ensure they are directed into the center of each of the shower stalls.</td>
<td><img src="image12" alt="Diagram" /></td>
</tr>
</tbody>
</table>

### Step by Step Instructions for Internal Setup

13. Place the wastewater transfer pump in the shelter next to the basin outlet and connect the quick connect drain hose to it. Be aware that the water from the water heater can flow at a rate of approximately 10 gallons per minute – 600 gallons in one hour.
14. Place the non ambulatory roller system into the middle line and expand the rollers to make a continuous 16 feet roller conveyor for non-ambulatory patients on backboards.
   a. Unlock and casters and roll the conveyor into the center lane of the tent.
   b. Ensure the folded roller is level. Legs are adjustable.
   c. Grasp the handles on each side at both ends of the conveyor and pull until expanded to full 8’ length. Expand second conveyor.
   d.  Lock casters.

15. Put grates into place in line #1 (female line) and #3 (male line).

16. Hang the loose end of the fluorescent light fixture to the roof hook.

17. Plug the drain pump into the GFI protected outlet.

**Step by Step Instructions for External Setup**

**18. If water heater is being used:**
   a. Put the water heater next to the shelter on the clean water “IN” plumbing connection.
   b. Make sure the fuel tank has an adequate amount of fuel and that the switch is in the OFF position. Use only kerosene, #1 or #2 diesel, JET A or JP-B fuel.
   c. Plug the water heater into the GFI power outlet.
   d. Using the garden hose, connect water heater to water supply on side wall of hospital and connect the two outlet hoses to each of the tent plumbing connections protruding from the sidewall of the tent.
   e. Connect the cold water supply using the ½” garden hose (3/4” diameter for distances greater than 50’) to the inlet hose connection located between the tires of the water heater.
   f. Turn on water supply.
   g. Turn on burner by flipping the burner toggle switch to ON position.
   h. Turn the burner thermostat knob on the water heater chassis clockwise. The outlet temperature is factory set to maximize flow at 97º outlet temperature.
   i.  Purge the system of stagnant water for approximately 20 seconds or until the water is clear. The burner will not operate if there is no water flowing through the system.

**19. If water heater is NOT being used:**
   a. Using the garden hose, connect to water supply and connect the hose to the tent plumbing connections protruding from the sidewall of the tent.
   b. Turn on water supply.
   c. Open shower heads in all three lanes and allow system to be purged, then shut off shower heads.

**20. Plug the fluorescent light into the 12 Volt DC power supply by connecting the two pin terminal on the sidewall of the tent to the two pin terminal at the end of the 35” 12 Volt DC cable.**

**Step by Step Instructions for External Setup**

**21. Plug the DC power supply into the outlet on the wall of the hospital.**

**22. If required, locate the air heater facing the center of exit from tent. Do not place**
   a. Fill fuel tank with kerosene or #1 or #2 fuel oil.
   b. Attach fuel cap
   c. Turn thermostat knob clockwise to the high position.
   d. Plug heater’s power cord into outlet on sidewalk of hospital.

**23. If required, turn on the DC power supply to illuminate the inside of the tent.**
24. Put cable covers over wires and hoses to reduce tripping hazard.
Appendix E

Donning Procedure Tychem PPE
For Biological/Chemical Decontamination

<table>
<thead>
<tr>
<th>Step by Step Donning Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lay out PPE equipment including the gas mask and CBRN canister. Confirm PPE is the right size and in working order.</td>
</tr>
<tr>
<td>2. Inspect your gas mask and canister. Install but do not over tighten canister.</td>
</tr>
<tr>
<td>3. Remove jewelry. In the case of long hair secure with a hair net or tie back.</td>
</tr>
<tr>
<td>4. Hydrate with 8 to 16 oz of fluid.</td>
</tr>
<tr>
<td>5. Don Tychem coveralls to waist.</td>
</tr>
<tr>
<td>6. Put on cooling vest if required.</td>
</tr>
</tbody>
</table>

8. Pull suit cuff over the top of boot and tape with Chem-Tape to secure. Leave pull-tab for easy removal.


11. Pull up Tychem coverall. Ensure zipper is covered and secured. Place a layer of Chem-tape on top of seam leaving tab for easy removal.

12. Put on outer gloves. Butyl gloves for chemical or Neoprene for biological. Double gloving is mandatory.

14. Pull hood over the edges of gas mask. The edges will be taped with Chem.-tape to ensure a tight fit.

15. A tape will be placed on the back of the coverall with your name and the time you enter the decontamination zone.
### Step by Step Donning Procedure

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><strong>Loosen the harness</strong> head straps on the face piece so the strap end tabs are approximately 1” from the buckles.</td>
</tr>
<tr>
<td>2.</td>
<td>With the face piece lens facing away, <strong>grasp the temple straps</strong> and <strong>neck straps</strong> in each hand.</td>
</tr>
<tr>
<td>3.</td>
<td>Slightly expand the harness straps, <strong>place chin into the face piece</strong> and <strong>pull the harness over</strong> the back of the head.</td>
</tr>
<tr>
<td>4.</td>
<td><strong>Support the weight of the mask by holding the cartridge</strong> in the palm of the hand. With the free hand adjust the face piece securely to the face, making sure the chin and nose are seated securely.</td>
</tr>
<tr>
<td>5.</td>
<td><strong>Tighten the other temple strap</strong> until both sides feel equally secure. Ensure face piece is centered on face by looking down at the nose-cup. It should be uniform on each side of the face. If not, readjust the temple straps.</td>
</tr>
</tbody>
</table>
7. Evenly **tighten the neck straps** by pulling the straight back.

8. **Tighten the top strap** for best visibility and fit.

9. **Test Respirator** to ensure it is assembled properly.

   **Negative Pressure Test:**
   
   a) Hold gas mask with canister (respirator) to face.
   
   b) Block off canister inlet using the palm of hand.
   
   c) Inhale gently and hold breath for 10 seconds. If the seal is good the face piece will collapse and remain collapsed against face. Remove hand and breath normally.
   
   d) If the face piece did not remain collapsed during the test, or any leakage is noted, readjust straps and perform negative pressure seal test again.
   
   e) If this does not correct the leak, the mask must not be used. Get another mask, install CBRN cartridge, refit mask and perform negative pressure seal test. Do not enter decontamination zone without a proper fit mask.
Appendix G

Doffing Tychem PPE Procedure  
(Chemical/Biological Decontamination)

“STAFF” = Decontamination Staff  
**Technical Decon Personnel**: Personnel who decontaminate Decontamination Staff

<table>
<thead>
<tr>
<th>Doffing Procedure</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STAFF will:</strong></td>
<td></td>
</tr>
</tbody>
</table>
| 1. Present themselves to the PPE removal personnel who will be responsible for removal of PPE  
  *No action will be taken by the STAFF unless instructed by the PPE removal personnel*  |
| 2. Technical Decon Personnel will: |  |
| 2. Instruct **STAFF** to **Rinse gloved hands** in bucket with 10% bleach solution mixed with hot water and soap  |
| 3. Instruct **STAFF** to Step into **first shuffle pit** (10% bleach solution). Shuffle feet around and then step into **second shuffle pit** (10% bleach solution).  |
| 4. Instruct **STAFF** to **assume position** with arms out and legs apart making quarter turn as the suit is decontaminated.  |
| 5. Decontamination of outside of **Tychem suit** with 10% bleach solution:  
  **Rinse – Scrub with Brush – Rinse**  |
| 6. Technical Decon Personnel will **spray down the entire suit** with water and 10% bleach solution using a **garden pump sprayer** and lightly **scrub the suit** from top to bottom, front and back. This includes the hood and gas mask. **Take care not to scratch the visor of the gas mask.**  |
| 7. Instruct staff to present **hands forward.**  |
| 8. **Do not remove ChemTape from wrist.** Pull outer butyl glove with sleeve downward while staff pulls hand out of gloves.  |
| 9. **STAFF will pull arms in to front of the chest** inside the Tychem suit. **Inner gloves** remain on.  |
| 10. **Remove ChemTape** from around gas mask, under chin and down front of suit.  |
11. Peel open front of Tychem suit exposing the zipper and Unzip front of Tychem suit to waist-level and carefully pull hood backwards off head.

**Instruct STAFF to remain still then:**
12. Grabbing only outside of Tychem suit remove hood by pulling it backwards.
13. Roll suit over onto itself pealing back over shoulders and downwards to knees
14. Instruct staff to slowly back up and sit on CLEAN bench at the exit line of Technical Decon Area.
   STAFF must maintain chin-up and arms crossed across chest.

**Technical Decon Personnel will:**

15. Once **STAFF** is sitting on bench **loosen boots**. Keep ChemTape in place around suit and boots.

16. **Remove first boot and leg of Tychem suit as a single unit.** Boot stays attached to leg of suit.
17. Instruct **STAFF** to **swing exposed leg over bench** to clean / cold zone. They should be straddling the stool.

18. **Remove second boot** with remaining leg of Tychem suit and have **STAFF** swing their leg over to clean / cold zone.

19. **STAFF** will **lean forward** and **remove Black Mask**; pulling from back of straps forward and **place mask into bucket** in Technical Decon Area to be cleaned.
20. Insert thumbs under each of the harness head straps end tab and fully extend the harness head straps
21. Lean forward, shut eyes, hold breath, grasp harness from back and pull mask away from face.
22. Place in marked container across the line in the warm zone.

<table>
<thead>
<tr>
<th>In Cold Zone STAFF will</th>
</tr>
</thead>
</table>

23. Remove cooling vest.
24. **Remove inner gloves** and place in container for gloves across the line in the warm zone.
25. **Wash hands**, and if possible shower.

26. Present self to Safety Officer/Occupational Health Staff for **vital signs assessment**
27. **Hydration** and rest.
Chemical/Biological Patient Decontamination Checklist

### Step by Step Decontamination Patients

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Dirty Triage Officer interviews patients and determine if there is need for decontamination.</td>
</tr>
<tr>
<td>2.</td>
<td>Patients are labeled using a predetermined system (e.g. <strong>marker on right hand</strong>: C for clean, D for dirty etc.).</td>
</tr>
<tr>
<td>3.</td>
<td>Instruct patients to wait for decontamination in <strong>Pre-decontamination Holding Area</strong></td>
</tr>
<tr>
<td>4.</td>
<td><strong>Divide patients in 3 lines</strong> in front of tent to wait for decontamination</td>
</tr>
<tr>
<td>5.</td>
<td>Instruct patients to remove clothing and personal items, and to place the items in bagging system prior to entering decontamination corridor</td>
</tr>
</tbody>
</table>

### Ambulatory Patients

**Monitor and verbally instruct** ambulatory patients within the decontamination corridor to ensure compliance with the following:

6. Rinse with water.
7. Wash with soap and water.
8. Spend a **minimum of 5 minutes** in the shower.
9. **Focus** on non-clothed/exposed areas.
10. Shower carefully **from the head down, leaning the head back** to reduce the chance of any residue contacting the eyes, nose and mouth.
11. Rinse with water.
12. Make all attempts to ensure patient dignity.

### Non-Ambulatory Patients

**Rescuer staff will decontaminate** non-ambulatory patients in the following manner:

13. Spend a **minimum of 12 minutes** per patient.
14. Assign a minimum of 2 people to stretcher patient decon with 1 person overseeing the process, for a total **minimum of 3 personnel per stretcher patient**.
15. Ensure a **bucket of decontamination solution** is located at **two corners of the shower** with **soft bristle brushes** or sponges contained within; use them to decontaminate patients.

16. **Assign an area of the victim to each person** assisting in the decontamination effort; each person should focus on that area (usually the waistline is a good demarcation line, as is the midline of the body).

17. **Start** the decontamination process **at the midline**, and **spray/wipe** the victim **laterally** or toward the side and back of the body.

18. Rinse the sponge or brush in the decontamination solution bucket after each wipe.

19. Once the body has been wiped, **thoroughly shower off the patient**, using the same general technique.

20. Once the front surfaces of the victim have been decontaminated, carefully **roll the patient onto one side**, and decontaminate the **back surfaces** with a sponge or **brush from highest to lowest point**.

21. Brush from top down with each stroke; do this twice over the entire body and then rinse.

22. Transfer the decontaminated patient to a clean stretcher or backboard.

23. Upon exit from warm zone shower corridor, dry off the patient and dress them in clean clothing. Label the patient as clean in order to allow entry into hospital triage area.
Appendix I

Management of Patient Belongings

The following recommended procedures serve as a foundation in order to collect and maintain the chain of evidence. In the event of a suspected or actual criminal event including a CBRN event, a variety of responders, ranging from health care providers to law enforcement, will play a role in the coordinated response. The identification of victims as well as the collection of evidence will be a critical step in these efforts.

- The health care provider's first duty is to the patient
- The performance of evidence collection while providing required patient decontamination, triage and treatment should be reasonable for the situation.
- Information gathered from the victims and first responders may aid in the epidemiological investigation and ongoing surveillance.

Collection of patient belongings

Valuables
- Ambulatory and non-ambulatory patients who are able to undress without assistance will be directed to place their valuables (wallets, jewelry, cell phones, etc.) in a labeled re-sealable envelope
- Assistive devices such as glasses, canes, hearing aids, etc. and car/house keys should be kept by the patient and decontaminated along with him/her.

Clothing
- Ambulatory and non-ambulatory patients who are able to undress without assistance will be directed to place their clothing in a pre-numbered plastic bag.
- Place the labeled patient’s valuables bag in the clothing bag.
- Label the bag with patient identification
  - Patient name
  - DOB
  - Medical record number
- Patient to write corresponding number on clothing bag onto their LEFT hand using marker
See Appendix N for “Decontamination Measures” for Management of Patients in a Radiation and/or Nuclear Event.

**Decontamination and release of belongings**

- The hospital shall not be held liable for any missing or misplaced patient belongings.
- Release of patient belongings and valuables to law enforcement authorities should be in accordance with local law enforcement and hospital policy.
- If valuables and/or belongings are released to law enforcement, it will be their responsibility to decontaminate the articles.
- In the event that law enforcement determines that the patient valuables and belongings are not needed as evidence, the property should be released to the patient upon discharge.
- The patient/family is responsible for the decontamination of belongings returned to them. The hospital can provide guidance in collaboration with external experts regarding how belongings should be decontaminated safely.
APPENDIX J

Radiation Monitoring Equipment Inventory

**Mini-Sentry**
- Portable Portal Gamma Monitor for rapid screening of potentially contaminated people.
- Easily assembled and deployed (see Appendix R).
- Simple operation.
- 40 hours battery operation.
- Place at the regular entrance of Emergency where patients would be entering after a radiological event.
- One person at a time passes through monitoring device (ambulatory, wheelchair or stretcher accessible).
- People waiting to be monitored need to be a suitable distance away from the monitor avoid any possible contamination from affecting results, at least 3 metres.
- Caution: The legs of the Mini-Sentry contain plastic scintillators and must be handled with care.
- Instructions for use is with Mini-Sentry and Code Response Kit.

**Dosimans**
- Keeps first receivers safe.
- Credit card sized.
- On/Off Switch clears all data and makes it ready for next use.
- Displays and Alarms (audible and visual) for Dose Rate and Current Dose.
- Worn by any member of the team that would come in contact with a potentially radioactive patient: Security, Dirty Triage, Decontamination Team and Medical Staff treating radioactive patient.
- Cumulative dose are monitored. Maximum dose for a first responder is 500 mSv. (Maximum dose for a person in a non-emergency situation is 1 mSv/yr, for a nuclear energy worker it is 50mSv/yr).
- Instructions for use is with Dosimans and Code Response Kit.

**MCB2**
- Used to measure and locate radioactive contamination.
- Used to survey post-decontaminated patients.
- Post-decontaminated values are posted on the “Patient Contamination Monitoring Form (Appendix Q).
- Used to survey staff in the process of doffing their PPE, as described in the “Staff Exit Form Controlled Radiological Zone”.
- Instructions for use is with MCB2 and Code Response Kit.
Appendix K

General Principles of Radiological / NUCLEAR Decontamination Response

Treatment of radiological contamination

- Radioactive contamination (whether internal or external) is generally not life threatening and therefore, a radiological assessment or decontamination should never take precedence over life-threatening acute medical conditions. Medical stabilization of the patient is the top priority of the health care provider, even though the patient is contaminated.

- Radiologically contaminated patients with life-threatening acute medical conditions should be transported to treatment areas without delay (e.g. Emergency Department, Radiology Department, and Surgery Suite) despite the presence of contamination.

- Cover stretcher with two clean sheets wrapping one around the patient to minimize the spread of contamination.

- To minimize staff risks from exposure to ionizing radiation, all healthcare providers should carry out their responsibilities keeping in mind these principles:
  - Not all patients need decontamination. Unless the patient is contaminated with material, they do not need to be decontaminated if they were only exposed. Remove from source.
  - Radiation material CANNOT be destroyed or neutralized. It can only be removed.
  - Limit spread of radioactive material
  - Removing patients’ clothing generally removes up to 90-95% of the contamination.
  - Minimize time spent in a radiological environment and maintain the maximum distance from sources of radiation consistent with appropriate patient care.
• Radiation Safety Officer/Nuclear Medicine staff to assist with detecting the sources of radioactive contamination and the effectiveness of decontamination efforts.

• All personnel responding to the care of a radiologically contaminated patient should be given a personal dosimeter.

• Medical personnel who will be handling potentially contaminated patients should use PPE. (Proshield II Coverall, N95 respirator, cap, safety goggles, Poly Boot covers and gloves)
### Appendix L

**Mini-Sentry Assembly, Control and Functions**

1. Open case, remove all components and lay them on a clean floor space.
2. Lay the component out so that the legs are sitting parallel to each other, with their sensor windows facing "in", and the cross-piece is at the top of the legs.
3. Remove End Caps (and keep, for later storage).

4. Insert base plate into foot of leg (note: this is most easily done by lifting the bottom of the leg with one hand, while affixing the base plate with the other).
5. Place the washers over the bolts, and finger-tighten the wing nuts over them.
6. The base will be roughly perpendicular to the ground.
7. Repeat the process with the opposite column, again ensuring that the base is perpendicular to the ground while the photo-sensor is pointed toward the expected center of the portal.

8. With the cross piece at the top of the legs, adjust the spacing of the legs so that they are lined up with the cross piece.

9. Feed the power and coaxial cables through the cross piece, and correct them to the appropriate terminals. The 90° connector attaches to the "T" on the "control leg."

10. Lift the end of the leg slightly, and hold with one hand, while inserting the opening of the cross piece over the column end.

11. Repeat with the opposite column. (Disassembly is the reverse of the previous steps).
12. Ensure not to pinch cables.
13. Do not use excessive force or any tools to fit the cross-piece, otherwise the unit might be easily disassembled.

14. Carefully stand up the Mini-Sentry.
15. Make sure to support the unit until it is securely standing on its own.
16. Wide paper or non-skid plastic should be secured at the entrance of the Mini-Sentry to prevent spread of radioactive contamination to other areas.
17. If the ground cover becomes contaminated it must be changed to avoid any possible contamination from affecting screening results.
Appendix M

Donning Procedure: PPE for Radiological and Nuclear Event

If it is unknown as to whether the contaminants may be a combination of chemicals with the radioactive material wear the higher level of PPE.

<table>
<thead>
<tr>
<th>PPE for Radioactive Material ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proshield II coveralls - white</td>
</tr>
<tr>
<td>Boot covers – one size</td>
</tr>
<tr>
<td>Nitrile gloves – 2 pair - inner and outer</td>
</tr>
<tr>
<td>N-95 mask</td>
</tr>
<tr>
<td>Safety goggles</td>
</tr>
</tbody>
</table>

Steps to Donning of PPE

1. Lay out PPE equipment. Confirm coverall and gloves are the right size.
2. Remove jewelry. In the case of long hair secure with a hair net or tie back.
3. Hydrate with 8 to 16 oz of fluid.
4. Don white Proshield II coveralls.
5. Put on boot covers. Pull suit cuff over the top of boot covers and tape with masking tape to secure. Leave pull-tab for easy removal.
6. Put on inner Nitrile gloves. Pull sleeves over the top of gloves and tape with masking tape to secure. Leave pull-tab for easy removal.
7. Put on N95 particulate mask.
8. Pull up hood on coverall. Ensure zipper is secured.
9. Clip Dosiman personal dosimeter to outside of coverall.
   - Slide power switch to “ON” position.
   - Normal operating screen should look like this:
• This alarm pictogram indicates alarm levels have been set by the Corporate Radiation Safety Office who maintain this equipment

• If the Dosiman alarms when you are in the radiation area, leave as soon as possible and report to the Radiation Safety Officer to have the alarms checked.

10. Put on **outer gloves**. These are **not taped to coverall** so that if contaminated they can be easily removed and clean gloves put on.
Appendix N

Checklist for the Management of Patients in a Radiation and/or Nuclear Event

Don Personal Protective Equipment:

The purpose of protective clothing is to keep bare skin and personal clothing free of contaminants. Members of the radiological emergency response teams should dress in scrub suit/uniform, Proshield II Coverall, N95 mask, cap, safety goggles, Poly Boot covers and 2 pairs of nitrile surgical gloves (outer pair not taped down). All open seams and cuffs should be taped using chem-tape. Fold-over tabs at the end of each taped area will aid removal.

Two pairs of nitrile surgical gloves should be worn. The first pair of gloves should be under the arm cuff and secured by tape. The second pair of gloves should be easily removable and replaced if they become contaminated.

A radiation dosimeter should be assigned to each team member and attached to the outside of the scrub suit/uniform at the neck where it can be easily removed and read. If available, a film badge or other type of dosimeter can be worn under the scrub suit/uniform. A waterproof apron can also be worn by any member of the team using liquids for decontamination purposes.

This protective clothing is effective in stopping alpha and some beta particles but not gamma rays. Lead aprons, such as those used in the x-ray department, are not recommended since they give a false sense of security as they will not stop most gamma rays.
### Management of Patients in Radiological and/or Nuclear Event

<table>
<thead>
<tr>
<th>Initial Steps</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ascertain from scene the type of radiological incident, number of victims and types of injuries</td>
<td></td>
</tr>
<tr>
<td>Obtain and test radiation survey meters</td>
<td></td>
</tr>
<tr>
<td>Obtain radiation decontamination supplies.</td>
<td></td>
</tr>
</tbody>
</table>

- Request assistance of the Radiation Safety Officer and/or Nuclear Medicine staff, if available
- Don PPE
- Provide personal dosimeters to staff
- A step-off-pad or boundary line should be established to distinguish clean areas from potentially contaminated areas.
  - **Cover floor of treatment room with non-skid plastic** covering (e.g. Herculite or other appropriate floor covering) to aid in facility decontamination following the event (if there is sufficient time and if external contamination is expected).
- Cover stretcher with two clean sheets
- Label waste containers for radioactive waste
- Upon arrival of the patient (as early as possible without delaying appropriate medical care) perform a very quick survey to ascertain presence of radioactivity and exposure rate.
- Patients without life-threatening conditions should receive effective decontamination prior to receiving medical care.

### Decontamination measures

- Remove and bag clothing in plastic bag carefully to prevent spread of contamination
- Locate the contamination by surveying the patient with a MCB2 Contamination Meter
- Record the location of contamination, including the counts per minute (CPM) on the GM survey meter at one inch above the location.
Collect samples as appropriate:

- Nasal (each nostril separately), oral
- Skin wipes of contaminated areas
- Foreign objects
- Blood
- Urine and/or feces (suspected internal contamination)
- Contaminated wound exudates
- Emesis

Cover uncontaminated wounds with waterproof dressings.

Decontaminate skin by cleaning carefully with soap and tepid water, wiping toward the highest contaminated area to limit spread. Do not abrade skin.

If radioactive fragments are discovered on the patient, use long-handled tongs or forceps to remove the fragment(s). Place the fragment in a shielded lead container, if available.

Irrigate contaminated wounds with room temperature sterile saline and gently wash with surgical sponges. Collect run-off in plastic bowls or absorb using gauze or sponges to minimize the spread of contamination.

While it is desirable to obtain samples during the decontamination effort that can be used for analysis to determine the radionuclides present, it is not necessary to attempt to contain all the fluids generated during decontamination. The amount of radioactive material released to the sanitary sewer will likely be below the levels that are of regulatory concern.

Gently rinse contaminated burns (do not scrub).

Stop decontamination of skin and wounds when either:

- The contamination is less than 2 to 3 times the normal background levels. (Measure background level at time of event with MCB2 then scan patient’s skin and/or wound)
  
  \textit{or;}

- Attempts to decontaminate are not significantly reducing contamination levels.

Control contamination by placing all potentially contaminated material in waste containers labeled with a “caution radioactive materials” sign.
Appendix O

Staff Exit Procedure from Controlled Radiological Zone

To exit the controlled radiation zone, all staff must remove PPE in the following sequence to contain radioactive contamination within that zone.

Procedure for Exiting Staff

1. Exiting staff will work in a buddy system.
2. Unzip Proshield 2 coverall. Pull hood back and off head. Do not touch face.
3. Remove outer gloves – to radioactive waste container.
4. Remove EPD and hand to Radiation Safety Officer in the cold zone.
5. Remove mask – to radioactive waste container.
6. Remove tape around wrists and ankles – to radioactive waste container.
7. Roll down Proshield coveralls to upper thighs. Roll outward and down to contain any radioactive contamination.
8. Sit on stool at the control line. Remove Proshield coveralls from legs - to radioactive waste container.
9. Remove inner gloves – to radioactive waste container.
10. Lift one foot for buddy to remove boot and survey foot.
11. If no radioactive contamination is detected, place clean foot on other side of control line in the cold zone.
12. Repeat with other foot. If no radioactive contamination is detected, place clean foot on other side of control line in the cold zone.
13. Stand up.
14. The safety officer will do a full body survey.
15. Any contamination must be removed before leaving the controlled warm zone. If contamination is on street clothing or body change out of clothing and place clothing in plastic bag. If contamination on hands/body; wash hands and/or shower as needed. Consult Radiation Safety Officer as required.

Procedure for Radiation Safety Officer

1. Receive personal doximeter from staff and record final reading on Personnel Radiation Dosimetry Log (Appendix R)
2. Instruct and assist staff with undressing as required.
3. Monitor staff exiting from controlled warm area into clean control area.
4. Advise on contamination removal if required and re-monitor after decontamination.
5. Complete all dosimetry records.
6. File Radiological Incident Report with Radiation Safety Officer if required.
### Radiation Emergency Area (REA) PROGRESS NOTES

<table>
<thead>
<tr>
<th>Time In</th>
<th>Time Out</th>
<th>Comments</th>
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</thead>
<tbody>
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Appendix Q

Patient Contamination Monitoring Form

Indicate levels of contamination on the drawing in counts per minute (cpm).

Indicate location of wounds. Use separate sheet for counts after decontamination.

PATIENT NAME: ____________________  Surveyed by: ________________________

Date & Time: ________________  Monitor Model & Serial Number: ________________

Skin to probe distance: ______________cm
## Appendix R

### Personnel Dosimetry Log

<table>
<thead>
<tr>
<th>NAME</th>
<th>SIN</th>
<th>Time Issued</th>
<th>Dosiman Number</th>
<th>Dosimam Reading</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Initial</td>
<td>Final</td>
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</table>

Radiation Safety Officer Signature: ___________________    Date: ___________________
Appendix S

Decontamination Staff Medical Monitoring Form

Medical Monitoring is MANDATORY to assess fitness of staff required to wear personal protective equipment.

Name: _____________________ Date: ________________

Reminder: staff to drink water and go to bathroom before donning PPE!

PRE-ENTRANCE EXAM COMPONENTS: To be completed within 1 hour prior to entry:

<table>
<thead>
<tr>
<th>Time</th>
<th>Temp</th>
<th>HR</th>
<th>RR</th>
<th>BP</th>
</tr>
</thead>
</table>

Exclusion Criteria

- Blood pressure diastolic over 95
- Pulse greater than 90 or irregular rhythm
- Respiratory rate greater than 24 per minute
- Temperature: not to exceed 36.1°C
- Weight or other disability unable to fit in suit without causing undue strain on same
- Skin eruption, open sore, large area of eczema, or other skin condition
- Mental status: any alteration
- Recent medical history: uncontrolled, severe, recurring, disabling within the past 72 hours, recent hospitalization for other medical conditions

All staff must be screened for exclusion criteria prior to putting on PPE (circle) PASS FAIL

Comments: ____________________________________________________________

Location Assigned to work (Circle one)  Trage  Hot Zone  Cold Zone

PPE Donned: (Circle one)

- Tyvek (gray suit): Trage
- Tyvek (white suit): Hot Zone
- N95 Mask: Cold Zone
- Neoprene Gloves: N95 Mask
- Beryl Gloves: Cold Zone

Personal Decontamination Tracking Number (if applicable): ____________________

Time in PPE: ________ Time out of PPE: ________

POST ENTRANCE ASSESSMENT:

<table>
<thead>
<tr>
<th>Time</th>
<th>Temp</th>
<th>HR</th>
<th>RR</th>
<th>BP</th>
</tr>
</thead>
</table>

Form Completed By: _______________________

Further guidance on the completion of this form can be obtained through the Occupational Health Department or by reference to the staff's occupational health files.
Appendix T

Decontamination Triage Guide for Chemical/Biological or Unknown Contaminated Patients

The Triage Physician will work with the Triage Nurse and provide expertise if required in assessing casualty patients.

Assess each patient in the hospital warm zone and assign a level of decontamination priority and using a bold marker write large sized letter on patients’ right hand

- Red – Critical
- Yellow – Immediate
- Green – Minor
- Black – DOA

The START triage method uses Respirations, Pulse, and Mental Status to categorize the patient into a colour code

<table>
<thead>
<tr>
<th>Respirations</th>
<th>&lt;10 or &gt;30 – RED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No respirations with patent airway – BLACK</td>
</tr>
<tr>
<td></td>
<td>Respirations between 10 – 30 go to pulse</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pulse</th>
<th>No radial pulse – RED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pulse present go to mental status</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mental status</th>
<th>Confused or Unconscious – RED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alert – YELLOW</td>
</tr>
<tr>
<td></td>
<td>Able to walk – GREEN</td>
</tr>
</tbody>
</table>
Appendix U

Guidelines for Chemical, Radiological, & Unknown Agents for Hospital Staff

Contacts: Ontario Poison Centre: 1-800-268-9017 or 416-513-5000
Ministry of Health & Long-Term Care Health Care Provider Hotline (for information or scientific support): 1-866-212-2272

General Notes on Decontamination
Please refer to established institutional protocols for chemical/biological/radiological/nuclear (CBRN) decontamination, including use of decontamination tent and related equipment.
With any potentially contaminated patient, the following principles apply:
Step 1. Remove the patient from the contaminated area and into the decontamination corridor.
Step 2. Remove all clothing and place in a plastic bag.
Step 3. Thoroughly wash and rinse contaminated skin using a soap and water solution, as per institutional procedure.
In a “cold zone” with a decontaminated patient, standard hospital wear is sufficient unless specific concerns exist.

RIOT AGENTS: Chloracacetophenone (Mace), Chlorobenzylidene Malononitrile (Tear Gas or CS), Dibenzoxazepine (CR) and Oleoresin Capsicum (OC or Pepper Spray)

<table>
<thead>
<tr>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical compounds that “temporarily” render people less able to engage in protest activity. Also known as tear gas, pepper spray, irritant incapacitants, and lacrimators.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clinical Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye: Excessive tearing, burning, blurred vision, erythema, blepharospasm. Respiratory: Runny nose, chest tightness, cough, choking or burning sensation, wheezing, shortness of breath, pharyngitis, bronchospasm. Skin: Blistering, rash, tingling, erythema, edema. Other: Trembling, agitation, severe anxiety.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Onset</th>
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</thead>
<tbody>
<tr>
<td>20-30 seconds after exposure. Usually stops in 10-30 minutes if patient is removed from exposure and/or decontaminated.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Personal Protective Equipment (PPE): Decontaminated Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>In general patients who have suffered tear gas exposure pose minimal or no risk to health workers as most, if not all gas will have dissipated or been removed prior to arrival; patients with pepper spray may be contaminated for a longer period. Therefore, health workers should use routine practices and symptom based precautions.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PPE: Contaminated Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health workers should don eye protection, surgical mask or N95 respirator, gown, and gloves.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specific Decontamination Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tear gas disperses easily, pepper spray may require decontamination: removal of clothing and thorough washing with soap and water is sufficient. Consider cutting shirt to avoid pulling over patient’s head.</td>
</tr>
</tbody>
</table>
**RIOT AGENTS: Chloroaacetophenone (Mace), Chlorobenzylidene Malononitrile (Tear Gas or CS), Dibenzoazepine (CR) and Oleoresin Capsicum (OC or Pepper Spray)**

<table>
<thead>
<tr>
<th>Assessment and Treatment</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1.</strong> Assess vital signs, with focus on respiratory status; address ABC’s.</td>
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</tr>
<tr>
<td><strong>Step 2.</strong> Assess co-morbidities; consider bronchodilators and oxygen as needed.</td>
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<tr>
<td><strong>Step 3.</strong> Assess visual acuity (light perception, counting fingers), if impaired, assess for corneal injury.</td>
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<tr>
<td><strong>Step 4.</strong> For eye discomfort:</td>
<td></td>
</tr>
<tr>
<td>a) Remove contact lenses.</td>
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</tr>
<tr>
<td>b) Irrigate thoroughly with normal saline.</td>
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</tr>
<tr>
<td>c) Consider use of topical anesthetic eye drops (do not give to patient).</td>
<td></td>
</tr>
</tbody>
</table>

**RADIATION EXPOSURE**

<table>
<thead>
<tr>
<th>General Principles</th>
<th></th>
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<tbody>
<tr>
<td>Ionizing radiation includes alpha or beta particles, gamma radiation and neutrons. Radiation cannot be detected by the human senses. A radiological survey with specialized equipment is the only way to confirm the presence of radiation. Exposure occurs when a person is near a radiation source. People who have been exposed may suffer radiation illness but do not become radioactive. External contamination occurs when loose particles of radioactive material are deposited on surfaces, skin, or clothing. Internal contamination occurs when radioactive particles are inhaled, ingested or lodged in a wound.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Clinical Management Principles</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressing contamination issues should not delay treatment of life-threatening injuries. Persons who have been exposed to radiation but are not contaminated pose zero risk to health workers; furthermore, it is highly unlikely that the levels of radioactivity associated with a contaminated patient would pose significant health risk to other workers. Utilize radiation meters to survey patient if clinically concerned about contamination; radiation personnel in your facility, if available, may be able to assist.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Acute Radiation Syndrome (ARS)</th>
<th></th>
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<tbody>
<tr>
<td>Vomiting is generally the earliest symptom. Later, symptoms of bone marrow suppression, gastrointestinal mucosal injury, and/or cardiovascular/central nervous system effects. Transient itching, tingling, erythema or edema may be seen from hours to days after exposure (cutaneous radiation injury). Depending on stage of illness, patient may be asymptomatic. Important initial labs are a complete blood count (CBC) with differential and amylase (used for measuring short-term trends).</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Onset</th>
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<tbody>
<tr>
<td>Nausea and vomiting may occur minutes to days after exposure. Onset of vomiting within one hour after exposure indicates a severe degree of ARS.</td>
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</table>

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<thead>
<tr>
<th>PPE</th>
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<tbody>
<tr>
<td>Required if ingestion and emesis or while removing contaminated substances; if unknown agent utilize protection based on institutional guidelines for potential CBRN agent including full face piece air purifying or N95 respirator with eye protection, coveralls, boots, hood, nitrile gloves.</td>
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<thead>
<tr>
<th>Specific Decontamination Notes</th>
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<tbody>
<tr>
<td>Removal of clothing and external debris (eliminates 80-90% of external contamination); dispose of in separate plastic-lined waste containers which are clearly marked. Specialized treatment for internal contamination; call health care provider hotline for assistance.</td>
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</tbody>
</table>
### Potential Chelation Therapies for Internal Contamination with Radionuclides

Note, therapies only applicable in cases of internal contamination; irradiation only cannot be treated by chelation.

Contact the Health Care Provider Hotline for further information: 1-866-212-2272

<table>
<thead>
<tr>
<th>Radioactive Sources</th>
<th>Treatment</th>
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<tbody>
<tr>
<td>Iodine</td>
<td>Potassium iodide (KI)</td>
</tr>
<tr>
<td>Caesium</td>
<td>Prussian blue</td>
</tr>
<tr>
<td>Strontium, Radium</td>
<td>Ammonium chloride</td>
</tr>
<tr>
<td>Cobalt</td>
<td>DTPA</td>
</tr>
<tr>
<td>Uranium</td>
<td>Bicarbonate</td>
</tr>
<tr>
<td>Iron</td>
<td>Deferoxamine</td>
</tr>
</tbody>
</table>
### UNKNOWN WHITE POWDER

**Step 1.**  
Leave it alone and leave the room or general area where substance is located and move to an isolated area to prevent further contamination.  

If it looks suspicious put it down, cover it up and leave it alone until it can be assessed.  
DO NOT try to clean it up.  
DO NOT shake or empty the contents of a suspicious envelope or package.  
DO NOT sniff, touch or look closely at any substance that may be spilled.  
DO NOT show a suspicious substance to others, or allow others to examine them.

**Step 2.**  
Report it.  

Call your CERN Team Leader on call if available (or appropriate contact based on your institutional protocols) to do a threat assessment by following your facility’s emergency procedures for hazardous materials. If deemed to be a threat, call 9-1-1 and follow caller’s instructions.

**Step 3.**  
Wash.  

While waiting for threat assessment to be done, ensure all persons who may have been exposed thoroughly wash their hands and any skin area that has touched the substance with soap and water.  
If anyone had direct contact with the substance or substance is visible on clothing, await directions based on threat assessment for further decontamination.  
If possible, create a list of persons who were in the room or area when the suspicious substance was recognized and give to public health and law enforcement officials.

### PATIENTS WITH UNIDENTIFIED POWDER CONTAMINATION: PPE and Decontamination

<table>
<thead>
<tr>
<th>Asymptomatic Patient</th>
<th>Routine practices and respiratory precautions (gown, gloves, eye protection, surgical mask or N95 respirator), direct patient to decontamination area.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptomatic Patient</td>
<td>If patient exhibits respiratory symptoms, the health care worker should don N95 respirator, eye protection, gown and gloves. Patients should be decontaminated by removing clothing, placing clothing in plastic bags and washing patient with soap and water.</td>
</tr>
</tbody>
</table>

**ADDITIONAL NOTES:**  
Potential threats include anthrax.  
Most common white powder substances found are flour or sugar.
## Nerve Agents: Sarin, Tabun, Soman, VX

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Volatile liquid commonly aerosolized or evaporated. Colourless gas or colourless/pale yellow liquid. Inhalation, ingestion, dermal exposures all possible.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onset</td>
<td>Inhalation of vapour — seconds to minutes. Dermal or liquid exposure — may be delayed by minutes/hours.</td>
</tr>
<tr>
<td>PPE: Decontaminated Patients</td>
<td>If decontaminated after inhalation or dermal exposure, no specific PPE required for health workers; if ingestion, patient may pose risk if emesis occurs or concerns about residual contamination therefore treat as contaminated.</td>
</tr>
<tr>
<td>PPE: Contaminated Patients</td>
<td>Ensure protection based on institutional guidelines for potential CBRN agent including full face piece air purifying respirator (APR), coveralls, boots, hood, and nitrile gloves.</td>
</tr>
<tr>
<td>Decontamination</td>
<td>Proceed with decontamination as per institutional guidelines.</td>
</tr>
</tbody>
</table>

## Antidotes

1. **Atropine** – Atropine 2 mg IV/IM/ET or by autoinjector every 5-10 minutes based on response. Drying of pulmonary secretions. May double the dose of atropine every 5 minutes until secretions/bronchospsam resolve.
2. Oximes (pralidoxime/2-PAM or obidoxime) – pralidoxime 600 mg IM or by autoinjector; or obidoxime 150 mg IM or by autoinjector.

<table>
<thead>
<tr>
<th>Pediatric Dosing &lt;10kg</th>
<th>1. Atropine 0.5 mg IV/IM q3 minutes based on response. 2. Pralidoxime 15 mg/kg IV/IM or obidoxime 8 mg/kg IV/IM. 3. Diazepam 2 mg IV/IM.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pediatric Dosing 10-39 Kg</td>
<td>1. Atropine 1 mg IV/IM q5 minutes based on response. 2. Pralidoxime 15 mg/kg IV/IM or obidoxime 8 mg/kg IV/IM. 3. Diazepam 0.2 mg/kg IV/IM.</td>
</tr>
</tbody>
</table>

## Toxic Asphyxiants: Cyanide

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Cyanide salts, other cyanogenic compounds, closed space smoke inhalation. Colourless gas or volatile liquid. May smell like bitter almonds.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical Findings</td>
<td>Early: CNS stimulation (headache, anxiety), tachycardia, hyperpnea, mild hypertension, palpitations. Late: Nausea, vomiting, tachycardia or bradycardia, hypotension, seizures (rare), loss of consciousness, apnea, dilated pupils, cardiac arrhythmias or ischemia, non-cardiogenic pulmonary edema.</td>
</tr>
</tbody>
</table>
### Toxic Asphyxiants: Cyanide

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Toxic Asphyxiants: Cyanide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onset</td>
<td>Inhalation → immediate.</td>
</tr>
<tr>
<td></td>
<td>Ingestion of cyanide salts → 30-60 mins.</td>
</tr>
<tr>
<td></td>
<td>Ingestion of cyanogenic compounds → may be delayed.</td>
</tr>
<tr>
<td>PPE: Decontaminated Patients</td>
<td>In general patients who have suffered inhalation of cyanide pose no risk to health workers; if ingestion or skin contamination, treat as contaminated.</td>
</tr>
<tr>
<td>PPE: Contaminated Patients</td>
<td>Ensure protection based on institutional guidelines for potential CBRN agent including full face piece APR, coveralls, boots, hood, nitrile gloves.</td>
</tr>
</tbody>
</table>

#### Decontamination
Proceed with decontamination as per institutional guidelines.

#### Special Investigations
Lactate, electrolytes, arterial blood gases.

#### Antidotes
- Cyanokit (hydroxycobalamin) 5 g by rapid IV infusion over 30 minutes (2x2.5 g bottles)
- Oximetry kit:
  1. Amyl nitrite prills - use under the nose, before IV access established.
  2. Sodium nitrite 10 mL of 3% solution (300 mg) slow IV push over 2.5 min.
  3. Sodium thiosulfate 12.5 g IV (1 50 mL ampule of 25% solution).

#### Pediatric Dosing
- Hydroxycobalamin 70 mg/kg
- Sodium nitrite 0.33 mL/kg (10 mg/kg)
- Sodium thiosulfate 1.65 mL/kg, max 50 mL

### Choking Agents: Chlorine, Phosgene

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Choking Agents: Chlorine, Phosgene</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential Source Of Exposure</td>
<td>Gaseous inhalation or liquid exposure. Colourless gas can form white cloud. May smell like hay/grass.</td>
</tr>
<tr>
<td>Clinical Findings</td>
<td>Predominantly respiratory: cough, irritation, bronchospasm, wheezing, shortness of breath, noncardiogenic pulmonary edema, hypotension.</td>
</tr>
<tr>
<td>Onset</td>
<td>Prognosis poor if initial presentation includes pulmonary edema, cyanosis, hypotension.</td>
</tr>
<tr>
<td>PPE: Decontaminated Patients</td>
<td>If decontaminated after inhalation or dermal exposure, no specific PPE required; if ingestion or concerns about residual contamination, treat as contaminated.</td>
</tr>
<tr>
<td>PPE: Contaminated Patients</td>
<td>Ensure protection based on institutional guidelines for potential CBRN agent including full face piece APR, coveralls, boots, hood, nitrile gloves.</td>
</tr>
<tr>
<td>Decontamination</td>
<td>Proceed with decontamination as per institutional guidelines.</td>
</tr>
<tr>
<td>Special Investigations</td>
<td>Chest radiography.</td>
</tr>
<tr>
<td>Antidotes</td>
<td>None available. Focus on cessation of exposure (fresh air) and observation and/or supportive treatment (including intubation and ventilation) as necessary.</td>
</tr>
</tbody>
</table>
### Exposure

<table>
<thead>
<tr>
<th>Potential Source Of Exposure</th>
<th>Vesicants: Sulfur Mustard (“Mustard Gas”)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Liquid or vapour exposure.</td>
</tr>
<tr>
<td></td>
<td>Colourless or amber oily liquid or colourless gas.</td>
</tr>
</tbody>
</table>

### Clinical Findings

- **Eyes**: Range from conjunctivitis to severe eye damage.
- **Skin**: Erythema and vesicles, particularly on thinner skin areas (groin, axilla).
- **Respiratory**: Range from mild irritation to severe respiratory distress.

### Onset

- **Delayed**.
- Asymptomatic period after exposure may be up to 24 hours. Ocular symptoms may be first sign.

### PPE: Decontaminated Patients

- If decontaminated after inhalation or dermal exposure, no specific PPE required; if ingestion or concerns about residual contamination, treat as contaminated.

### PPE: Contaminated Patients

- Ensure protection based on institutional guidelines for potential CBRN agent including full face piece APR, coveralls, boots, hood, nitrile gloves.

### Decontamination

- Decontamination critical: remove clothing; consider chemical deactivation with 0.5% bleach solution if available (soap and water may not be ideal).

### Antidotes

- None available.
- Symptomatic and/or supportive therapy for lesions or systemic effects.

---

1. The uncontaminated area where workers should not be exposed to hazardous conditions.
2. If patients are brought to hospital by EMS they may have been decontaminated. Consult with local EMS supporting the response. If they are well enough to self-present it is unlikely that they pose a significant threat to first receiver health care workers; however, decontamination may be considered based on type of agent and symptom severity as per institutional protocols.
3. Confirmation of dosing with Ontario Poison Centre is recommended.
Appendix V

CBRN Incident Recognition, Decontamination and Treatment

<table>
<thead>
<tr>
<th>CHEMICAL AGENTS</th>
<th>Characteristics</th>
<th>Incubation</th>
<th>Signs and Symptoms</th>
<th>Decontamination</th>
<th>Treatment/First Aid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agent A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agent B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BIOLOGICAL AGENTS</th>
<th>Contagious</th>
<th>Incubation</th>
<th>Signs and Symptoms</th>
<th>Decontamination</th>
<th>Treatment/First Aid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agents Bacterial</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agent A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agent B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Appendix W
Appendix X

Guidelines on Hospital Emergency Plans for the Management of Minor Radiation Accidents
Source: Advisory Committees of the Canadian Nuclear Safety Commission

General Precautions

1. It is extremely unlikely that radioactive contamination on the patient will pose a clinical hazard to the hospital emergency and treatment staff.
2. Hospital clothing (uniforms, surgical clothing, gowns, and latex gloves) will provide adequate protection against radioactive contamination.

3. Covering the contaminated casualty with a blanket will prevent inadvertent transfer of contamination from the patient during transfer from the ambulance to the treatment and decontamination area.

4. Anything that the patient comes in contact with should be considered to be contaminated.

5. Hospital and treatment staff that has inadvertently contaminated the skin on their hands (or other parts of the body) should wash the contaminated areas with soap and water to remove contamination. Hot water should not be used to decontaminate the skin.

6. Clothing and effects from the contaminated patient should be segregated from hospital clothing and artifacts associated with medical treatment of the radiation casualty. These items should be placed in plastic bags and stored in a secure area until their disposal is accomplished.

7. As a general precaution, female emergency and treatment staff in whom pregnancy has been confirmed should not be involved in handling of radioactively contaminated patients.

**Admission of Radiation Accident Patients**

1. The hospital is informed of imminent or actual arrival of radiation accident victims. The hospital should obtain information on the number of casualties, their medical condition and the extent and type of contamination.

2. The hospital radiation emergency plan is activated, appropriate personnel are notified and the Radiation Treatment and Decontamination Area is set up.

3. Upon arrival of the victim(s), hospital staff determines the severity of the injuries sustained by the victim(s).

4. If the injuries are life-threatening, and if the Radiation Treatment and Decontamination Area is not available, the patient(s) should be immediately treated using “universal precautions” in conjunction with the treatment principles outlined in “Treatment Principles for Life-Threatening Situations”.
5. If the injuries are not life-threatening, the patient’s treatment should be delayed until the Radiation Treatment and Decontamination Area is prepared.

6. The patient’s clothing should be removed at the earliest opportunity.

7. If the injuries are not serious and if the patient is mobile. The patient should proceed to shower for decontamination.

Preparation of Radiation Treatment and Decontamination Area

1. Set up the Radiation treatment and Decontamination Area using rope, tape, traffic cones or warning signs to demarcate areas that are off-limits to spectator traffic and to hospital staff not involved in the admission and treatment of radiation accident victims

2. Ensure that appropriate equipment and supplies (see Equipment and Supplies for Preparation of Radiation Treatment and Decontamination Area) are available within the Radiation Treatment and Decontamination Area.

3. Assist hospital staff to dress in hospital clothing (uniforms, surgical clothing, gowns, and latex gloves).

4. Remove all non-essential supplies and equipment from the Radiation Treatment and Decontamination Area. If removal is not possible, cover these items with plastic to prevent possible contamination.

5. Cover the floor of the Radiation Treatment and Decontamination Area with paper or non-slide plastic. Note: Not an essential step, as non-porous floors are easily cleaned.

6. Place a strip of tape or a step-over barrier at the entrance to the Radiation Treatment and Decontamination Area delineate the “contaminated side” from the “non-contaminated side”

7. Evacuate all non-essential personnel from the Radiation Treatment and Decontamination Area before the radiation casualty arrives.

8. To help prevent inadvertent transfer of contamination, security personnel may be posted at the control points to control access of personnel to this area.

9. Follow the basic precautions outlined in General Precautions.
10. If contamination survey meters are available, monitor personnel and material leaving the Radiation Treatment and Decontamination Area. If no contamination survey meters are available, hospital clothing (uniforms, surgical garb, gowns) should be laundered (as per normal procedures), and equipment and materials should be set aside for subsequent monitoring by outside agencies.

Treatment Principles for Life-threatening Situations

1. In a life-threatening case, medical treatment has priority over all other considerations, including decontamination.

2. The primary consideration is to treat severe physical trauma using the “A,B,C’s” of emergency treatment. Airways, breathing and circulation should receive the highest priority before other medical care or decontamination is undertaken.

3. If the Radiation Treatment and Decontamination Area is not available, the patient(s) should be immediately treated using “universal precautions”.

4. Using standard procedures, remove clothing and place into a plastic bag for subsequent monitoring, decontamination or disposal (if required).

5. After the patient has stabilized, transfer the patient to the Radiation Treatment and Decontamination Area and decontaminate the patient using the principles outlined in Principles of Patient Decontamination.

Treatment Principles for Non Life-Threatening Situations

1. If the injuries are not life-threatening, the patient’s admission to the hospital should be delayed until the Radiation Treatment and Decontamination Area has been prepared (see Preparation of Radiation Treatment and Decontamination Area). The patient’s clothing should be removed at the earliest opportunity.

2. Treatment of severe wounds or burns should receive the first priority as life-threatening treatment measures are not required.

3. Treatment of contaminated wounds or burns receives the next priority (see Treatment of Contaminated Wounds and Burns).

4. Decontamination of the patient is only to be undertaken after open wounds or burns have been dressed, using the principles outlined in Principles of Patient Decontamination.
5. If the injuries are not serious, and if the mobile, the patient should proceed to the shower for decontamination.

**Treatment of Contaminated Wounds and Burns**

1. After life-threatening treatment measures have been completed, treatment of contaminated wounds or burns should have first priority.

2. Treatment of contaminated intact skin (i.e. decontamination of patient) is only to be undertaken after open wounds or burns have been dressed.

3. **Contaminated wounds or burns** should be **cleaned and irrigated** to remove contamination and to help prevent subsequent infection. **Irrigation can be performed using normal emergency room procedures.** Irrigation water can be poured down the drain since it does not pose a radiation hazard, due to dilution.

4. If radiation instruments are not available, the wounds should be **irrigated for approximately 15 minutes with normal sterile saline using standard techniques.** A final **cotton swab** gently applied to the wound before closing the wound may subsequently be used to provide an indirect (and crude) **estimation of residual contamination.** The cotton swab and gauzes used are to be aside in a clean container.

5. If radiation instruments are available, they should be used to find residual contamination. Repeated irrigation and monitoring provides some measure of the progress of decontamination. Use a medical report form (**Patient Contamination Monitoring Form**) to record the location of injuries, contamination and associated contamination levels.

6. If the wound or burn is grossly contaminated with radioactive materials and there is concern that the wound has not been satisfactorily decontaminated, the **wound can be left open** and the patient can be transferred to a referral hospital where through decontamination can be carried out.

7. Collect and segregate all clothing and contaminated materials, place in **plastic bags** and store in a secure area for subsequent monitoring and disposal.

8. Standard clean-up hospital procedures can be applied at the end of the emergency, followed by radiological monitoring to verify effectiveness of clean-up operations.

**Principles of Patient Decontamination**
1. Decontamination of skin should only be started after alleviation of life-threatening conditions created by traumatic injury. Hospital clothing (uniforms, surgical clothing and masks, gowns, latex gloves) will provide adequate protection against radioactive contamination.

2. **Except when urgent wound care is required, decontamination is performed in the following order:** (i) head, face and hands (to prevent internal contamination); (ii) wounds and adjacent skin; and (iii) other skin areas.

3. Decontamination should be undertaken from highest levels of contamination (if known) outside the wound to the lowest.

4. **Removal of clothes and shoes will likely remove most of the contamination.** If injuries are not life-threatening and the patient is mobile, the patient should proceed to the shower for decontamination.

5. Collect and segregate all clothing and contaminated materials, place in plastic bags, label the bags and store in a secure area for subsequent monitoring and disposal.

6. For intact skin, **dry decontamination methods** (such as use of adhesive tapes to strip removable particulate matter on the skin) may be used. Liquid decontaminants (**detergents** or other mild chemical agents that facilitate removal) are equally suitable for decontamination of the intact skin but may not always be appropriate for wound cleansing or irrigation of body orifices. **Hot water should not be used to decontaminate the skin.**

7. Usually, decontamination is most effective in the earliest stages. i.e., most of the radioactive material is removed during the first decontamination effort. Continued decontamination may show diminished effectiveness. At some point, a decision has to be made to either accept some residual contamination, or proceed with the use of more potent decontaminants. Do not abrade the skin.

8. If contamination survey meters are available, monitor periodically to measure progress of decontamination.

9. If possible, take swabs from nostrils, ears, mouth and other orifices to be counted for radioactivity. If inhalation is suspected, collect nose blow and cough sample.

10. Decontamination should be performed carefully so as to prevent transfer of contamination from the patient to hospital emergency and treatment staff, and to other areas of the hospital.
11. If **severe internal contamination** is suspected, the patient should be referred to a tertiary center (Radiation Trauma Unit at Toronto Western Hospital). If expertise is available, the following treatments should be initiated prior to patient referral: gastric lavage for any acute ingestion (as for poisoning); iodide or perchlorate for radioiodine inhalation or ingestion; fluid diuresis for phosphate ingestion, and Gaviscon for metal isotopes.

**Equipment and Supplies for Preparation of radiation Treatment and Decontamination Area**

1. Rope, tape, traffic cones or warning signs for making routes and controlled areas.
2. Radiation warning signs and placards.
3. 2 – 4 ft wide paper or non-skid plastic roll for covering floors (optional).
4. Absorbent padding.
5. 2 inch wide roll of masking tape.
6. Disposal bins lined with plastic bags.
8. Labels for identifying contents of material and samples.
9. Dosimeters (if available)
10. Rubber of plastic aprons
11. Any of: Sodium hypochlorite (bleach), Proviodine iodine solution or other surgical soap, soft scrub brush, powdered detergent, 3% hydrogen peroxide solution, shampoo or betadine solution (Note: use from current stores)

**Contamination and Exposure Controls**

1. If possible, cover the wound, then cover the contaminated accident victim with a blanket to help prevent inadvertent transfer of contaminated accident victim with a blanket to help prevent inadvertent transfer of contamination from the patient
during the transfer to the Radiation Treatment and Decontamination Area from the ambulance.

2. Wear hospital clothing (uniforms, surgical clothing, gowns, and latex gloves) to provide protection against radioactive contamination.

3. Treat the contaminated patient in the Radiation Treatment and Decontamination Area unless life-threatening intervention is required to be performed in some other area.

4. Remove clothing and personal effects from the contaminated patient after life-threatening intervention has been completed. If injuries are not serious, and if the patient is mobile. The patient should proceed to the shower for decontamination.

5. Limit the time spent around contaminated materials.

6. Maximize distance from contaminated materials.

7. Segregate contaminated waste from the non-contaminated waste and store contaminated waste in a secure area until disposal.

8. If contamination survey meters are available, perform periodic radiological surveys.

9. If radiation doseimeters are available, they should be worn to estimate any radiation doses received be the hospital emergency and treatment staff.

10. Hospital and treatment staff that has inadvertently contaminated the skin on their hands (or other parts of the body) should wash the contaminated areas with soap and water to remove contamination. Hot water should not be used to decontaminate the skin.

11. After the emergency, radiological monitoring should be undertaken in affected areas of the hospital to identify possible spread of radioactive contamination.

12. All radioactive contamination should be cleaned up as soon as it is identified, and followed by radiological monitoring to verify effectiveness of clean-up operations.

13. As a general precaution, female emergency and treatment staff in whom pregnancy has been confirmed should not be involved in handling radioactively contaminated patients.
Appendix Y
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Appendix Y
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