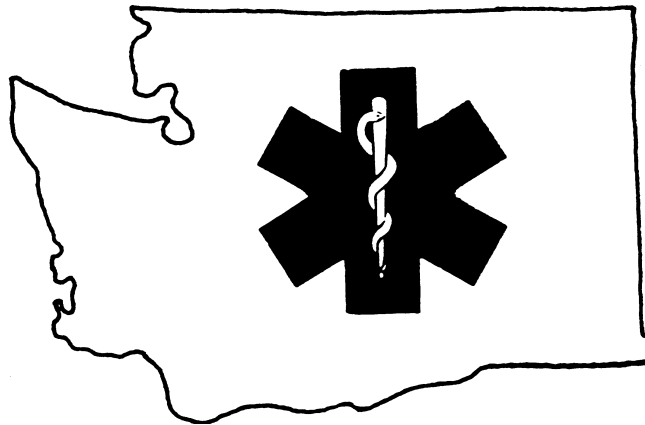


**WASHINGTON STATE**

**DEPARTMENT OF HEALTH**

**HEALTH SERVICES QUALITY ASSURANCE DIVISION**

**OFFICE OF EMERGENCY MEDICAL SERVICES & TRAUMA SYSTEM**



**MASS CASUALTY - ALL HAZARDS  
FIELD PROTOCOLS**



Revised January 2008

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**These Weapons of Mass Destruction (WMD) Field Protocols are State Protocols that establish the standard for field performance. EMS County Medical Program Directors may NOT have protocols that vary from these without specific written approval from the Department of Health. Any deviation from these protocols must be identified to and approved in writing by the Department of Health.**

# TABLE OF CONTENTS

<b>Introduction</b> .....	<b>2</b>
<b>Mass Casualty-All Hazards General Orders – Updated 8/31/07</b> .....	<b>3</b>
<b>Chemical Agents</b> .....	<b>5</b>
<b>INCAPACITATING (RIOT CONTROL) AGENTS</b> .....	<b>5</b>
<i>Tear Gas (Cs, Ca, And Cr), Mace (Cn), Pepper Spray (Oc),</i> .....	<i>5</i>
<b>CHOKING (LUNG DAMAGING) AGENTS</b> .....	<b>6</b>
<i>Chlorine (Cl)</i> .....	<i>6</i>
<i>Ammonia (Nh<sub>3</sub>)</i> .....	<i>7</i>
<b>BLISTER AGENTS:</b> .....	<b>8</b>
<i>Chloropicrin</i> .....	<i>8</i>
<i>Impure Sulfur Mustard (H), Distilled Sulfur Mustard (Hd), And Nitrogen Mustard (Hn-1, Hn-2, Hn-3)</i> .....	<i>9</i>
<i>Lewisite (L)</i> .....	<i>11</i>
<i>Phosgene Oxime (Cx)</i> .....	<i>13</i>
<b>Radiological And Nuclear Illness/Injuries</b> .....	<b>15</b>
<b>Explosives/Incendiary Agents/Thermal Burns</b> .....	<b>18</b>
<b>EXPLOSIVES</b> .....	<b>18</b>
<i>General Information</i> .....	<i>18</i>
<i>Explosives &amp; Blast Injuries</i> .....	<i>19</i>
<b>INCENDIARY AGENTS/THERMAL BURNS</b> .....	<b>22</b>
<b>MAGNESIUM/THERMITE</b> .....	<b>22</b>
<b>NAPALM</b> .....	<b>24</b>
<b>WHITE PHOSPHORUS</b> .....	<b>25</b>
<b>THERMAL BURNS</b> .....	<b>26</b>
<b>Appendicies</b> .....	<b>27</b>
<b>SUMMARY OF THE EFFECTS OF HAZARDOUS AGENTS</b> .....	<b>29</b>
<b>ACUTE RADIATION SYNDROME</b> .....	<b>37</b>
<i>Whole Body Radiation From External Radiation Or Internal Absorption</i> .....	<i>37</i>
<b>SURVIVAL RATES BY RADIATION DOSAGE</b> .....	<b>37</b>
<i>Radiation Exposure Documentation</i> .....	<i>38</i>
<b>SUMMARY OF THE EFFECTS OF EXPLOSIVE BLASTS</b> .....	<b>39</b>
<b>OVERVIEW OF EXPLOSIVE-RELATED INJURIES</b> .....	<b>40</b>
<b>BLAST LUNG INJURY MANAGEMENT ALGORITHM</b> .....	<b>41</b>
<b>RULE OF NINES - ESTIMATING BURNS</b> .....	<b>43</b>
<b>START TRIAGE</b> .....	<b>44</b>
<b>PREHOSPITAL TRAUMA TRIAGE (DESTINATION) PROCEDURE</b> .....	<b>45</b>
<b>PREHOSPITAL TRAUMA TRIAGE (DESTINATION) PROCEDURES - SCHEMATIC</b> .....	<b>46</b>
<b>GLOSSARY</b> .....	<b>47</b>

# **INTRODUCTION**

Development of these protocols was based on the nation wide research of data and references available for each protocol and subject matter expert review. The protocols represent the consolidation of medical procedures for emergency pre-hospital patient care for WMD events from local and national sources.

These protocols are to be used by Washington State certified EMS personnel. No person may provide any treatment they are not trained AND certified to provide by the Department of Health at the required level of certification. These protocols and recommended training programs and options are available on the EMS and Trauma System web site at <http://www.doh.wa.gov/hsqa/emstrauma/>

**The General Orders are intended to be considered with all protocols contained within.**

**These protocols are intended to:**

1. Provide direction for the use of appropriate emergency medical care procedures in an all hazards environment, to be employed by Washington State certified EMS personnel while working under the direction of the County Medical Program Director;
2. Provide for the standardization of pre-hospital care in Washington State;
3. Provide base hospital physicians and nurses with an understanding of what aspects of patient care have been stressed to EMS personnel and what their treatment capabilities may be;
4. Provide EMS personnel with a framework for pre-hospital care and an anticipation of supportive orders from Medical Control;
5. Provide the basic framework on which Medical Control can conduct quality improvement programs.

**They are not intended to:**

1. Allow procedures to be performed by EMS personnel who are not qualified and certified to do so.
2. Be a replacement for “on-line” medical control;
3. Be a teaching manual for EMS personnel. It is understood that EMS personnel are appropriately trained and that each person will continue to meet the state’s continuing education requirements for recertification. It is further understood that the County Medical Program Director will provide continuing education based on the results of patient care audit and review;
4. Interfere with the wishes of the patient or family.

**They are based on the following assumptions:**

1. The event is a mass casualty situation
2. The hazard has been identified and personnel are utilizing the appropriate PPE.
3. Scope of practice is not violated, meaning an EMS responder does not function beyond their level of training and certification.

**Updates in these protocols will include protocols for the following events:**

- Biological

# Mass Casualty-All Hazards General Orders – Updated 8/31/07

## I. Scene Size-up

### A. Scene Safety

1. Approach scene from uphill, upwind, upstream
2. Consider the possibility of water reactive chemicals
3. Do not eat, drink, chew or smoke while exposed hazardous materials. If absolutely necessary to drink water, drink from a canteen or other closed container
4. Consider hazard or spread of contamination from service animals.

### B. R.A.I.N.

1. **Recognize** - indications of possible Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE) use
  - a. Unusual vapor cloud, liquid, spray, odor
  - b. Lack of insects; sick or dying animals, fish or birds
  - c. Unusual metal debris or spray devices
  - d. Multiple patients with similar symptoms
  - e. Attempt to determine agent identity
2. **Avoid** – the hazard/contamination/injury
  - a. Prepare personal protection equipment, decontamination supplies, antidotes, etc., prior to entry into contaminated area.
  - b. Additional exposure to patients or responders
  - c. Unsafe structures, secondary devices anything that appears unsure or unsafe
  - d. Expansion of contamination site through movement of people and equipment
3. **Isolate** – Isolate or remove exposure to hazardous agents/threats
  - a. Eliminate exposure to contamination or threat.
  - b. Remove yourself from contamination zone
  - c. Keep people from entering contamination zone
  - d. If possible, remove contaminated patients to the warm zone.
4. **Notify** - Notify medical control (notifies burn centers) and the Incident Commander (IC)
  - a. Dispatch and incoming units of scene size-up.
  - b. Agency responsible for HAZMAT.
  - c. Agency responsible for radiation emergencies (State Radiation Control Program Director 24/7 phone number is 1-206-(nuclear) 682-5327)
  - d. Base station hospital of approximate number of patients, Nature of Illness (**NOI**)/Mechanism of Injury (**MOI**).

### C. Incident Management

1. Establish incident command
2. Establish staging area
3. Request additional resources
  - a. HAZMAT Team (MCI)
  - b. State Radiation Control Program Director
  - c. Transport vehicles

4. Establish safe routes of ingress and egress
5. Document all workers and victims exposed to radiation. The Department of Health and Human Services will request this information later and use it for medical monitoring. (See Radiation Exposure Documentation, page 38)

#### **D. Scene Assessment**

1. NOI (Chemical, Biological, Radiological)
  - a. Refer to the specific patient care protocol
2. MOI (Chemical, Radiological, Nuclear, and Explosive)
  - a. Refer to the specific trauma protocol

**E. Identify priority patients** – Begin triage per mass casualty incident plan [See Simple Triage And Rapid Treatment (START) Triage, page 44]

### **II. Management**

- A. Provide emergency decontamination per specific protocols (or see chart on page 29)
- B. Provide appropriate care according to specific treatment protocol.
- C. Provide technical decontamination necessary for transport.
  1. Mustard Agents - decontaminate exposed patients before transport and entry into medical treatment facilities to prevent vapor accumulation
  2. Radiation Decontamination:
    - a. Exposure without contamination requires no decontamination.
    - b. Patient with life-threatening condition, treat, then decontaminate.
    - c. Patient with non-life-threatening condition, decontaminate, then treat.

### **III. Transportation**

- A. Transport precautions
  1. Air Transport
    - a. Close observation is warranted for any patient suspected of blast lung injury (BLI) who is transported by air.
    - b. Consider effects of altitude on patient, airway equipment, inflatable cuffs and chest-tube management
  2. Perpetrators may be among the injured
    - a) Victims should be screened for secondary devices and weapons.
    - b) Law enforcement officers should accompany suspected perpetrators to the hospital.
    - c) Hospital should be alerted to the pending arrival of a possible perpetrator.
- B. Provide protection from the environment.
- C. Transport per MCI plans
- D. Advise emergency department of changes in patient's condition during transport
- E. Continue ongoing assessment and patient care

### **IV. Communications**

- A. Communicate patient information to the receiving hospital.
- B. Reports/Documentation
  1. Provide appropriate report to medical staff
  2. Complete agency incident documentation
  3. Document all workers and victims exposed to radiation. The Department of Health and Human Services will request this information later and use it for medical monitoring. (See Radiation Exposure Documentation, page 38)

### **V. Clean, Decontaminate, Service And Restock Vehicle**

# CHEMICAL AGENTS

- Information for each material is found in the 2004 Emergency Reference Guidebook (ERG).
- Please contact your nearest HazMat Team or Fire Department if you suspect any of these materials are present:

## ***Incapacitating (Riot Control) Agents***

### ***Tear Gas (CS, CA, and CR), Mace (CN), Pepper spray (OC),***

- Riot control agents incapacitate individuals and are not intended to cause significant injury or fatality, but to render individuals incapable of effective concerted actions.
- Short duration irritants. Effects are immediate. Symptoms resolve themselves (10 to 30 min.)
- Characteristics: Odor: CN – apple blossom

#### **I. Scene Size-up**

- A. Utilize appropriate PPE

#### **II. Signs and Symptoms**

- A. Eyes - Intense irritation, pain, spasmodic twitching, tearing, sensitivity to light
- B. Respiratory Tract – Runny nose, pain, tightness in chest, difficulty breathing, choking, burning
- C. Skin -Stinging, occasional dermatitis, blistering may occur
- D. Gastrointestinal tract - Nausea, vomiting rarely occurs
- E. Other – Headache

#### **III. Emergency Decontamination**

- A. Remove contaminated clothing and personal belongings
- B. Irrigation of the eyes may help with pain relief.
- C. Prevent contaminated irrigation solution from running onto unaffected tissues.

#### **IV. Management**

- A. Clear the airway, provide oxygen and/or ventilatory assistance as necessary
- B. **ALS** – analgesic nose/eye drops per MPD

## **Choking (Lung Damaging) Agents**

Choking agents cause destruction to the respiratory system. These agents are delivered as heavy gases that remain near ground level and in low lying areas. They dissipate rapidly in a breeze.

### **Chlorine (Cl)**

- Chlorine is the most widely known chemical in this category and is easily available.
- Chlorine is usually stored as a liquid, but becomes a gas that expands when released.
- There is no contamination of objects when in gas form. Chlorine in the upper respiratory area results in the production of hydrochloric acid and chemical burns at the site.
- Characteristics: Color – greenish-yellow gas or amber liquid (under pressure)

#### **I. Scene Size-up**

- A. Chlorine is reactive to water, produces toxic gasses and may increase toxicity when mixed with water
- B. Utilize appropriate PPE

#### **II. Signs and Symptoms**

- A. Eyes – tearing, irritation
- B. Respiratory tract: - nose and throat irritation, sneezing, dyspnea, violent cough, chest pain, decreased breath sounds, wheezing, stridor, loss of voice, runny nose, laryngeal or pulmonary edema, ulceration of the respiratory tract
- C. Skin -Redness, and chemical burns to the skin, cyanosis, dermatitis
- D. Central nervous system -General excitement or restlessness, lightheadedness, headache
- E. Gastrointestinal tract -Nausea, vomiting, abdominal pain
- F. Cardiovascular system -Rapid heart rate, increased rate of respiration
- G. Other -Excessive salivation, muscle weakness, rales

#### **III. Emergency Decontamination**

- A. Remove and double-bag contaminated clothing and personal belongings
- B. Handle frostbitten skin and eyes with caution.
  1. Warm affected parts
  2. Let the circulation reestablish itself naturally.
- C. Flush exposed skin and hair with plain water for 3 to 5 minutes
  1. Wash twice with mild soap
  2. Rinse thoroughly with water
  3. Prevent contaminated irrigation solution from running onto unaffected skin.
- D. Irrigation of the eyes may help with pain relief.
- E. Use caution to avoid hypothermia when decontaminating

#### **IV. Management**

- A. Clear the airway, provide oxygen and/or ventilatory assistance as necessary
  1. Move patient to fresh air environment
  2. ALS - Intubate the trachea if necessary
  3. For lower airway injury resulting in pulmonary edema positive pressure ventilations using positive end expiratory pressure (PEEP) may be indicated
- B. ALS – analgesic nose/eye drops per MPD



## Ammonia ( $NH_3$ )

- Used in the production of methamphetamine
- Synonyms include ammonia gas, anhydrous ammonia, liquid ammonia, aqueous ammonia, ammonia solution and ammonium hydroxide.
- Ammonia can cause illness through absorption, inhalation, or ingestion.
- The extent of illness depends on exposure, depth of inhalation, and concentration of exposure.
- Characteristics: colorless gas, which has a sharp, pungent, suffocating odor

### I. Scene Size-up

- A. Ammonia is reactive to water, produces toxic gasses and may increase toxicity when mixed with water
- B. Utilize appropriate PPE

### II. Signs and Symptoms

- A. Eyes - Irritation, corneal scarring, potential blindness
- B. Respiratory tract - nose, and throat irritation; coughing; bronchospasm, laryngospasm and laryngeal edema, pulmonary edema
- C. Skin - Stinging pain, inflammation of skin, blisters, necrosis, especially moist areas
- D. Gastrointestinal tract - burning, abdominal pain, difficulty swallowing, drooling, nausea, vomiting
- E. Central nervous system - Altered mental status

### III. Emergency Decontamination

- A. Removal of the victim from the environment and decontaminate
  1. If exposed patient has no skin or eye irritation, decontamination is usually not necessary
  2. If exposure is significant, rapid skin decontamination is critical
    - a) Remove and double-bag contaminated clothing and personal belongings while flushing exposed areas
      - (1) Patient may assist with clothing removal and basic decontamination if able
    - b) Flush liquid-exposed skin and hair with plain water for at least 5 minutes
    - c) If possible, wash exposed skin extremely thoroughly with soap and water
    - d) Flush exposed or irritated eyes with plain water or saline for 3 to 5 minutes
      - (1) Remove contact lenses if present
    - e) Use caution to avoid hypothermia when decontaminating

### IV. Management

- A. Clear the airway, provide oxygen and/or ventilatory assistance as necessary
  1. **ALS** - Intubate the trachea if necessary
  2. For lower airway injury resulting in pulmonary edema positive pressure ventilations using positive end expiratory pressure (PEEP) may be indicated.
- B. Pharmacology:
  1. Bronchodilator per MPD
  2. **ALS** – analgesics/narcotics per MPD
- C. **EMT-I/ALS** - Provide IV therapy as necessary
- D. In case of ingestion, do not induce vomiting:
  1. Contact Poison Center.

## **Blister Agents:**

Blister agents affect both exterior and interior parts of the body by causing tissue destruction and upon inhalation form blisters on lung tissue. The liquid blister agents slowly vaporize. More dense than air, blister agent vapors stay near the ground and dissipate slowly.

### **Chloropicrin**

- Chloropicrin is a dermally active toxin. Do not approach the patient without adequate protective gear.
- Use hazardous materials teams in patient rescue and decontamination.
- Characteristics: Colorless-to-light green oily liquid with an intense and penetrating odor

#### **I. Scene Size-up**

- A. Utilize appropriate PPE

#### **II. Signs and Symptoms**

- A. Eyes - irritation, pain, redness, and tearing; prolonged eye exposure to chloropicrin can cause blindness.
- B. Respiratory tract - irritation, coughing, labored breathing, sore throat, dizziness, bluish skin, vomiting, and in some instances, chemical pneumonitis and pulmonary edema.
- C. Skin - chemical burns or dermatitis manifested by red, cracked, and irritated skin.
  1. The extent of skin injury depends on the concentration and duration of exposure
- D. Gastrointestinal tract - burns to the mouth, throat, and esophagus.
  1. Ingestion of large quantities of chloropicrin liquid can be fatal.
- E. Injection: Redness and irritation of surrounding tissues.

#### **III. Emergency Decontamination**

- A. During decontamination, it is important to avoid cross-contamination
- B. Remove and double-bag contaminated clothing and personal belongings
- C. Clean and scrub the patient's entire skin surface with soap and water
- D. Use caution to avoid hypothermia when decontaminating

#### **IV. Management**

- A. Clear the airway, provide oxygen and/or ventilatory assistance as necessary; **DO NOT** use mouth-to-mouth.
  1. Intubate the trachea if necessary.
  2. For lower airway injury resulting in pulmonary edema positive pressure ventilations using positive end expiratory pressure (PEEP) may be indicated.
- B. Provide supportive measures addressing cardiovascular status as necessary.
- C. If the patient complains of eye pain or tearing, irrigate the eyes with copious amounts of water.
- D. **EMT-I/ALS** - Provide IV therapy as necessary
- E. **ALS** – bronchodilator, analgesics/narcotics per MPD
- F. No specific antidote exists for this toxin. General supportive measures are indicated.

## **Impure Sulfur Mustard (H), Distilled Sulfur Mustard (HD), and Nitrogen Mustard (HN-1, HN-2, HN-3)**

- Mustard causes injury mainly through skin contact because it vaporizes slowly.
- After exposure, there may be a latent period from 2 hours to 1 day before blisters appear on the skin.
- If Sulfur Mustard (HD) is inhaled the symptoms begin in 4 to 6 hours, if absorbed by the skin, symptoms will begin within 2 to 48 hours.
- Nitrogen mustard has a slight odor, and appears colorless when pure, but can turn yellowish upon storage.
- Characteristics:
  - H and HD – colorless and almost odorless (may be odor of mustard, garlic, or rotten onions)
  - HN1-HN3 – Dark, oily liquid

### **I. Scene Size-up**

- A. Utilize appropriate PPE

### **II. Signs and Symptoms**

- A. Eyes -Irritation, redness, edema of lids, tearing, sensitivity to light, spasmodic twitching, pain, corneal ulceration, possible scarring
- B. Respiratory tract - Irritation, cough, hoarseness, sinus and pharynx burning, nosebleed, dyspnea, rales, pulmonary edema, fever, and pneumonia in severe cases
- C. Skin -Redness of skin, small rash-like dots, itching, tissue destruction and death (gray appearance) may be seen within minutes, burning, blisters within hours, necrosis within days, moist areas affected most
- D. Gastrointestinal Tract -Pain, nausea, vomiting, diarrhea
- E. Other -Shock may occur after severe exposure, anxiety and depression

### **III. Emergency Decontamination**

- A. Remove and double-bag contaminated clothing and personal belongings and cut away the victim's mustard-contaminated hair.
- B. Unless carried out within 1-2 minutes, decontamination does not prevent subsequent blistering. Decontamination still should be carried out to prevent secondary contamination.
- C. Decontaminate immediately:
1. Mustards should not be decontaminated with water, except for the eyes, as it will spread the agent
    - a) Eyes and mucous membranes – flush with water, saline, or isotonic sodium bicarbonate for 5 to 10 minutes
    - b) Exposed skin and scalp – decontaminate by blotting, not wiping off the agent, so the contaminant will not be spread. Use military or commercially available decontamination kits
      - (1) As an alternative, use 0.5% aqueous chlorine solution to thoroughly wash the skin and hair, but is less effective for HN3
      - (2) Absorbent powders, such as flour, talcum powder or fullers earth may also be used
      - (3) Wash off the decontamination solutions within 3-4 minutes with soap and water
    - c) If the victim already has erythematous skin, decontaminating the skin with just soap and water is recommended
- D. Use caution to avoid hypothermia when decontaminating

#### IV. Management

- A. Clear the airway, provide oxygen and/or ventilatory assistance as necessary
  - 1. **ALS** - Intubate the trachea if necessary.
  - 2. For lower airway injury resulting in pulmonary edema positive pressure ventilations using positive end expiratory pressure (PEEP) may be indicated.
- B. **EMT-I/ALS** - Provide IV therapy as necessary
  - 1. Unlike thermal burns, chemical burns do not require massive fluid replacement.
  - 2. Do not over-hydrate. Over-hydration of patients with significant skin burns may result in "third spacing" of fluids within damaged lungs and worsen ventilation/perfusion mismatches
- C. **ALS** – Pharmacology per MPD:
  - 1. Analgesics/narcotics per MPD
  - 2. Antihistamine per MPD for vomiting, itching, and edema resulting from exposure to impure and distilled sulfur mustard.
  - 3. Antibiotics per MPD for respiratory infections, affected skin areas and eyes
- D. In case of ingestion, contact the Poison Center
- E. Dress affected skin areas as necessary. Do not cover the eyes with bandages.

## **Lewisite (L)**

- Lewisite vaporizes quickly enough to be a respiratory hazard, but can also be absorbed. Effects from both vapor and skin exposure occur immediately.
- Providers attending contaminated patients should have protective masks, butyl rubber gloves, and chemical protective over garments
- Caution: Lewisite may cause rubber to break down with prolonged exposure
- Characteristics: appears as a colorless liquid with a very slight odor when pure. If impure, the color may vary from purple or brown and have a geranium-like odor. MD and ED reportedly smell like rotting fruit.

### **I. Scene Size-up**

- A. Utilize appropriate PPE

### **II. Signs and Symptoms**

- A. Eyes -Pain, redness, spasmodic twitching, sensitivity to light, tearing, and corneal damage
- B. Respiratory Tract -Extreme immediate irritation, nosebleed, hoarseness and productive cough, sneezing, shortness of breath, pulmonary edema
- C. Skin – Rash within 15-30 minutes followed by blisters, pain, redness, necrotic grayish skin
- D. Gastrointestinal Tract -Diarrhea, nausea, vomiting, liver failure
- E. Other -Shock may occur with severe exposures, anxiety and depression

### **III. Emergency Decontamination**

- A. Remove and double-bag contaminated clothing and personal belongings
- B. Decontamination must occur immediately by blotting, not wiping off the agent, so the contaminant will not be spread
- C. Lewisite should not be decontaminated with water, except for the eyes, as it will spread the agent.
  1. Eyes and mucous membranes - flush with water, saline, or isotonic sodium bicarbonate for 5 to 10 minutes.
  2. Exposed skin and scalp – decontaminate using military or commercially available decontamination kits. If specialized kits are not available, rags, leaves, sticks, or just about any other material can be used to blot off liquid agent
    - a) As an alternative, use 0.5% aqueous chlorine or hypochlorite solution to thoroughly wash the skin and hair, but is less effective for HN3
    - b) Absorbent powders, such as flour, talcum powder or fuller's earth may also be used
    - c) Wash off the decontamination solutions within 3-4 minutes with soap and water
  3. If the victim already has erythematous skin, decontaminating the skin with just soap and water is recommended
  4. Use caution to avoid hypothermia when decontaminating

### **IV. Management**

- A. Clear the airway, provide oxygen and/or ventilatory assistance as necessary
  1. ALS - Intubate the trachea if necessary.
  2. For lower airway injury resulting in pulmonary edema positive pressure ventilations using positive end expiratory pressure (PEEP) may be indicated.

- B. **EMT-I/ALS** - Provide IV therapy as necessary
  - 1. Care should be taken, over-hydration of patients with significant skin burns may result in "third spacing" of fluids within damaged lungs and worsen ventilation/perfusion mismatches
- C. **ALS** – Pharmacology:
  - 1. Analgesics/narcotics per MPD
  - 2. British anti-lewisite (BAL), in oil IM for systemic removal and in ointment form for the eyes and skin – Per MPD
- D. Dress affected skin areas as necessary
- E. Do not cover the eyes with bandages, if necessary, use dark or opaque goggles to relieve discomfort from light sensitivity
- E. In case of ingestion, do not induce vomiting:
  - 1. Contact Poison Center.

## **Phosgene Oxime (CX)**

Phosgene oxime vaporizes quickly enough to be a respiratory hazard.

- CX is not a true vesicant because it does not cause blisters; instead exposure results in corrosive lesions.
- Upon exposure, signs and symptoms occur immediately.
- The pain from CX contact with skin may persist for days.
- Characteristics: Odor - a peppery or pungent odor, odor of new mown hay

### **I. Scene Size-up**

A. Utilize appropriate PPE

### **II. Signs and Symptoms – Effects occur immediately**

- A. Eyes – Unbearable pain, redness, spasmodic twitching, tearing, corneal damage, lid edema, with possible blindness
- B. Respiratory tract -Immediate irritation, sore throat, hoarseness, dyspnea, chest pain, cough, pulmonary edema, including rales and wheezes; and possible pulmonary thromboses with severe exposure
- C. Skin - Unbearable pain, blanching, red ring in 30 seconds, itchy swelling in 30 minutes, necrosis may occur
- D. Gastrointestinal - possible bleeding in the GI tract
- E. Other – Anxiety and depression

### **III. Emergency Decontamination**

- A. Remove and double-bag contaminated clothing and personal belongings
- B. Decontaminate immediately after exposure because the agent is absorbed from the skin within seconds:
1. Eyes and mucous membranes - flush with water, saline, or isotonic sodium bicarbonate for 5 to 10 minutes
  2. Skin:
    - a) Vapor exposure only:
      - (1) Decontaminate with soap and water or 0.5% solution of sodium hypochlorite
    - b) Liquid exposure:
      - (1) Showering with water alone will be adequate to remove any agent that has not yet reacted with tissue
      - (2) If the victim already has erythematous skin, washing the skin with just soap and water is recommended
    - c) As an alternative form of decontamination:
    - d) Use 0.5% sodium hypochlorite solution to thoroughly wash the skin and hair; a chlorinated solution is ineffective for phosgene oxime
    - e) Absorbent powders, such as flour, talcum powder or fullers earth may also be used
  3. Wash off the decontamination solutions within 3-4 minutes with soap and water
  4. Use caution to avoid hypothermia when decontaminating

#### **IV. Management**

- A. Clear the airway, provide oxygen and/or ventilatory assistance as necessary
  - 1. **ALS** - Intubate the trachea if necessary
  - 2. For lower airway injury resulting in pulmonary edema positive pressure ventilations using positive end expiratory pressure (PEEP) may be indicated.
- B. **EMT-I/ALS** - Provide IV therapy as necessary
  - 1. Care should be taken, over-hydration of patients with significant skin burns may result in "third-spacing" of fluids within damaged lungs and worsen ventilation/perfusion mismatches
- C. **ALS** – Pharmacology per MPD:
  - 1. Analgesics/narcotics ASAP per MPD
  - 2. Corticosteroids given I.V. may be particularly helpful for the treatment of phosgene
- D. Do not cover the eyes with bandages
- F. In case of ingestion, do not induce vomiting:
  - 1. Contact Poison Center.



# **RADIOLOGICAL and NUCLEAR ILLNESS/INJURIES**

Added January 4, 2008

**Understanding Exposure:** - Exposure may be known and recognized or clandestine as:

- Large radiation exposures, such as a nuclear bomb or catastrophic damage to a nuclear power station.
- Small radiation source emitting continuous gamma radiation producing chronic intermittent exposures (such as people passing by radiological sources)
- Skin contamination with radioactive material (external contamination)
- Internal radiation from absorbed, inhaled, or ingested radioactive material (internal contamination)
- Factors that determine severity of exposure include: duration of time exposure, distance from radioactive source, and shielding from radioactive exposure

**Treatment vs. Decontamination:** - Radiation measuring equipment should be used to check everyone near the scene for radioactive contamination.

- Always treat a patient with life-threatening condition with suspected exposure. Do not wait for decontamination. After treatment, transport, then decontaminate.
- Decontaminate people whose injuries are not life-threatening (broken arms, etc.) before transporting
- Do not send people without physical injuries to hospitals.
- Exposure without contamination requires no decontamination

## **I. Scene Size-up**

A. Wear appropriate PPE prior to arrival at the scene and follow the guidance of the radiation safety officer or operations commander. If possible, field personnel should elicit type of radioactive material involved and extent of exposure.

1. Wear a mask to reduce the dose from inhalation of radioactive dust, preferably a full face mask with HEPA filter. Most cases an N-95 mask is sufficient
2. Wear a loose fitting removable garment to prevent dust from contacting skin, remove and discard after you leave the area.
3. Responders must protect open wounds or abrasions from radioactive contamination.
4. After exposure, if contamination is isolated, decontaminate those areas. For greater surface exposure (if running water or showers are available), full body rinsing with lukewarm water is advised after removing outer garment and before leaving the area
5. Wash thoroughly with lukewarm water as soon as possible after leaving the area even if you decontaminated before leaving the scene

## **B. Scene Safety**

1. If a high radiation field is discovered, areas of operation should be determined.
2. If detonation of a nuclear weapon, stay away from ground zero (the immediate area of total destruction. Enter surrounding area only to save lives and only if radiation is in acceptable levels. Follow the guidance of the radiation safety officer or operations commander.
3. Rescue operations may be required in higher exposure areas, but exposure limits should be strictly regulated by supervisors.

4. Do not eat, drink, chew or smoke while exposed to potentially radioactive dust or smoke. If absolutely necessary to drink water, drink from a canteen or other closed container.
5. Place available **uncontaminated** (including no alpha particles) measuring instruments in plastic bags prior to use to prevent contamination and use them to map the areas leading up to the highest dose rates.
6. Do not enter an area if the dose rates are at unacceptable levels except to save lives (note: a dose rate could be the “highest” one and still not necessarily be dangerous), and then make the entry as brief as possible.
7. Document time into and out of area.

## II. Signs and Symptoms

### A. Local irradiation injuries:

1. Cutaneous Radiation Injury (CRI)
  - a) Possible early signs and symptoms (within hours of exposure):
    - (1) Itching, tingling, heat sensations or a transient edema, that define the exposure area, without a history of exposure to heat or caustic chemicals can occur within a few hours of exposure.
    - (2) Head and Neck – burns around the mucosal areas, i.e., contact burns around the eyes, particularly the cornea, sclera and conjunctivae.

### B. Acute Radiation Syndrome (Whole body radiation - external radiation or internal absorption - **Prodromal Phase**: early symptoms before characteristic symptoms appear) See Acute Radiation Syndrome, page 37

1. 0 - 100 rad or cGy
  - a) Nausea and vomiting -none
  - b) Time of onset – none
  - c) Duration – none
  - d) Central Nervous System (CNS) function – No impairment
2. 100 - 200 rad or 1-2 Gy
  - a) Nausea and vomiting – 5-50%
  - b) Time of onset – 3-6 hours
  - c) Duration – <24 hours
  - d) CNS function – No impairment
3. 200 - 600 rad or 2-6 Gy
  - a) Nausea and vomiting – 50-100%
  - b) Time of onset – 2-4 hours
  - c) Duration – < 24 hours
  - d) CNS function – Cognitive impairment for 6-20 hours
  - e) Approximately 450 rad is the LD 50/60 if left untreated
4. 600 - 800 rad or 6-8 Gy
  - a) Nausea and vomiting – 75 -100%
  - b) Time of onset – 1-2 hours
  - c) Duration – < 48 hours
  - d) CNS function – Cognitive impairment for > 24 hours
5. 800 - 3000 rad or 8-30 Gy
  - a) Nausea and vomiting – 90-100%
  - b) Time of onset – < 1 hour
  - c) Duration – < 48 hours
  - d) CNS function – Rapid incapacitation, often after a lucid period of up to several hours
6. > 3000 rad or >30 Gy
  - a) Nausea and vomiting -100%

- b) Time of onset – minutes
- c) Duration – N/A
- d) CNS function – Rapid incapacitation, often after a lucid period of up to several hours

C. **All non-radiation injuries:** - See specific treatment protocol, (i.e., burns, blast injuries, etc.).

### III. Emergency Decontamination

- A. Exposure to a beam of radiation does not contaminate a patient. Patient contamination generally results from having radioactive materials on or in the body.
- B. Exposure with contamination requires standard precautions, removal of patient clothing and decontamination with soap and water.
  - 1. Exposure without contamination requires no decontamination.
  - 2. Patients with life-threatening condition, treat, transport, and then decontaminate at receiving medical facility.
  - 3. Patients with Non-life-threatening condition, decontaminate, treat, and then transport to receiving medical facility.

### IV. Management

- A. Immediate manual head and C-spine immobilization if appropriate
- B. Clear the airway, provide oxygen and/or ventilatory assistance as necessary
- C. ALS - Intubate the trachea if necessary
- D. Control bleeding
- E. Pulse oximetry
- F. Treat for shock
- G. Cardiac monitoring - treat cardiovascular compromise per MPD protocol
- H. EMT-I/ALS - Provide IV therapy as necessary
- I. **ALS** – Pharmacology per MPD:
  - 1. Narcotic analgesia for pain control
  - 2. Antinausea medication
  - 3. Anti seizure medication
- J. Infection prophylaxis
- K. Localized irradiation burns **may** develop several hours after exposure and are treated in the same manner as thermal burns. Severe burns develop much later.
- L. Mechanical head and spine immobilization if appropriate.
- M. Psychological Support
- N. Non-radiation injuries:
  - 1. Provide appropriate care according to specific treatment protocol, (i.e., burns, blast injuries, etc.)
  - 2. Protect open wounds from radioactive contamination.
- O. Patients exhibiting severe symptoms of nausea, vomiting, may have received fatal doses – provide comfort care and immediate transport.

#### I. Transport

- A. Transport Considerations:
  - 1. Patient with life-threatening condition, after treatment, transport, then decontaminate.
  - 2. Patient with Non-life-threatening condition, decontaminate, treat, then transport.
  - 3. Person with no physical injuries - Do not transport to the hospital.

#### I. Communication

- A. Document all workers and victims exposed to radiation. The Department of Health and Human Services will request this information later and use it for medical monitoring. (See Radiation Exposure Documentation, page 38)

# **EXPLOSIVES/INCENDIARY AGENTS/THERMAL BURNS**

Added June 2007

## **EXPLOSIVES**

### **GENERAL INFORMATION**

#### **Scene Safety:**

- Identify source i.e., blast injuries, and take appropriate safety precautions.
- Identify and report to the Incident Commander (IC) any information regarding the nature and size of the explosion; the time of occurrence; the proximity of the victim(s) to the epicenter of the blast; victim displacement by the blast wind if any; the presence of secondary fires, smoke, dust, and history of entrapment in collapsed structures.
- Screen for radioactive or chemical contamination. If detected, decontamination of personnel and equipment as well as notification of the receiving hospital is required
- Ensure all responding personnel use appropriate PPE. Consider the need for respiratory, flash burn, and ballistic PPE, as well as body substance isolation.
- Wait for a secure scene, since live munitions may be in the area.
- Consider secondary and tertiary devices
- Activate appropriate disaster and/or hazardous material responses as early as possible
- Consider minimizing exposure to secondary devices or contamination by rapidly moving victims out of the impact area to a tertiary triage point.

#### **Categories of Explosives:**

- High-energy (HE) explosions produce a defining supersonic over-pressurization shock wave.
- Low-energy (LE) explosions create a subsonic explosion

#### **Mechanism of injury:**

- Primary Blast Injury – caused by the blast pressure wave. Air-filled organs are most vulnerable, i.e., ears, lungs, GI tract.
- Secondary Blast Injury – caused by projectiles carried by the blast pressure wave.
- Tertiary Blast Injury – caused from being propelled by blast pressure. Occurs in high-energy explosions.
- Quaternary Blast Injury:
  - Burns and inhalation of toxic substances caused by fires resulting from the blast.
  - Crush, debris and dust injuries – caused by structural collapse, falling debris and dust generated by a large explosion resulting in severe inhalation injuries.
- Secondary Contamination:
  - Explosion may contain radiological material (“dirty” bomb).
  - Low-order explosions may contain chemical or biological agents.

## **General Treatment Considerations:**

- Blast injury treatment should include cervical-spine and fracture precautions
- Consider Rapid Assessment Procedures.
- Shrapnel, clothing, and personal effects should be tagged and retained or secured for possible use as evidence.
- Patient communications and instructions may need to be written because of tinnitus and sudden temporary or permanent deafness.
- Compartment syndrome and acute renal failure are associated with structural collapse, prolonged extrication/entrapment, and severe burns.

## **Emergency Management Considerations:**

- Follow your hospital's and regional disaster system's plan.
- Hospitals should expect an "upside-down" triage - the most severely injured arriving after the less injured, who by-pass EMS triage and go directly to the closest hospitals.
- Double the first hour's casualties for a rough prediction of total number of casualties.
- If structural collapse occurs, expect increased severity and delayed arrival of casualties.

## ***EXPLOSIVES & BLAST INJURIES***

### **I. Scene Size-up**

- A. Utilize appropriate PPE
- B. Scene Safety

### **II. Signs and Symptoms**

#### **A. Respiratory:**

1. Wheezing, shortness of breath, hemoptysis, cough, chest pain
2. Apnea, bradycardia, and hypotension

#### **B. Eyes, Orbit, Face:** - Blurred vision, perforated or ruptured globe, foreign body, fractures, oropharyngeal petechiae

#### **C. Ears:** - Hearing loss, earache, dizziness, extreme pain, discharge from the ear, indications of eardrum rupture

#### **D. Central Nervous System:**

##### **1. Traumatic Brain Injury (TBI):**

- a) Mild: -Brief loss of consciousness, headache, stiff neck, confusion, lightheadedness, dizziness, bad taste in the mouth, fatigue or lethargy, progressive mental deterioration, and behavioral or mood changes
- b) Moderate or Severe: - Same as mild with addition of:
  - (1) Headache gets worse
  - (2) Nausea, repeated vomiting, convulsions or seizures
  - (3) Inability to awaken from sleep, dilation of one or both pupils, slurred speech, weakness or numbness in the extremities, loss of coordination, and/or increased confusion, restlessness, or agitation.
  - (4) Small children with moderate to severe TBI may also display: - persistent crying, inability to be consoled, and/or refusal to nurse or eat.
  - (5) The symptoms of mild TBI and post traumatic stress disorder can be identical

**E. Circulatory:**

1. Chest pain
2. Mild to severe bleeding
3. Shock

**F. Extremity and Body Injuries:**

1. Bruising, bleeding, lacerations, angulated extremities, exposed bone ends
2. Burns (flash, partial, and full thickness)
3. Traumatic amputation, crush injuries
4. Penetrating ballistic (fragmentation) injuries

**G. Gastrointestinal/Abdomen:**

1. Abdominal pain, guarding, rebound tenderness, absent bowel sounds,
2. Nausea, vomiting, bloody vomit
3. Rectal pain, rectal bleeding
4. Unexplained hypotension

**H. Genitourinary:**

1. Penetrating injuries, lacerations, hypotension
2. Testicular pain

- I. **Other injuries** are often present: - Some may be overlooked or may not appear for hours

**III. Management**

- A. Immediate manual head and C-spine immobilization if appropriate
- B. Clear the airway, provide oxygen and/or ventilatory assistance as necessary
  1. Blast Lung Injury (BLI) should receive supplemental high-flow oxygen to prevent hypoxemia
  2. EMT-I/ALS - advanced airway if necessary, however use caution as mechanical ventilation and positive pressure may increase the risk of alveolar rupture, pneumothorax, and air embolism in BLI patients.
  3. Treat any pneumothorax that may have resulted directly from the blast as well as secondarily, from too much positive pressure ventilation.
  4. Place in coma position (halfway between left lateral decubitus and prone, with head at or below the level of the heart)
  5. ILS/AW and ALS - Chest decompression per MPD for tension pneumothorax
- C. Control bleeding
- D. EMT-I/ALS - Provide IV therapy as necessary but do not overload
- E. ALS - Narcotic analgesia per MPD may be useful if the patient's hemodynamic status permits.
- F. Pulse oximetry
- G. Treat for shock
- H. Cover burns with dry sterile dressing.
  1. Avoid large areas of wet dressings due to the risk of hypothermia.
  2. Do not use oily or greasy dressing, since the element is lipid soluble and can penetrate into the tissue
- I. Mechanical head and spine immobilization.
- J. Stabilize the patient and focus on preventing further injury.
- K. Psychological Support

## **IV. Transport**

### **A. Transport precautions**

#### **1. Air Transport**

- a) Close observation is warranted for any patient suspected of BLI who is transported by air.
- b) Consider effects of altitude on patient, airway equipment, inflatable cuffs and chest-tube management

#### **2. Perpetrators may be among the injured:**

- a) Victims should be screened for secondary devices and weapons.
- b) Law enforcement officers should accompany suspected perpetrators to the hospital.
- c) Hospital should be alerted to the pending arrival of a possible perpetrator.

# **INCENDIARY AGENTS/THERMAL BURNS**

## **Individuals are severely burned when:**

- A Combination of burns  $\geq 20\%$  or involve the face or airway (**State of Washington-Prehospital Trauma Triage (Destination) Procedures**).
- They meet the American Burn Association's "**Criteria For Transfer To A Burn Center**":
  - Burn Injuries that should be referred to a burn unit include the following:
    - Partial thickness burns greater than 10% total body surface area (TBSA)
    - Third-degree burns in any age group
    - Electrical burns, including lightning injury
    - Chemical burns
    - Inhalation injury
    - Burn injury in a patient with preexisting medical disorders that could complicate management, prolong recovery, or affect mortality
    - Any patient with burns and concomitant trauma
    - Burns that involve the face, hands, feet, genitalia, perineum or major joints.

## **Magnesium/Thermite**

- Identify source of burning and take appropriate safety precautions.
- Secure the scene, since live munitions may be in the area.
- Consider secondary and tertiary devices
- Incendiary agents primarily affect the skin (thermal) and the respiratory system (magnesium dust and fumes).

### **I. Scene Size-up**

- A. Utilize appropriate PPE

### **II. Signs And Symptoms**

- A. Eyes – Agent may produce chemical injury to the eyes
- B. Respiratory Tract – Irritation, nasal drainage, productive cough, Hypoxia and tachypnea, wheezes or crackles on lung examination, airway burns (e.g., edema, charring), lung burns with potential airway obstruction, possible chemical injuries
- C. Skin - Deep partial or full-thickness thermal burns.
  - 1. Thermite –Thermal burns with minimally reactive metal particles embedded in the tissue, possible chemical injuries.
  - 2. Magnesium – Retained particles in skin may:
    - a) React with tissue fluid to produce magnesium dihydroxide, which produces an alkali chemical burn.
    - b) Produce skin lesions that mimic gas gangrene, with tissue death and intratissue gas bubbles due to hydrogen gas formed from the same reaction.
- D. Evaluate depth and area by using Rule Of Nines Appendix (see page 43)
  - 1. Burns  $\geq 20\%$  and/or involving face or airway, see Trauma Triage Procedure, page 45)



### III. Emergency Decontamination

- A. Stop the burning process and remove patients from the burning environment, with appropriate attention to personal safety.
  - 1. Remove jewelry and non-adhered clothing as necessary
  - 2. Thermite – Flush thermite burns with copious amounts of water and brush them to remove contaminating particles
  - 3. Magnesium - Remove all unburned particles by mechanical means
    - a) If particles are present, do not flush with water until particles have been removed.
    - b) Use copious amounts of water to rapidly flush away residual magnesium before the resulting chemical reaction can cause harm.

### IV. Management

- A. Clear the airway, provide oxygen and/or ventilatory assistance as necessary
- B. Control bleeding
- C. **EMT-I/ALS** - Provide IV therapy as necessary
- D. **ALS** - Narcotic analgesia per MPD may be useful if the patient's hemodynamic status permits.
- E. Pulse oximetry
- F. Cover burns with dry sterile dressing. Avoid large areas of wet dressings due to the risk of hypothermia.

## **Napalm**

- Identify source of burning and take appropriate safety precautions.
- Secure the scene, since live munitions may be in the area.
- Consider secondary and tertiary devices

### **I. Scene Size-up**

- A. Utilize appropriate PPE

### **II. Signs And Symptoms**

- A. Patient may recall the sound of an explosion and complain of severe pain from burns
- B. Eyes – Agent may produce chemical injuries to the eyes
- C. Respiratory Tract –Airway burns (e.g., edema, charring) or lung burns, with potential airway obstruction, possible chemical injuries
- D. Skin - Deep partial or full-thickness thermal burns from agent, dehydration as a result of radiant heat, possible chemical injuries
- E. Altered level of consciousness due to carbon monoxide exposure as a result of the combustion process
- F. Evaluate depth and area by using Rule Of Nines Appendix (see page 43)
  - 1. Burns  $\geq$  20% and/or involving face or airway, see Trauma Triage Procedure, page 45)

### **III. Emergency Decontamination**

- A. Stop the burning process and remove patients from the burning environment, with appropriate attention to personal safety
  - 1. Remove jewelry and non-adhered clothing as necessary
  - 2. Take care when removing smoldering napalm from the skin
  - 3. Cool tissues with saline or clean water.

### **IV. Management**

- A. Clear the airway, provide oxygen and/or ventilatory assistance as necessary
  - 1. Carbon monoxide exposure may be a concern; provide 100% oxygen via nonrebreather mask en route.
- B. Control bleeding
- C. **EMT-I/ALS** - Provide IV therapy as necessary
- D. **ALS** - Narcotic analgesia per MPD may be useful if the patient's hemodynamic status permits.
- E. Cover burns with dry sterile dressing. Avoid large areas of wet dressings due to the risk of hypothermia.

## **White Phosphorus**

- Identify source of burning and take appropriate safety precautions.
- Secure the scene, since live munitions may be in the area.
- Consider secondary and tertiary devices

### **I. Scene Size-up**

- A. Utilize appropriate PPE

### **II. Signs And Symptoms**

- A. Eyes – Agent may produce chemical injuries to the eyes
- B. Respiratory Tract –Airway burns (e.g., edema, charring) or lung burns, with potential airway obstruction, possible chemical injuries
- C. Skin - Deep partial or full-thickness thermal burns from agent, possible chemical injuries
- D. Direct assessment toward traumatic and burn injuries
  1. Pay particular attention to areas where phosphorus may be embedded as a result of explosion
- E. Evaluate depth and area by using Rule Of Nines Appendix (see page 43)
  1. Burns  $\geq$  20% and/or involving face or airway, (see Trauma Triage Procedure, page 45)

### **III. Emergency Decontamination**

- A. Remove jewelry and all clothing for the initial assessment - may re-ignite and cause additional injury
- B. Exercise care when handling potentially contaminated clothing to prevent secondary exposure and burns.
- C. Stop the burning process and remove patients from the burning environment, with appropriate attention to personal safety.
  1. Irrigate exposure sites with saline or place saline-soaked and/or water-soaked pads on areas of exposure.
  2. Remove all unburned particles of White Phosphorus by mechanical means

### **IV. Management**

- A. Clear the airway, provide oxygen and/or ventilatory assistance as necessary
- B. Control bleeding
- C. **EMT-I/ALS** - Provide IV therapy as necessary
- D. **ALS** - Narcotic analgesia per MPD may be useful if the patient's hemodynamic status permits.
- E. Pulse oximetry
- F. Cover burns with dry sterile dressing.
  1. Avoid large areas of wet dressings due to the risk of hypothermia.
  2. Do not use oily or greasy dressing, since the element is lipid soluble and can penetrate into the tissue

## **Thermal Burns**

- Identify source of burning and take appropriate safety precautions.
- Secure the scene, since live munitions may be in the area.
- Consider secondary and tertiary devices

### **I. Scene Size-up**

- A. Utilize appropriate PPE

### **II. Signs And Symptoms**

- A. Eyes –tearing, sensitivity to light, or a foreign body sensation, corneal damage
- B. Respiratory –oropharyngeal edema, changes in the voice, altered mental status
- C. Skin –
  1. Superficial burns involves only the epidermis – Example = sunburn
    - a) Tissue blanches with pressure
    - b) Tissue is erythematous and often painful
    - c) Tissue damage is minimal
  2. Partial thickness burns involves the epidermis and portions of dermis
    - a) Burned area characteristically has blisters and is very painful
  3. Full thickness burns are characterized by charring of skin or a translucent white color, with coagulated vessels visible below
    - a) Burn site is painless, but patient will complain of pain from surrounding tissues
    - b) Skin tissue and structures are destroyed
- D. Evaluate depth and area by using Rule Of Nines Appendix (see page 43)
  1. Burns  $\geq$  20% and/or involving face or airway, (see Trauma Triage Procedure, page 45)

### **III. Emergency Decontamination**

- A. Stop the burning process and remove patients from the burning environment, with appropriate attention to personal safety.
  1. Remove jewelry and non-adhered clothing as necessary - clothes may re-ignite and cause additional injury
  2. Cool tissues with saline or clean water

### **IV. Management**

- A. Clear the airway, provide oxygen and/or ventilatory assistance as necessary
  1. Carbon monoxide exposure may be a concern; provide 100% oxygen via nonrebreather mask.
- B. Control bleeding
- C. **EMT-I/ALS** - Provide IV therapy as necessary
- D. **ALS** - Narcotic analgesia per MPD may be useful if the patient's hemodynamic status permits.
- E. Cover burns with dry sterile dressings or dry sterile sheets. Avoid large areas of wet dressings due to the risk of hypothermia.

## **APPENDICIES**



## SUMMARY OF THE EFFECTS OF HAZARDOUS AGENTS

Agent	Signs and Symptoms	Emergency Decontamination	Management
<p><b>Tear Gas (CS, CA, and CR), Mace (CN), Pepper spray (OC)</b></p>	<p><b>Eyes</b> - Intense irritation, pain, spasmodic twitching, tearing, sensitivity to light  <b>Respiratory Tract</b> – Runny nose, pain, tightness in chest, difficulty breathing, choking, burning  <b>Skin</b> -Stinging, occasional dermatitis, blistering may occur  <b>Gastrointestinal tract</b> - Nausea, vomiting rarely occurs  <b>Other</b> – Headache</p>	<p>Remove contaminated clothing and personal belongings</p> <p>Irrigation of the eyes may help with pain relief.</p> <p>Prevent contaminated irrigation solution from running onto unaffected tissues</p>	<p>Clear the airway, provide oxygen and/or ventilatory assistance as necessary  <b>ALS</b> – analgesic nose/eye drops per MPD</p>
<p><b>Chlorine (Cl)</b></p>	<p><b>Eyes</b> – tearing, irritation</p> <p><b>Respiratory tract</b> - nose and throat irritation, sneezing, dyspnea, violent cough, chest pain, decreased breath sounds, wheezing, stridor, loss of voice, runny nose, laryngeal or pulmonary edema, ulceration of the respiratory tract</p> <p><b>Skin</b> -Redness, and chemical burns to the skin, cyanosis, dermatitis  <b>Central nervous system</b> –General excitement or restlessness, lightheadedness, headache</p> <p><b>Gastrointestinal tract</b> -Nausea, vomiting, abdominal pain</p> <p><b>Cardiovascular system</b> -Rapid heart rate, increased rate of respiration</p> <p><b>Other</b> -Excessive salivation, muscle weakness, rales</p>	<p>Remove and double-bag contaminated clothing and personal belongings  Handle frostbitten skin and eyes with caution.  Warm affected parts  Let the circulation reestablish itself naturally.</p> <p>Flush exposed skin and hair with plain water for 3 to 5 minutes  Wash twice with mild soap  Rinse thoroughly with water  Prevent contaminated irrigation solution from running onto unaffected skin.</p> <p>Irrigation of the eyes may help with pain relief.  Use caution to avoid hypothermia when decontaminating</p>	<p>Clear the airway, provide oxygen and/or ventilatory assistance as necessary  Move patient to fresh air environment</p> <p><b>ALS</b> - Intubate the trachea if necessary</p> <p>For lower airway injury resulting in pulmonary edema positive pressure ventilations using positive end expiratory pressure (PEEP) may be indicated</p> <p><b>ALS</b> – analgesic nose/eye drops per MPD</p>

Agent	Signs and Symptoms	Emergency Decontamination	Management
<p><b>Ammonia NH<sub>3</sub></b></p>	<p><b>Eyes</b> - Irritation, corneal scarring, potential blindness  <b>Respiratory tract</b> - nose, and throat irritation; coughing; bronchospasm, laryngospasm and laryngeal edema, pulmonary edema</p> <p><b>Skin</b> - Stinging pain, inflammation of skin, blisters, necrosis, especially moist areas</p> <p><b>Gastrointestinal tract</b> - burning, abdominal pain, difficulty swallowing, drooling, nausea, vomiting</p> <p><b>Central nervous system</b> - Altered mental status</p>	<p>Removal of the victim from the environment and decontaminate</p> <p>If exposed patient has no skin or eye irritation, decontamination is usually not necessary</p> <p>If exposure is significant, rapid skin decontamination is critical  Remove and double-bag contaminated clothing and personal belongings while flushing exposed areas  Patient may assist with clothing removal and basic decontamination if able</p> <p>Flush liquid-exposed skin and hair with plain water for at least 5 minutes  If possible, wash exposed skin extremely thoroughly with soap and water</p> <p>Flush exposed or irritated eyes with plain water or saline for 3 to 5 minutes  Remove contact lenses if present</p> <p>Use caution to avoid hypothermia when decontaminating</p>	<p>Clear the airway, provide oxygen and/or ventilatory assistance as necessary  ALS - Intubate the trachea if necessary</p> <p>For lower airway injury resulting in pulmonary edema positive pressure ventilations using positive end expiratory pressure (PEEP) may be indicated.</p> <p>Pharmacology:  Bronchodilator per MPD  <b>ALS</b> – analgesics/narcotics per MPD</p> <p><b>EMT-I/ALS</b> - Provide IV therapy as necessary</p> <p>In case of ingestion, do not induce vomiting:  Contact Poison Center.</p>
<p><b>Chloropicrin</b></p>	<p><b>Eyes</b> - irritation, pain, redness, and tearing. Prolonged eye exposure to chloropicrin can cause blindness.</p> <p><b>Respiratory tract</b> - Irritation, coughing, labored breathing, sore throat, dizziness, bluish skin, vomiting, and in some instances, chemical pneumonitis and pulmonary edema.</p> <p><b>Skin</b> - Chemical burns or dermatitis manifested by red, cracked, irritated skin.  The extent of skin injury depends on the concentration and duration of exposure</p> <p><b>Gastrointestinal tract</b> - burns to the mouth,</p>	<p>During decontamination, it is important to avoid cross-contamination</p> <p>Remove and double-bag contaminated clothing and personal belongings</p> <p>Clean and scrub the patient's entire skin surface with soap and water</p> <p>Use caution to avoid hypothermia when decontaminating</p>	<p>Clear the airway, provide oxygen and/or ventilatory assistance as necessary; <b>DO NOT</b> use mouth-to-mouth.</p> <p>Intubate the trachea if necessary.  For lower airway injury resulting in pulmonary edema positive pressure ventilations using positive end expiratory pressure (PEEP) may be indicated.</p> <p>Provide supportive measures addressing cardiovascular status as necessary.</p> <p>If the patient complains of eye pain or</p>



Agent	Signs and Symptoms	Emergency Decontamination	Management
	<p>throat, and esophagus. Ingestion of large quantities of chloropicrin liquid can be fatal.</p> <p><b>Injection:</b> Redness and irritation of surrounding tissues.</p>		<p>tearing, irrigate the eyes with copious amounts of water. <b>EMT-I/ALS</b> - Provide IV therapy as necessary <b>ALS</b> – bronchodilator, analgesics/narcotics per MPD No specific antidote exists for this toxin. General supportive measures are indicated.</p>
<p><b>Impure Sulfur Mustard (H) Distilled Sulfur Mustard (HD), and Nitrogen Mustard (HN-1, HN-2, HN-3)</b></p>	<p><b>Eyes</b> -Irritation, redness, edema of lids, tearing, sensitivity to light, spasmodic twitching, pain, corneal ulceration, possible scarring</p> <p><b>Respiratory tract</b> - Irritation, cough, hoarseness, sinus and pharynx burning, nosebleed, dyspnea, rales, pulmonary edema, fever, and pneumonia in severe cases</p> <p><b>Skin</b> -Redness of skin, small rash-like dots, itching, tissue destruction and death (gray appearance) may be seen within minutes, burning, blisters within hours, necrosis within days, moist areas affected most</p> <p><b>Gastrointestinal Tract</b> -Pain, nausea, vomiting, diarrhea</p> <p><b>Other</b> -Shock may occur after severe exposure, anxiety and depression</p>	<p>Remove and double-bag contaminated clothing and personal belongings and cut away the victim's mustard-contaminated hair.</p> <p>Unless carried out within 1-2 minutes, decontamination does not prevent subsequent blistering.</p> <p>Decontamination still should be carried out to prevent secondary contamination.</p> <p>Decontaminate immediately: Mustards should not be decontaminated with water, except for the eyes, as it will spread the agent</p> <p>Eyes and mucous membranes – flush with water, saline, or isotonic sodium bicarbonate for 5 to 10 minutes</p> <p>Exposed skin and scalp – decontaminate by blotting, not wiping off the agent, so the contaminant will not be spread. Use military or commercially available decontamination kits As an alternative, use 0.5% aqueous chlorine solution to thoroughly wash the skin and hair, but is less effective for HN3 Absorbent powders, such as flour, talcum powder or fullers earth may</p>	<p>Clear the airway, provide oxygen and/or ventilatory assistance as necessary <b>ALS</b> - Intubate the trachea if necessary.</p> <p>For lower airway injury resulting in pulmonary edema positive pressure ventilations using positive end expiratory pressure (PEEP) may be indicated.</p> <p><b>EMT-I/ALS</b> - Provide IV therapy as necessary Unlike thermal burns, chemical burns do not require massive fluid replacement. Do not over-hydrate. Over-hydration of patients with significant skin burns may result in "third spacing" of fluids within damaged lungs and worsen ventilation/perfusion mismatches <b>ALS</b> – Pharmacology per MPD: Analgesics/narcotics per MPD Antihistamine per MPD for vomiting, itching, and edema resulting from exposure to impure and distilled sulfur mustard. Antibiotics per MPD for respiratory infections, affected</p>

Agent	Signs and Symptoms	Emergency Decontamination	Management
		<p>also be used Wash off the decontamination solutions within 3-4 minutes with soap and water</p> <p>If the victim already has erythematous skin, decontaminating the skin with just soap and water is recommended</p> <p>Use caution to avoid hypothermia when decontaminating</p>	<p>skin areas and eyes In case of ingestion, contact the Poison Center</p> <p>Dress affected skin areas as necessary. Do not cover the eyes with bandages.</p>
<b>Lewisite (L)</b>	<p><b>Eyes</b> -Pain, redness, spasmodic twitching, sensitivity to light, tearing, and corneal damage</p> <p><b>Respiratory Tract</b> -Extreme immediate irritation, nosebleed, hoarseness and productive cough, sneezing, shortness of breath, pulmonary edema</p> <p><b>Skin</b> – Rash within 15-30 minutes followed by blisters, pain, redness, necrotic grayish skin</p> <p><b>Gastrointestinal Tract</b> -Diarrhea, nausea, vomiting, liver failure</p> <p><b>Other</b> -Shock may occur with severe exposures, anxiety and depression</p>	<p>Remove and double-bag contaminated clothing and personal belongings</p> <p>Decontamination must occur immediately by blotting, not wiping off the agent, so the contaminant will not be spread</p> <p>Lewisite should not be decontaminated with water, except for the eyes, as it will spread the agent.</p> <p>Eyes and mucous membranes - flush with water, saline, or isotonic sodium bicarbonate for 5 to 10 minutes.</p> <p>Exposed skin and scalp – decontaminate using military or commercially available decontamination kits. If specialized kits are not available, rags, leaves, sticks, or just about any other material can be used to blot off liquid agent</p> <p>As an alternative, use 0.5% aqueous chlorine or hypochlorite solution to thoroughly wash the skin and hair, but is less effective for HN3</p> <p>Absorbent powders, such as flour, talcum powder or fullers earth may also be used</p> <p>Wash off the decontamination solutions within 3-4 minutes with soap and water</p> <p>If the victim already has erythematous skin, decontaminating the skin with just</p>	<p>Clear the airway, provide oxygen and/or ventilatory assistance as necessary</p> <p>ALS - Intubate the trachea if necessary.</p> <p>For lower airway injury resulting in pulmonary edema positive pressure ventilations using positive end expiratory pressure (PEEP) may be indicated.</p> <p><b>EMT-I/ALS</b> - Provide IV therapy as necessary</p> <p>Care should be taken, over-hydration of patients with significant skin burns may result in "third spacing" of fluids within damaged lungs and worsen ventilation/perfusion mismatches</p> <p><b>ALS</b> – Pharmacology: Analgesics/narcotics per MPD British anti-lewisite (BAL), in oil IM for systemic removal and in ointment form for the eyes and skin – Per MPD</p> <p>Dress affected skin areas as necessary. Do not cover the eyes with bandages, if necessary, use dark or opaque goggles to relieve discomfort from light sensitivity</p>

Agent	Signs and Symptoms	Emergency Decontamination	Management
		<p>soap and water is recommended</p> <p>Use caution to avoid hypothermia when decontaminating</p>	<p>In case of ingestion, do not induce vomiting: Contact Poison Center.</p>
<p><b>Phosgene Oxime (CX)</b></p>	<p><b>Eyes</b> – Unbearable pain, redness, spasmodic twitching, tearing, corneal damage, lid edema, with possible blindness</p> <p><b>Respiratory tract</b> -Immediate irritation, sore throat, hoarseness, dyspnea, chest pain, cough, pulmonary edema, including rales and wheezes; and possible pulmonary thromboses with severe exposure</p> <p><b>Skin</b> - Unbearable pain, blanching, red ring in 30 seconds, itchy swelling in 30 minutes, necrosis may occur</p> <p><b>Gastrointestinal</b> - possible bleeding in the GI tract</p> <p><b>Other</b> – Anxiety and depression</p>	<p>Remove and double-bag contaminated clothing and personal belongings</p> <p>Decontaminate immediately after exposure because the agent is absorbed from the skin within seconds:</p> <p>Eyes and mucous membranes - flush with water, saline, or isotonic sodium bicarbonate for 5 to 10 minutes</p> <p>Skin:</p> <p>Vapor exposure only: Decontaminate with soap and water or 0.5% solution of sodium hypochlorite</p> <p>Liquid exposure: Showering with water alone will be adequate to remove any agent that has not yet reacted with tissue. If the victim already has erythematous skin, washing the skin with just soap and water is recommended</p> <p>As an alternative form of decontamination: Use 0.5% sodium hypochlorite solution to thoroughly wash the skin and hair; A chlorinated solution is ineffective for phosgene oxime</p> <p>Absorbent powders, such as flour, talcum powder or fullers earth may also be used</p> <p>Wash off the decontamination solutions within 3-4 minutes with soap and water. Use caution to avoid hypothermia when decontaminating</p>	<p>Clear the airway, provide oxygen and/or ventilatory assistance as necessary</p> <p><b>ALS</b> - Intubate the trachea if necessary</p> <p>For lower airway injury resulting in pulmonary edema positive pressure ventilations using positive end expiratory pressure (PEEP) may be indicated.</p> <p><b>EMT-I/ALS</b> - Provide IV therapy as necessary Care should be taken, over-hydration of patients with significant skin burns may result in "third spacing" of fluids within damaged lungs and worsen ventilation/perfusion mismatches</p> <p><b>ALS</b> – Pharmacology per MPD: Analgesics/narcotics ASAP per MPD</p> <p>Corticosteroids given I.V. may be particularly helpful for the treatment of phosgene</p> <p>Do not cover the eyes with bandages</p> <p>In case of ingestion, do not induce vomiting: Contact Poison Center.</p>

Agent	Signs and Symptoms	Emergency Decontamination	Management
<b>Magnesium/Thermite</b>	<p><b>Eyes</b> – Agent may produce chemical injury to the eyes</p> <p><b>Respiratory Tract</b> – Irritation, nasal drainage, productive cough, Hypoxia and tachypnea, wheezes or crackles on lung examination, airway burns (e.g., edema, charring), lung burns with potential airway obstruction, possible chemical injuries</p> <p><b>Skin</b> - Deep partial or full-thickness thermal burns.</p> <p>Thermite –Thermal burns with minimally reactive metal particles embedded in the tissue, possible chemical injuries.</p> <p>Magnesium – Retained particles in skin may:</p> <p>React with tissue fluid to produce magnesium dihydroxide, which produces an alkali chemical burn. Produce skin lesions that mimic gas gangrene, with tissue death and intratissue gas bubbles due to hydrogen gas formed from the same reaction.</p> <p>Evaluate depth and area by using Rule Of Nines Appendix (see page 43) Burns <math>\geq</math> 20% and/or involving face or airway, see Trauma Triage Procedure, page 45)</p>	<p>Stop the burning process and remove patients from the burning environment, with appropriate attention to personal safety.</p> <p>Remove jewelry and non-adhered clothing as necessary</p> <p>Thermite – Flush thermite burns with copious amounts of water and brush them to remove contaminating particles</p> <p>Magnesium - Remove all unburned particles by mechanical means</p> <p>If particles are present, do not flush with water until particles have been removed.</p> <p>Use copious amounts of water to rapidly flush away residual magnesium before the resulting chemical reaction can cause harm.</p>	<p>Clear the airway, provide oxygen and/or ventilatory assistance as necessary</p> <p>Control bleeding</p> <p><b>EMT-I/ALS</b> - Provide IV therapy as necessary</p> <p><b>ALS</b> - Narcotic analgesia per MPD may be useful if the patient's hemodynamic status permits.</p> <p>Pulse oximetry</p> <p>Cover burns with dry sterile dressing. Avoid large areas of wet dressings due to the risk of hypothermia.</p>
<b>Napalm</b>	<p>Patient may recall the sound of an explosion and complain of severe pain from burns</p> <p><b>Eyes</b> – Agent may produce chemical injuries to the eyes</p> <p><b>Respiratory Tract</b> –Airway burns (e.g., edema, charring) or lung burns, with potential airway obstruction, possible chemical injuries</p>	<p>Stop the burning process and remove patients from the burning environment, with appropriate attention to personal safety</p> <p>Remove jewelry and non-adhered clothing as necessary</p> <p>Take care when removing smoldering napalm from the skin</p>	<p>Clear the airway, provide oxygen and/or ventilatory assistance as necessary</p> <p>Carbon monoxide exposure may be a concern; provide 100% oxygen via nonrebreather mask en route.</p> <p>Control bleeding</p>

Agent	Signs and Symptoms	Emergency Decontamination	Management
	<p><b>Skin</b> - Deep partial or full-thickness thermal burns from agent, dehydration as a result of radiant heat, possible chemical injuries</p> <p>Altered level of consciousness due to carbon monoxide exposure as a result of the combustion process</p> <p>Evaluate depth and area by using Rule Of Nines Appendix (see page 43) Burns <math>\geq</math> 20% and/or involving face or airway, see Trauma Triage Procedure, page 45)</p>	<p>Cool tissues with saline or clean water.</p>	<p><b>EMT-I/ALS</b> - Provide IV therapy as necessary</p> <p><b>ALS</b> - Narcotic analgesia per MPD may be useful if the patient's hemodynamic status permits.</p> <p>Cover burns with dry sterile dressing. Avoid large areas of wet dressings due to the risk of hypothermia.</p>
<b>White Phosphorus</b>	<p><b>Eyes</b> – Agent may produce chemical injuries to the eyes</p> <p><b>Respiratory Tract</b> –Airway burns (e.g., edema, charring) or lung burns, with potential airway obstruction, possible chemical injuries</p> <p><b>Skin</b> - Deep partial or full-thickness thermal burns from agent, possible chemical injuries Direct assessment toward traumatic and burn injuries Pay particular attention to areas where phosphorus may be embedded as a result of explosion</p> <p>Evaluate depth and area by using Rule Of Nines Appendix (see page 43) Burns <math>\geq</math> 20% and/or involving face or airway, (see Trauma Triage Procedure, page 45)</p>	<p>Remove jewelry and all clothing for the initial assessment - may re-ignite and cause additional injury</p> <p>Exercise care when handling potentially contaminated clothing to prevent secondary exposure and burns.</p> <p>Stop the burning process and remove patients from the burning environment, with appropriate attention to personal safety. Irrigate exposure sites with saline or place saline-soaked and/or water-soaked pads on areas of exposure.</p> <p>Remove all unburned particles of White Phosphorus by mechanical means</p>	<p>Clear the airway, provide oxygen and/or ventilatory assistance as necessary</p> <p>Control bleeding</p> <p><b>EMT-I/ALS</b> - Provide IV therapy as necessary</p> <p><b>ALS</b> - Narcotic analgesia per MPD may be useful if the patient's hemodynamic status permits.</p> <p>Pulse oximetry</p> <p>Cover burns with dry sterile dressing. Avoid large areas of wet dressings due to the risk of hypothermia.</p> <p>Do not use oily or greasy dressing, since the element is lipid soluble and can penetrate into the tissue.</p>

Agent	Signs and Symptoms	Emergency Decontamination	Management
<p><b>Thermal Burns</b></p>	<p><b>Eyes</b> –tearing, sensitivity to light, or a foreign body sensation, corneal damage  Respiratory –oropharyngeal edema, changes in the voice, altered mental status  <b>Skin</b> –  Superficial burns involves only the epidermis –  Example = sunburn  Tissue blanches with pressure  Tissue is erythematous and often painful  Tissue damage is minimal</p> <p>Partial thickness burns involves the epidermis and portions of dermis  Burned area characteristically has blisters and is very painful</p> <p>Full thickness burns are characterized by charring of skin or a translucent white color, with coagulated vessels visible below  Burn site is painless, but patient will complain of pain from surrounding tissues  Skin tissue and structures are destroyed</p> <p>Evaluate depth and area by using Rule Of Nines Appendix (see page 43)  Burns &gt;= 20% and/or involving face or airway, (see Trauma Triage Procedure, page 45)</p>	<p>Stop the burning process and remove patients from the burning environment, with appropriate attention to personal safety.  Remove jewelry and non-adhered clothing as necessary - clothes may re-ignite and cause additional injury  Cool tissues with saline or clean water</p>	<p>Clear the airway, provide oxygen and/or ventilatory assistance as necessary  Carbon monoxide exposure may be a concern; provide 100% oxygen via nonrebreather mask en route.</p> <p>Control bleeding</p> <p><b>EMT-I/ALS</b> - Provide IV therapy as necessary</p> <p><b>ALS</b> - Narcotic analgesia per MPD may be useful if the patient's hemodynamic status permits.</p> <p>Cover burns with dry sterile dressings or dry sterile sheets.</p> <p>Avoid large areas of wet dressings due to the risk of hypothermia.</p>

# ACUTE RADIATION SYNDROME

1 Gray (Gy) = 100 rads 1 centiGray (cGy) = 1 rad

<b>Whole body radiation from external radiation or internal absorption</b>							
Phase of Syndrome	Feature	Subclinical range		Sublethal range		Lethal range	
		0-100 rad Or cGy	100-200 rad 1-2 Gy	200-600 rad 2-6 Gy	600-800 rad 6-8 Gy	800-3000 rad 8-30 Gy	>3000 rad >30 rad
<b>Prodromal Phase</b>	Nausea, vomiting	None	5-50%	50-100%	75-100%	90-100%	100%
	Time of onset		3-6 hrs	2-4 hrs	1-2 hrs	<1 hr	Minutes
	Duration		<24 hrs	<24 hrs	<48 hrs	<48 hrs	N/A
	CNS function	No impairment	No impairment	Cognitive Impairment for 6-20 hrs	Cognitive Impairment for >24 hrs	Rapid incapacitation, often after a lucid period of up to several hours	

<b>Survival Rates by Radiation Dosage</b>	
MEASUREMENT	DOSE (RADS)
LD <sub>50/30</sub> without treatment	250-325
LD <sub>50/30</sub> with treatment	350-400
LD <sub>50/60</sub> without treatment	300-350
LD <sub>50/60</sub> with treatment	450-500
LD <sub>95</sub> without treatment	500
LD <sub>95</sub> with treatment	700
LD <sub>50/30</sub> Estimated dose that will cause death in 50% of those exposed within 30 days; LD <sub>50/60</sub> , estimated dose that will cause death in 50% of those exposed within 60 days; LD <sub>95</sub> , estimated dose that will cause death in 95% of those exposed.	

# **Radiation Exposure Documentation**

All people exposed to radiation, both emergency responders and members of the public, will require future medical monitoring. Collect the following information from each person who was in the affected area and retain it until requested by the Department of Health and Human Services:

Date \_\_\_\_\_ Name \_\_\_\_\_

Home Address \_\_\_\_\_  
Street or P.O. Box

City, State, Zip \_\_\_\_\_

Telephone(s) \_\_\_\_\_

Social Security Number \_\_\_\_\_

Gender M F Date of birth (or approximate age) \_\_\_\_\_

The following information would be useful for further medical evaluation. Collect it only if you have time to collect the information without delaying treatment of the injured:

Date of Exposure \_\_\_\_\_ Time of Exposure \_\_\_\_\_

Location \_\_\_\_\_

Describe the location where the person received his or her exposure

Duration of exposure \_\_\_\_\_

Did person have any open wounds? Y N

Did person use respiratory protection? Y N

What kind? \_\_\_\_\_

Did person eat or drink while in the area? Y N

Did you find any external contamination on the person? Y N

Emergency contact information: Name \_\_\_\_\_

Address: \_\_\_\_\_  
(City, state, ZIP)

Telephone: \_\_\_\_\_

Employer: \_\_\_\_\_



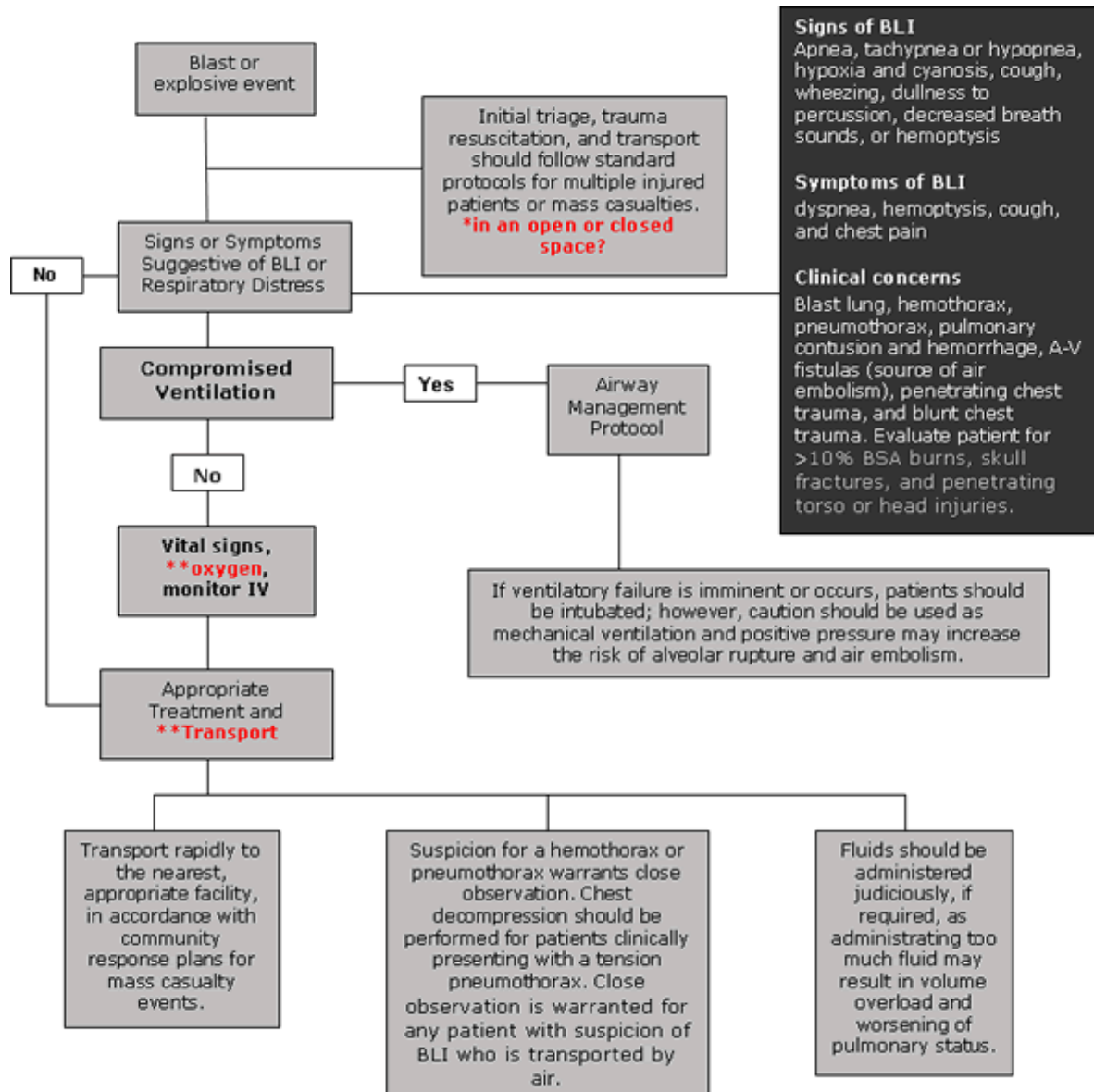
## **SUMMARY OF THE EFFECTS OF EXPLOSIVE BLASTS**

<b>Category</b>	<b>Characteristic</b>	<b>Body Part Affected</b>	<b>Types of Injuries</b>
<b>Primary</b>	Unique to HE, results from the impact of the over-pressurization wave with body surfaces.	Gas filled structures are most susceptible - lungs, GI tract, and middle ear.	Blast lung (pulmonary barotrauma) TM rupture and middle ear damage Abdominal hemorrhage and perforation - Globe (eye) rupture- Concussion (TBI without physical signs of head injury)
<b>Secondary</b>	Results from flying debris and bomb fragments	Any body part may be affected	Penetrating ballistic (fragmentation) or blunt injuries Eye penetration (can be occult)
<b>Tertiary</b>	Results from individuals being thrown by the blast wind	Any body part may be affected	Fracture and traumatic amputation Closed and open brain injury
<b>Quaternary</b>	All explosion-related injuries, illnesses, or diseases not due to primary, secondary, or tertiary mechanisms.  Includes exacerbation or complications of existing conditions.	Any body part may be affected	Burns (flash, partial, and full thickness) Crush injuries Closed and open brain injury Asthma, COPD, or other breathing problems from dust, smoke, or toxic fumes Angina
LE are classified differently because they lack the self-defining HE over-pressurization wave. LE's mechanisms of injuries are characterized as due from ballistics (fragmentation), blast wind (not blast wave), and thermal. There is some overlap between LE descriptive mechanisms and HE's Secondary, Tertiary, and Quaternary mechanisms.			

<b><i>Overview of Explosive-Related Injuries</i></b>	
<b>System</b>	<b>Injury or Condition</b>
<b>Auditory</b>	TM rupture, ossicular disruption, cochlear damage, foreign body
<b>Eye, Orbit, Face</b>	Perforated globe, foreign body, air embolism, fractures
<b>Respiratory</b>	Blast lung, hemothorax, pneumothorax, pulmonary contusion and hemorrhage, A-V fistulas (source of air embolism), airway epithelial damage, aspiration pneumonitis, sepsis
<b>Digestive</b>	Bowel perforation, hemorrhage, ruptured liver or spleen, sepsis, mesenteric ischemia from air embolism
<b>Circulatory</b>	Cardiac contusion, myocardial infarction from air embolism, shock, vasovagal hypotension, peripheral vascular injury, air embolism-induced injury
<b>CNS Injury</b>	Concussion, closed and open brain injury, stroke, spinal cord injury, air embolism-induced injury
<b>Renal Injury</b>	Renal contusion, laceration, acute renal failure due to rhabdomyolysis, hypotension, and hypovolemia
<b>Extremity Injury</b>	Traumatic amputation, fractures, crush injuries, compartment syndrome, burns, cuts, lacerations, acute arterial occlusion, air embolism-induced injury

**Note:** Up to 10% of all blast survivors have significant eye injuries. These injuries involve perforations from high-velocity projectiles, can occur with minimal initial discomfort, and present for care days, weeks, or months after the event. Symptoms include eye pain or irritation, foreign body sensation, altered vision, periorbital swelling or contusions. Findings can include decreased visual acuity, hyphema, globe perforation, subconjunctival hemorrhage, foreign body, or lid lacerations. Liberal referral for ophthalmologic screening is encouraged.

## **Blast Lung Injury Management Algorithm**

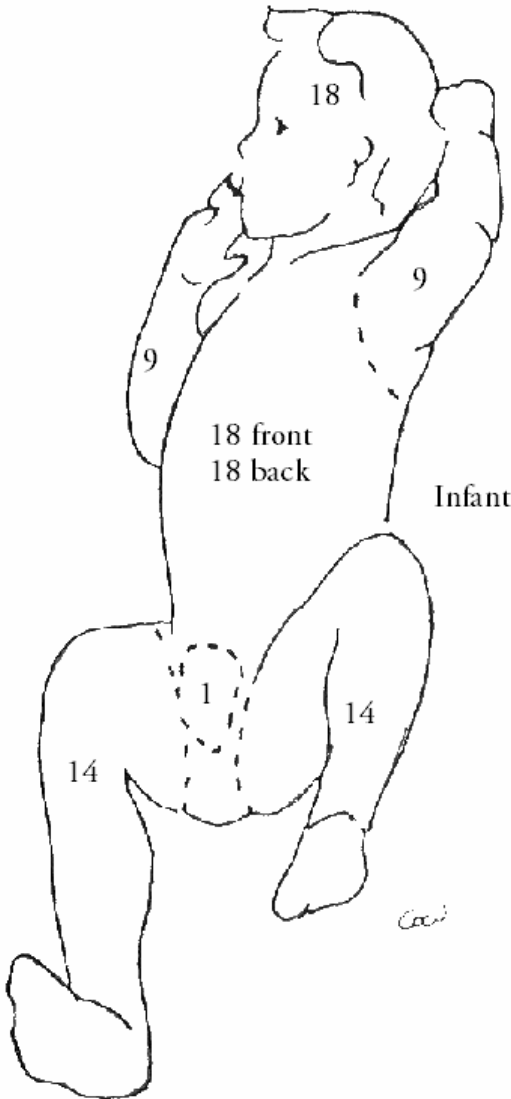
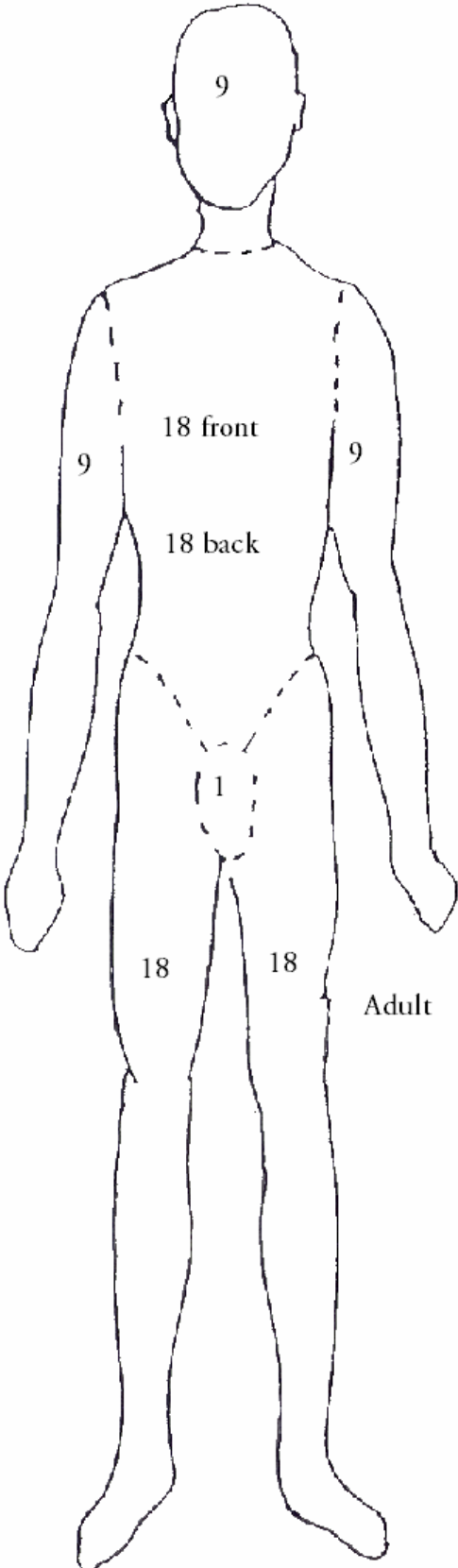


\*There is a higher incidence of BLI in enclosed spaces.

\*\*High flow oxygen, airway management as appropriate, evaluate for additional injury and rapid transport.



**RULE OF NINES - ESTIMATING BURNS**



# ***START TRIAGE***

## **Simple Triage And Rapid Treatment**

I. RPM method of identifying immediate patients; Respiration's, Perfusion, Mental status

II. Triage Criteria

A. Immediate (Red)

1. Respiration's >30 per minute or absent until head repositioned, or
2. Radial pulse absent or capillary refill > 2 seconds, or
3. Cannot follow simple commands

B. Delayed (Yellow)

1. Respiration's present and < 30 per minute, and
2. Radial pulse present, and can follow simple commands

C. Minor (Green)

1. Anyone that can get up and walk when you instruct them to do so.

D. Deceased (Black)

1. Anyone not breathing after you open the airway

III. This system is limited to use in the incident where needs exceed resources immediately available

IV. Frequently reassess patients and perform a more in-depth triage as more rescuers become available

## STATE OF WASHINGTON PREHOSPITAL TRAUMA TRIAGE (DESTINATION) PROCEDURE

### Purpose

The purpose of the Triage Procedure is to ensure that **major** trauma patients are transported to the most appropriate hospital facility. This procedure has been developed by the Prehospital Technical Advisory Committee (TAC), endorsed by the Governor's EMS and Trauma Care Steering Committee, and in accordance with RCW 70.168 and WAC 246-976 adopted by the Department of Health (DOH).

The procedure is described in the schematic with narrative. Its purpose is to provide the prehospital provider with quick identification of a major trauma victim. If the patient is a major trauma patient, that patient or patients must be taken to the highest level trauma facility within 30 minutes transport time, by either ground or air. To determine whether an injury is major trauma, the prehospital provider shall conduct the patient assessment process according to the trauma triage procedures.

### Explanation of Process

- A. **Any certified EMS and Trauma person can identify a major trauma patient and activate the trauma system.** This may include requesting more advanced prehospital services or aero-medical evacuation.
- B. **The first step (1) is to assess the vital signs and level of consciousness.** The words "Altered mental status" mean anyone with an altered neurologic exam ranging from completely unconscious, to someone who responds to painful stimuli only, or a verbal response which is confused, or an abnormal motor response.
- C. The "and/or" conditions in Step 1 mean that any one of the entities listed in Step 1 can activate the trauma system.
- D. Also, the asterisk (\*) means that if the airway is in jeopardy and the on-scene person cannot effectively manage the airway, the patient should be taken to the nearest medical facility or consider meeting up with an ALS unit. These factors are true regardless of the assessment of other vital signs and level of consciousness.
- E. **The second step (2) is to assess the anatomy of injury.** The specific injuries noted require activation of the trauma system. Even in the assessment of normal vital signs or normal levels of consciousness, the presence of any of the specific anatomical injuries does require activation of the trauma system.
- F. Please note that steps 1 and 2 also require notifying Medical Control.
- G. **The third step (3) for the prehospital provider is to assess the biomechanics of the injury and address other risk factors.** The conditions identified are reasons for the provider to contact and **consult with Medical Control** regarding the need to activate the system. They do not automatically require system activation by the prehospital provider.
- H. Other risk factors, coupled with a "gut feeling" of severe injury, means that Medical Control should be consulted and consideration given to transporting the patient to the nearest trauma facility.
- I. Please note that certain burn patients (in addition to those listed in Step 2) should be considered for immediate transport or referral to a burn center/unit.

### **Patient Care Procedures**

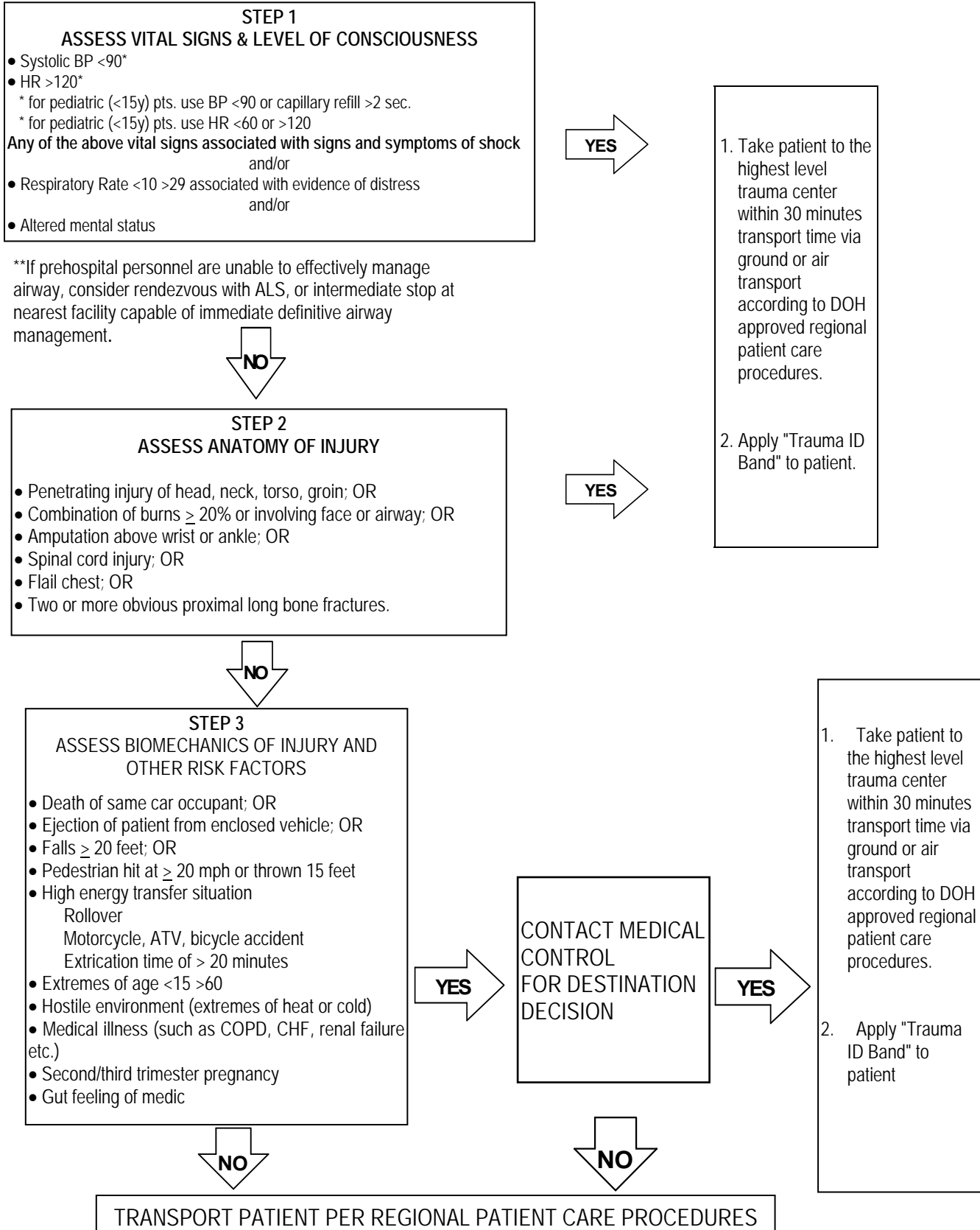
To the right of the attached schematic you will find the words "according to DOH approved regional patient care procedures." These procedures are developed by the regional EMS and Trauma council in conjunction with local councils. They are intended to further define how the system is to operate. They identify the level of medical care personnel who participate in the system, their roles in the system, and participation of hospital facilities in the system. They also address the issue of inter-hospital transfer, by transfer agreements for identification, and transfer of critical care patients.

In summary, the Prehospital Trauma Triage Procedure and the Regional Patient Care Procedures are intended to work in a "hand in glove" fashion to effectively address EMS and Trauma patient care needs. By functioning in this manner, these two instruments can effectively reduce morbidity and mortality.

If you have any questions on the use of either instrument, you should bring them to the attention of your local or regional EMS and Trauma council or contact 1-800-458-5281.

# STATE OF WASHINGTON PREHOSPITAL TRAUMA TRIAGE (DESTINATION) PROCEDURES - SCHEMATIC

- Prehospital triage is based on the following 3 steps: Steps 1 and 2 require prehospital EMS personnel to notify medical control and activate the Trauma System. Activation of the Trauma System in Step 3 is determined by medical control\*\*





## **GLOSSARY**

ACUTE RADIATION SYNDROME	(ARS) (sometimes known as radiation toxicity or radiation sickness) is an acute illness caused by irradiation of the entire body (or most of the body) by a high dose of penetrating radiation in a very short period of time (usually a matter of minutes).
ALS	<u>A</u> dvanced <u>L</u> ife <u>S</u> upport
AMBULATE	To walk about
ANALGESTIC	A drug that relieves pain.
ANTIDOTE	A remedy that counteracts the effect of poison
APHASIA	A defect in speaking or comprehending in the normal fashion, caused by injury or disease in the brain centers regulating speech
APNEA	Absence of breathing
ASPHYXIA	Suffocation
BILATERAL	Pertaining to both sides.
BIOLOGICAL AGENTS	The FBI WMD Incident Contingency Plan defines biological agents as microorganisms or toxins from living organisms that have infectious or noninfectious properties that produce lethal or serious effects in plants and animals
BLAST LUNG INJURY (BLI)	A direct consequence of the blast wave from high explosive detonations upon the body
BLS	<u>B</u> asic <u>L</u> ife Support
BRADYCARDIA	An abnormal condition in which the heart contracts steadily but at a rate of less than 60 beats per minute
BRADYPNEA	An abnormally slow rate of breathing
BRONCHODILATOR	A drug that relaxes bronchial muscle resulting in expansion of the bronchial air passages
BRONCHOSPASM	Constriction of the air passages of the lung (as in asthma) by spasmodic contraction of the bronchial muscles
BURN	An injury caused by extremes of temperature, electric current, or certain chemicals:

- Superficial - A burn affecting only the outer skin layers
- Partial Thickness - A partial thickness burn penetrating beneath the superficial skin layers, producing edema and blistering
- Full Thickness - A full thickness burn, involving all layers of the skin and underlying tissues as well, having a charred or white, leathery appearance

**BUTYL GLOVES**

Gloves impermeable to a wide range of chemicals due to a tight molecular structure including: nerve and mustard agents, acids, alkalis, MEK, MIBK, acetone, & other chemicals. Butyl rubber has excellent resistance to Aldehydes, Ketones, Esters, Alcohols, most inorganic acids, most caustics, Dioxene. Agent resistance (maximum recommended usage time) for: Mustard Gas (HD) - 75 minutes, Nerve Gas (GB) - 360 min.

**CAROTID**

One of the main arteries of the neck supplying blood to the head

**CBRNE**

Chemical, Biological, Radiological, Nuclear, Explosive

**CENTRAL NERVOUS SYSTEM (CNS)**

The brain and spinal cord.

**CHEMICAL AGENTS**

The Federal Bureau of Investigation (FBI) Weapons of Mass Destruction (WMD) Incident Contingency Plan defines chemical agents as solids, liquids, or gases that have chemical properties that produce lethal or serious effects in plants and animals.

**CHEMICAL PNEUMONITIS**

Inflammation of the lungs resulting from inhalation of chemicals

**COMA**

A state of unconsciousness from which the patient cannot be aroused, even by powerful stimulation.

**COMA POSITION**

A body position, which allows the unconscious patient (non-traumatic) to breathe without obstruction from oral bleeding or drainage.

**CONTAMINATION, RADIOACTIVE CONTAMINATION (PERSONAL)**

Deposition of radioactive nuclide on the skin (External contamination) or in the body systems (internal contamination). If not excreted, internally deposited radioactive nuclides may be incorporated into cellular systems.

**CONTRAINDICATION**

Any condition which renders a particular line of

	treatment improper or undesirable.
COPIOUS AMOUNT	A large quantity, i.e., a water or solution wash using copious amounts of water (preferably under a shower) should be more than a liter or two of solution. If too little water is used on a burn agent, the contaminant could spread
CORNEAL	The transparent part of the coat of the eyeball that covers the iris and pupil and admits light to the interior
CORTICOSTEROIDS	Corticosteroids are potent anti-inflammatory compounds used to treat numerous inflammatory conditions and severe allergic reactions
CYANOSIS	Bluish color to the skin, associated with hypoxia.
DECEREBRATE POSTURE	A posture assumed by patients with severe brain dysfunction characterized by extension and rotation of the arms and extension of the legs.
DECONTAMINATION	Emergency – decontamination necessary to provide patient care Technical – More complete decontamination
DECORTICATE POSTURE	A posture assumed by patients with severe brain dysfunction characterized by extension of the legs and flexion of the arms.
DENSE	Marked by compactness or crowding together of parts; having a high mass per unit volume
DERMATITIS	Inflammation of skin evidenced by itching, redness, and various skin lesions.
DIAPHORESIS	Profuse perspiration
DIRTY BOMB	The term <b>dirty bomb</b> is primarily used to refer to a Radiological Dispersal Device (RDD), a radiological weapon which combines radioactive material with conventional explosives
DISSIPATE	To cause to spread thin or scatter and gradually vanish
DOT	<u>D</u> epartment <u>O</u> f <u>T</u> ransportation.
DYSPNEA	Difficulty in breathing, with resultant rapid, shallow respirations.
EDEMA	The condition in which excess fluid accumulates in body tissue, manifested by swelling.
EMBOLISM	A mass (embolus, singular; emboli, plural) of solid, liquid

or gaseous material that is carried in the circulation and may lead to occlusion of blood vessels, with resultant infarction and necrosis of tissue supplied by those vessels.

EPITHELIUM	Layer of cells closely bound to one another to form continuous sheets covering surfaces that may come into contact with foreign substances
EXPOSURE	A quantity used to indicate the amount of ionization in air produced by X or gamma radiation. The conventional unit is the roentgen (R). One roentgen is approximately equal to one RAD and/or rem for X and gamma radiation.
FEBRILE	Characterized by fever
GANGRENE	Local death of soft tissues due to loss of blood supply
GAS GANGRENE	Progressive gangrene marked by impregnation of the dead and dying tissue with gas and caused by one or more toxin-producing bacteria of the genus <i>Clostridium</i> that enter the body through wounds and proliferate in necrotic tissue
GASTROINTESTINAL TRACT	Pertaining to stomach and intestine.
HEMODYNAMIC	Relating to or functioning in the mechanics of blood circulation
HYPO-PERFUSION	Decreased perfusion to the body's tissue, also called shock
HYPOVENTILATION	A reduced rate or depth of breathing, often resulting in an abnormal rise of carbon dioxide
HYPOXIA	Reduction of oxygen in body tissues below normal levels.
INCIDENT COMMANDER	The person responsible for the overall management of the incident, approval of action plans, and providing direction and control for the command and staff sections of the incident command structure. In a Unified Command structure, the IC collaborates and consults with the chiefs and experts from the other disciplines involved in the response.
INCENDIARY	Relating to, or being a weapon (as a bomb) designed to start fires
KILOGRAM	A measure of weight equaling 2.2 pounds.
LARYNGEAL	Of, relating to, affecting, or used on the larynx

LARYNGEAL EDEMA	Edema of the larynx
LARYNGOSPASM	Spasm of laryngeal muscles
LAVAGE	To wash out, or irrigate.
LATENT	Present and capable of becoming though not now visible, obvious, or active (a <i>latent</i> infection)
LETHARGY	A condition of drowsiness or indifference.
LIPID	Substances that are soluble in nonpolar organic solvents (as chloroform and ether), that with proteins and carbohydrates constitute the principal structural components of living cells
MAN-REM	A unit of measurement of absorbed radiation that is equal to one rem absorbed by one individual
METHAMPHETAMINE	A drug used medically in the form of its crystalline hydrochloride especially in the treatment of obesity and often used illicitly
MOI	<u>M</u> echanism <u>O</u> f <u>I</u> njury
MUCOUS MEMBRANE	A membrane rich in mucous glands lining bodily cavities and canals that lead to the outside, chiefly the respiratory, digestive, and urogenital tracts. Mucous membranes line many tracts and structures of the body, including the mouth, nose, eyelids, windpipe and lungs, stomach and intestines, and the ureters, urethra, and urinary bladder. Also called mucosa
NECROSIS	The death of tissue, usually caused by a cessation of its blood supply.
NOI	<u>N</u> ature <u>O</u> f <u>I</u> llness
NUCLEAR WEAPONS	The Effects of Nuclear Weapons (DOE, 1977) defines nuclear weapons as weapons that release nuclear energy in an explosive manner as the result of nuclear chain reactions involving fission and/or fusion of atomic nuclei.
ORGANIC ARSENICALS	An organic compound or preparation containing arsenic
OROPHARYNGEAL	Of or relating to the mouth and pharynx
OVER-HYDRATION	A condition in which the body contains an excessive amount of fluids
PATIENT CARE	Written operating guidelines adopted by the regional

PROCEDURES (PCPS)	EMS/TC council per WAC 246-976-010.
PEEP	Positive end-expiratory pressure
PERSONAL PROTECTIVE EQUIPMENT (PPE)	<b>Personal protective equipment (PPE)</b> refers to <b>protective</b> clothing , helmets , goggles , or other gear designed to protect the wearer's body or clothing from injury by electrical hazards, heat ...
PHARYNX	The part of the alimentary canal situated between the cavity of the mouth and the esophagus
POSTICTAL	Referring to the period after the convulsive state of a seizure.
PRODROMAL PHASE	Early stage or symptoms of a disease before characteristic symptoms appear
PULMONARY EDEMA	Abnormal accumulation of fluid in the lungs
QUATERNARY BLAST INJURY	Burns and smoke inhalation caused by fires resulting from the blast
RAD	A unit of absorbed dose of ionizing radiation equal to an energy of 100 ergs per gram of irradiated material
RADIOLOGICAL DISPERSAL DEVICES (RDD)	A conventional explosive device incorporating radioactive material(s) sometimes referred to as a "dirty bomb."
RADIATION DOSE	The absorbed dose of radiation is the amount of energy absorbed by biologic tissue. Radiation dose is measured in Gray (Gy) or radiation absorbed dose (rad). Gray is the SI unit for dose and is expressed as J/kg. One gray is equal to 100 rad. Since the biologic effects of different types of radiation (e.g., gamma vs alpha vs neutron) vary significantly, expressing radiation exposure in terms of equivalent dose is sometimes useful. By assigning a weighting factor to each type of radiation (gamma = 1, alpha = 20), the equivalent dose can be calculated by multiplying the absorbed dose (Gy) by the radiation weighting factor. Equivalent dose is then expressed in sieverts (Sv).
R.A.I.N.	<b>R</b> ecognize, <b>A</b> void, <b>I</b> solate, <b>N</b> otify
RALES	An abnormal breath sound heard in the chest with a stethoscope. Fine rales have a crackling sound caused by air entering the lower air sacs (alveoli) of the lungs that have a buildup of fluids.
RCW	Revised Code of Washington

REM	The dosage of an ionizing radiation that will cause the same biological effect as one roentgen of X-ray or gamma-ray dosage -- compare REP
REP	the dosage of an ionizing radiation that will develop the same amount of energy upon absorption in human tissues as one roentgen of X-ray or gamma-ray exposure -- compare REM
SALIVATION	To have a flow of saliva especially in excess
SOB	<u>S</u> hortness <u>O</u> f <u>B</u> reath
SPASMODIC	Of, relating to, characterized by, or resulting from spasm
STRIDOR	Harsh sound during respiration; high pitched and resembling the blowing of wind due to obstruction of air passages.
SUBCUTANEOUS EMPHYSEMA	The presence of a gas and especially air in the subcutaneous tissue, causing a crackling sensation on palpation of the skin
TACHYCARDIA	A rapid heart rate, over 100 per minute.
TACHYPNEA	An abnormally rapid rate of breathing
TERTIARY	Occurring in or being a third stage: as being a third device
THIRD-SPACING	A condition where extracellular water migrates into the interstitial spaces
THROMBOSIS	The formation or presence of a blood clot within a blood vessel during life
TINNITUS	Tinkling or ringing heard in one or both ears. It may be a sign of hearing injury.
TOXIN	A poison manufactured by bacteria or other forms of animal or vegetable life.
TRIAGE	A system used for categorizing and sorting patients according to the severity of their problems.
ULCERATION	Suppuration taking place on a free surface, as on the skin or on a mucous membrane, to form an ulcer
VAPORIZE	To convert from a liquid or solid into vapor
VESICANT	An agent (as a drug or a war gas) that induces blistering - called also <i>blister gas</i>

WAC

Washington Administrative Code

WEAPONS OF MASS  
DESTRUCTION - (18 U.S.C.,  
SECTION 2332A)

- (A) Any destructive device as defined in section 921 of this title (which reads) any explosive, incendiary or poison gas, bomb, grenade, rocket having a propellant charge of more than four ounces, missile having an explosive or incendiary charge of more than one quarter ounce, mine or device similar to the above
- (B) Poison gas,
- (C) Any weapon involving disease organism
- (D) Any weapon that is designed to release radiation or radioactivity at a level dangerous to human life

WHEEZING

Production of whistling sounds during difficult breathing such as occurs in asthma, croup, and other respiratory disorders.





