11.03 Special Circumstances – HAZMAT, Chemical & Radiological Agents

EMSAC FEBRUARY 2026

GENERAL HAZARDOUS MATERIALS SCENE ASSESSMENT

- EMS personnel must complete California State mandated HAZMAT First Responder Awareness Training
- Initial Ambulance Response: If the first ambulance on scene determines or is suspicious of a hazardous material incident, they will:
  - Prioritize their own safety:
    - If possible, ambulances should park uphill and upwind from the site
    - If the event is thought to be a chemical, nuclear, or biological (e.g. weapons of mass destruction), then deny entry to the area
  - Attempt identification of hazardous materials from container signage, bystanders, etc.
  - Notify police and fire, through the Department of Emergency Communications (DEC), of a potential hazardous material scene so that additional resources may be activated as needed (e.g. Health Department, Hazardous Material Response Team, Local Industry Response Team; and/or other specialized detection or response teams)
- If there are enough patients, activate the **Multi-Casualty Incident Plan** and establish Incident Command System (ICS)
- All EMS personnel, public and private, responding to the scene will follow San Francisco Fire Department (SFFD) Incident Commander or designee for direction, scene tasking and safe operations in a HAZMAT scene. Incident commander instructions may include:
  - Use of personal protective equipment
  - Approaching patient's and/or contact with anyone coming from the hot zone
  - Patient decontamination
  - Minimal medical treatment rendered in the "hot zone" area of the incident site (e.g. airway control, antidote administration)
  - Standard prehospital medical care will be rendered only after decontamination has occurred as directed by the incident commander
- Notify the Receiving Hospital ~~Base Hospital Physician~~ of all pertinent information including:
  - Identification of the Hazardous Materials Incident
  - Name of the agent, route, and length of exposure
  - Medical assessment of the patients
  - Degree of decontamination in progress or completed
- For treatment of poisonings due to known medication overdose or exposures, refer to **Protocol 2.10 Poisoning and Overdose**

General Decontamination and Treatment

- EMS personnel should **NOT** use specialized PPE or assist in decontamination operations without completing the required training
- Patients should be relocated to a safe environment by emergency personnel wearing appropriate PPE prior to rendering medical care
- If life-saving treatment is needed prior to removal of patient from ~~Hazmat~~ Hot Zone, do simultaneous gross decontamination only if safe to do so (follow SFFD Hazmat team

instructions), then initiate treatment

- For patients with no apparent immediate life-threatening conditions, decontaminate the patient prior to rendering care
- Decontaminate the patient BEFORE transport to reduce/avoid contamination of EMS personnel; ambulance and receiving facility
- Gross decontamination should include:
    - Brush off dry powder
    - Remove and bag any contaminated or wet clothing and jewelry.
    - If possible, copious irrigation with water:
        - Skin exposure: triple-washed: water, soap (if available) and water
        - Eye exposure/symptoms: flush with copious amounts of water
- Ambulatory patients leaving the "Exclusion Zone" are considered contaminated until formally decontaminated by trained personnel
- Arrival at the hospital: Provide advance notice to receiving hospital about patient and decontamination procedures prior to arrival at facility and again to the receiving hospital clinician directly on patient handover. For non-critical patients, to minimize in-hospital contamination, consider staging in ambulance bay until confirmation that hospital is ready to receive patient.
- Clearing Contaminated Ambulances for Return to the Field: A contaminated ambulance must be properly decontaminated by the ambulance provider before returning to service. The final decision on returning an ambulance to service lies with the ambulance provider.

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CHLORINE
Example exposures: mixing household cleaners, swimming pool accidents, industrial accidents Chlorine as a gas may be greenish yellow in color with a pungent, acrid odor and is a strong eye, skin and respiratory tract irritant. Presentation: Mild exposures: cough, eye irritation & lacrimation, choking sensation Severe exposures: hoarseness, wheezing, severe cough, respiratory collapse due to laryngospasm, pulmonary edema
BLS MANAGEMENT
• O_2 as indicated for hypoxia
ALS MANAGEMENT
• Establish IV/IO of **Normal Saline** TKO • For patients with bronchospasm administer ➔ Mild: **Albuterol** ➔ Moderate/severe: Nebulized **Sodium Bicarbonate** • Advanced airway as indicated
COMMENTS
• All patients who have had a moderate or high level of exposure (respiratory distress or airway symptoms upon exam by EMS personnel) should be referred to a medical facility for examination and treatment.

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CROWD CONTROL AGENTS/TEAR GAS
Example exposures: Crowd control agents may include harassing agents, lacrimators, oleoresin capsicum (OC, pepper spray), 2-Chloroacetophenone (CN, Mace®), incapacitating agents, o-chlorobenzylidene, malononitrile (CS), and tear gas Presentation: • Eyes: tearing, pain, conjunctivitis, blurred vision • Nose/mouth/throat: rhinorrhea, burning pain, trouble swallowing, drooling • Pulmonary: coughing, choking sensation, wheezing, shortness of breath, • Skin: burning, redness • GI: nausea and vomiting are rare but might be post-tussive. • Symptoms frequently decrease over time (15-45 minutes) after exposure ends
BLS MANAGEMENT
• Move affected individual(s) from contaminated environment into fresh air, if possible • Remove contaminated clothing to prevent continued skin exposure. • Irrigate with water or normal saline
ALS MANAGEMENT
• For patients with bronchospasm (see respiratory distress 2.11)
COMMENTS
• CN (Mace), CS, and OC are the most encountered riot control agents • Symptoms begin within seconds of exposure, are self-limited, and are best treated by removing the patient from ongoing exposure.

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ORGANOPHOSPHATES- CHEMICAL NERVE AGENTS (Acetylcholinesterase Inhibitors)
Example exposures: VX, Sarin, Soman, Tabun Presentation: • Symptoms "**SLUDGE**" (**S**alivation, **L**acrimation, **U**rination, **D**iaphoresis/**D**iarrhea, **G**astric hypermotility, **E**mesis/**E**ye (small pupils, blurry vision). • Symptoms that result in death are the **Killer B's: B**ronchorrhea, **B**ronchospasm, **B**radycardia • Severe exposures may result in decreased level of consciousness, fasciculation/muscle weakness, paralysis, seizures
BLS MANAGEMENT
• Autoinjector formulations of DuoDote® may be administered to patients, to self or to other first responders exhibiting SLUDGE symptoms (See Table 1 below) • Bronchospasm and respiratory secretions are the best acute symptoms to monitor response to Atropine/2-PAM therapy: Improved ventilation and decreased respiratory secretions = getting better.
ALS MANAGEMENT
• Administer **Atropine** until SLUDGE symptoms subside. May exceed 20mg • Administer **Pralidoxime chloride** (2-PAM) as soon as possible to reactivate the enzyme (acetylcholinesterase) that is blocked by the organophosphate • Midazolam (or equivalent available benzodiazepine) as indicated for seizures
COMMENTS
• **DuoDote®** is a commercially available auto-injector of nerve agent/organophosphate antidote. It contains **2.1mg atropine** and **600mg pralidoxime chloride** • **ATNAA ®** Antidote Treatment Nerve Agent Auto Injector is an auto-injector of nerve agent/organophosphate antidote that is typically in military supplies but may be seen in civilian supplies when Duodote® is unavailable. It contains the 2.1mg of atropine and 600mg of pralidoxime. • **CHEMPACK** is a federal cache of nerve agent antidotes that is managed by the Center for Disease Control and Prevention (CDC) and offered to states that agree to maintain custody and security of CHEMPACK assets and is reserved for events exposures will deplete the local or regional supply of antidotes. The SFFD rescue captain or chief officer can request the CHEMPACK in a mass casualty incident if indicated. Early notification to DEC should be made if nerve agent is suspected.

TABLE 1: ATROPINE/PRALIDOXIME DOSING FOR PATIENTS EXPERIENCING SYMPTOMS FROM NERVE GAS EXPOSURE

Patient (Weight)	Atropine Dose IM or via Auto-injector	Pralidoxime Chloride Dose IM or via 600 mg Auto-injector
Infant: 0–2 years of age	0.05 mg/kg IM or via auto-injector (i.e., *0.25 mg and/or 0.5 mg auto-injector)*	15 mg/kg IM
Child: 3–7 years of age (13–25 kg)	1 mg IM or via auto-injector (i.e., *one 1 mg auto-injector or two 0.5 mg auto-injectors)*	15 mg/kg IM **OR** One auto-injector (600 mg)
Child: 8–14 years of age (26–50 kg)	2 mg IM or via auto-injector (i.e., *one 2 mg auto-injector or two 1 mg auto-injectors)*	15 mg/kg IM **OR** One auto-injector (600 mg)
Adolescent/ Adult	2–4 mg IM or via auto-injector	600 mg IM **OR** One auto-injector (600 mg)
Pregnant Women	2–4 mg IM or via auto-injector	600 mg IM **OR** One auto-injector (600 mg)
Geriatric/Frail	2 mg IM or via auto-injector	10 mg/kg **IM** **OR** One auto-injector (600 mg)

Adapted from: *U.S. Department of Health and Human Services, ASPR, National Library of Medicine, Chemical Hazards Emergency Medical Management: Nerve Agents— Prehospital Management, https://wwwn.cdc.gov/TSP/MMG/MMGDetails.aspx?mmgid=523&toxid=93*

MUSTARD (SULFUR MUSTARD)

Example exposure: human-made chemical warfare blistering agent. Sulfur mustard is a yellow to brown oily liquid with an odor resembling mustard, garlic, or horseradish.

Presentation:
Symptom severity is dose dependent and may develop 4–12-hours after exposure
Skin exposure: redness, itching may progress to blisters
Eyes exposure: irritation, pain, swelling, tearing, temporary blindness
Respiratory exposure: coughing, shortness of breath, pulmonary edema

COMMENTS

- Liquid or vapor mustard penetrates the skin and mucous membranes and damages cells within minutes of exposure, so decontamination must be done immediately after exposure. Decontamination should be performed with soap and water.
- Mustard agent can **penetrate** clothing and uniforms including fire turnouts. All surfaces with potential contamination must be carefully cleaned before considered decontaminated.

RADIATION

Example exposures: industrial plants, healthcare facilities that provide radiologic services, nuclear power plants, nuclear bombs, "dirty bomb"

Presentation:
Acute Radiation Syndrome (ARS):

1. Prodromal (hours to days): nausea, vomiting, diarrhea, fatigue. This phase is directly proportional to the dose. That is, the greater the dose received, the more rapid the onset of symptoms, and the longer their duration.
2. Latent: Apparent improvement of symptoms, during which time the patient appears to have recovered. It can last several days to several weeks, depending on the dose received.
3. Manifest illness: Usually begins in the 3rd to 5th week following exposure. This phase includes cerebrovascular syndrome (hyperthermia, ataxia, loss of motor control, apathy, lethargy, CV shock, seizures), pulmonary syndrome (pneumonitis, respiratory failure, pulmonary fibrosis), GI syndrome (GI mucosal cell injury, anorexia, nausea/vomiting, diarrhea, dehydration), hematologic syndrome (stem cell death, white cell depletion, pancytopenia), cutaneous syndrome (bullae, blisters, hair loss, ulceration).
4. Recovery: Occurs if patient survives the manifest illness phase, but may take weeks to months before completed.

COMMENTS
• Follow facility radiation exposure plan for patient decontamination and disposal of all contaminated waste. • In the nuclear bomb scenario casualty load will be excessive. Radiation detection support to identify the Dangerous Radiation Zone will be essential—first responders should not enter these areas until the radiation levels have decreased. Utilize austere care protocol and strict triaging to maximize available resources. Access all available disaster resources.

Appendix 1: Hazardous Materials Incident Control Zones