<table>
<thead>
<tr>
<th>Agents</th>
<th>Signs</th>
<th>Symptoms</th>
<th>Onset</th>
<th>Clinical Diagnostic Tests</th>
<th>Exposure Route and Treatment</th>
<th>Differential diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nerve Agents:</strong> Sarin (GB); Tabun (GA); Soman (GD); Cycloheptyl Sarin (GF); VX; Novichok agents, other organophosphorus compounds including carbamates and pesticides</td>
<td>Pinpoint pupils (miosis)</td>
<td>Moderate exposure: Diffuse muscle cramping, runny nose, difficulty breathing, eye pain, dimming of vision, sweating, muscle tremors. <strong>High exposure:</strong> The above plus sudden loss of consciousness, seizures, fascicul paralysis (late sign)</td>
<td>Aerosols: Seconds to minutes Liquids: minutes to hours</td>
<td>Red blood cell or serum cholinesterase (whole blood) Treat based on signs and symptoms; lab tests only for later confirmation</td>
<td><strong>Inhalation and dermal absorption</strong> Atropine (2mg) IV; repeat q 5 minutes, titrate until effective, average dose 6 to &gt;15 mg – use IM in the field before IV access (establish airway for oxygenation) Pralidoxime chloride (2-PAMCl) 600-1800 mg IM or 1.0 g IV over 20-30 minutes (maximum 2 g IM or IV per hour) Additional doses of atropine and 2-PAMCl depending on severity Diazepam or lorazepam to prevent seizures if &gt;4 mg atropine given Ventilatory support</td>
<td>Poisoning from organophosphate and carbamate pesticides may occur as a result of occupational exposure Cyanide poisoning Myasthenia gravis</td>
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<td><strong>Cyanides:</strong> hydrogen cyanide (HCN), cyanogen chloride</td>
<td>Moderate exposure: Metabolic acidosis, venous blood-O2 level above normal, hypotension, “pink”Increased color <strong>High exposure:</strong> Above signs plus coma, convulsions, cessation of respiration and heartbeat</td>
<td>Moderate exposure: Giddiness, palpitations Dizziness, nausea, vomiting, headache, eye irritation, increase in rate and depth of breathing (hyperventilation), drowsiness <strong>High exposure:</strong> Immediate loss of consciousness, convulsions and death within 1 to 15 minutes</td>
<td>Seconds to minutes</td>
<td>Bitter almond odor associated with patient suggests cyanide poisoning Metabolic acidosis Cyanide (blood) or thio cyanate (blood or urine) levels Treat based on signs and symptoms; lab tests only for later confirmation</td>
<td><strong>Inhalation, ingestion and dermal absorption</strong> 100% oxygen by face mask; intubation with 100% FiO2 if indicated Amyl nitrite via inhalation, 1 ampule (0.2 mL) q 5 minutes Sodium nitrite (300 mg IV over 5-10 minutes) and sodium thiosulfate (12.5 g IV) Additional sodium nitrite should be based on hemoglobin level and weight of patient</td>
<td>Similar CNS illness can result from: Industrial/occupational exposure to HCN and derivatives; carbon monoxide (CO) exposure from incomplete combustion of natural gas or petroleum fuels (exhaust fumes in enclosed areas); hydrogen sulfide (H2S) exposure from sewers, animal waste, industrial sources) Poisoning from nerve agents</td>
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<td><strong>Vesicants/Blister Agents:</strong> sulfur mustard, lewisite, nitrogen mustard, mustard lewisite, phosgene-oxide</td>
<td>Skin erythema and blistering; watery, swollen eyes; upper airways sloughing with pulmonary edema; metabolic failure; neutropenia and sepsis (esp. sulfur mustard, late in course)</td>
<td>Pulmonary edema with some mucosal irritation (greater water solubility of agent = greater mucosal irritation) leading to ARDS or non-cardiogenic pulmonary edema</td>
<td>Lewisite, minutes; Sulfur mustard, hours to days</td>
<td>Often smell of garlic, horseradish, and/or mustard on body Oily droplets on skin from ambient sources Urine thioglycol Tissue biopsy (USAMRCD)</td>
<td><strong>Inhalation and dermal absorption</strong> Mustards no antidote For lewisite and lewisite/mustard mixtures: British Anti-Lewisite (BAL or Dimercaprol) IM (rarely available) Thermal burn therapy; supportive care (respiratory support and eye care)</td>
<td>Diffuse skin exposure with irritants, such as caustics, sodium hydroxides, ammonia, etc., may cause similar syndromes. Sodium hydroxide (NaOH) from trucking accidents</td>
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<td><strong>Pulmonary/Choking Agents:</strong> phosgene, chlorine, diphosgene, chloropirpin, oxides of nitrogen, sulfur dioxide</td>
<td>Pulmonary edema with some mucosal irritation (greater water solubility of agent = greater mucosal irritation) leading to ARDS or non-cardiogenic pulmonary edema Pulmonary infiltrate</td>
<td>Shortness of breath Chest tightness Wheezing Laryngeal spasm Mucosal and dermal irritation and redness</td>
<td>1-24 hours (rarely up to 72 hours); May be asymptomatic period of hours</td>
<td>No tests available but history may help identify source and exposure characteristics (majority of incidents generating exposures to humans involve trucking with labels on vehicle)</td>
<td><strong>Inhalation</strong> No antidote Management of secretions; O2 therapy; consider high dose steroids to prevent pulmonary edema (demonstrated benefit only for oxides of nitrogen) Treat pulmonary edema with PEEP to maintain PO2 above 60 mm Hg</td>
<td>Mucosal irritation, airway reactions, and deep lung effects depend on the specific agent, especially water solubility</td>
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<td><strong>Ricin (castor bean oil extract)</strong></td>
<td>Clusters of acute lung or GI injury; circulatory collapse and shock, tracheobronchitis, pulmonary edema, necrotizing pneumonia</td>
<td>Ingestion: Nausea, diarrhea, vomiting, fever, abdominal pain Inhalation: chest tightness, coughing, weakness, nausea, fever</td>
<td>18-24 hours 8-36 hours</td>
<td>ELISA (from commercial laboratories) using respiratory secretions, serum, and direct tissue</td>
<td><strong>Inhalation and Ingestion</strong> No antidote Supportive care For ingestion: charcoal lavage</td>
<td>Tularemia, plague, and Q fever may cause similar syndromes, as may biological weapons and chemical weapon agents such as Staphylococcal enterotoxin B and phosgene</td>
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<td><strong>T-2 mycotoxins:</strong> Fusarium, Myroctecium, Trichoderma, Verticmonosporium, Stachybotrys</td>
<td>Mucosal erythema and hemorrhage (intestinal necrosis) Red skin, blistering Increased salivation Pulmonary edema Seizures and coma Liver/renal dysfunction</td>
<td>Dermal and mucosal irritation; blistering, necrosis Blurred vision, eye irritation, tearing Nausea, vomiting, and diarrhea Ataxia coughing and dyspnea</td>
<td>2-4 hours</td>
<td>ELISA from commercial laboratories Gas chromatography/Mass spectroscopy in specialized laboratories</td>
<td><strong>Inhalation and dermal contact</strong> No antidote Supportive care For ingestion: charcoal lavage Consider high dose steroids</td>
<td>Pulmonary toxins (O2, NO2, phosgene, NH3) may cause similar syndromes though with less mucosal irritation.</td>
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### UNIVERSAL PERSONAL PROTECTIVE EQUIPMENT (PPE)*

**Level A:** Maximum protection against vapor and liquids. Environment known to be immediately dangerous to life and health (harm occurs within 30 minutes).

- Fully encapsulating, chemical-resistant suit, chemically resistant gloves and boots, and a pressure-demand supplied air respirator (air hose) and escape self-contained breathing apparatus (SCBA)

**Level B:** Minimum protection exposure to unknown hazards. Full respiratory protection is required but danger to skin/risk of dermal absorption from vapor is less.

- Agent not identified, or concentration not known to be safe (i.e., field decontamination or ambulatory setting).
- Nonencapsulating, splash-protective chemical resistant suit (splash suit), chemical resistant gloves and boots/shoes, and a pressure-demand supplied air respirator (air hose) and escape SCBA

**Level C:** Until patient/victim decontamination completed.

- Organic vapor/P11 cartridge respirator or hood, nonencapsulating chemically-resistant (i.e., coated Tyvek) suit and gloves

* Training required to properly and safely use PPE

### NOTIFICATION PROCEDURES

1. First call the local Health Director; after hours contact local Health Director via 911.
2. If criminal activity is suspected, call your local law enforcement and the FBI.
3. Alert local HAZMAT team via fire department at 911.

### FOR MORE INFORMATION

- Contact your local poison control center or National Poison Control 800-222-1222
- Contact your public health regional surveillance team
- Contact your institution industrial hygienist or safety officer
- Department of Justice Domestic Preparedness National Response Hotline 800-424-8802
- If you need further help in clinical diagnosis, call CDC Emergency Response 770-488-7100
- Review US Army Chemical Casualty Care handbook (http://ccc.apgea.army.mil)

### UNIVERSAL DECONTAMINATION PROTOCOL

1. Remove clothing quickly and seal in plastic impervious bags (save for authorities). Strongly recommend even if exposure only to vapor or aerosol agent.
2. Wash skin and shampoo with hypoallergenic liquid soap and copious tepid water in sequential steps of rinse, soap, rinse, wait one minute, then final additional rinse (20 minutes).
3. Latent response from cyanide or pulmonary agents do not require decontamination.
4. Decontamination waste water may require special collection or treatment. (Discuss with local water authorities; notify local water authorities at the time of an event.)
5. Pure metals and strong corrosives require dry decontamination (i.e., gentle brushing or vacuuming of larger particles) before water is applied.
6. Clean and decontaminate the healthcare facility according to the specific agent involved. http://www.bt.cdc.gov/Agent/AgentlistChem.asp

### DETECTION OF OUTBREAKS

**Epidemiologic Strategies**

- A rapidly increasing disease incidence
- An unusual increase in the number of people seeking care, especially with neurologic, respiratory, dermal or gastrointestinal symptoms
- Higher attack rate among persons who had attendance at similar activities or events (work site, convention, sports events) with either indoor or outdoor exposure.
- Clusters of patients arriving from a single locale
- Large numbers of rapidly fatal cases
- Any patient presenting with symptoms and/or signs that suggest inhalation, ingestion, or dermal exposure to a toxic chemical agent

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