

Potential Chemical Agents of Bioterrorism

Agent or disease	Symptoms	PPE	Treatment
<p>Ammonia Pulmonary/choking agent</p> <p>(ammonia gas, anhydrous ammonia, liquid ammonia)</p>	<p>Majority of cases are inhalation, lead to symptoms of ocular, nasal, and respiratory irritation, lacrimation, cough, suffocation, choking sensation, dyspnea</p> <p>May cause burns to oral/nasal/pharyngeal mucosa, bronchiolar/alveolar edema, and airway destruction</p> <p>Low airborne concentrations produce irritation to eyes and nose</p> <p>Ingestion: N/V/abdominal pain, severe esophageal burns, corrosive injury to mouth/throat /stomach</p>	<p>Inhalation: standard precautions</p> <p>Skin/clothing contamination: contact precautions, well-ventilated room</p>	<p>Irrigation of eyes</p> <p>Airway support</p> <p>Administer oxygen</p> <p>If bronchospasm occurs, administer bronchodilators</p> <p>Racemic epinephrine for stridor</p> <p>Do NOT give activated charcoal or induce emesis. Give 4-8 oz of water or milk if the patient is able to swallow.</p>
<p>Arsenic or arsine Blood agent</p> <p>(element widely distributed in earth's crust; occurs typically in the workplace, near hazardous waste areas, or areas with high natural levels)</p>	<p>Garlic odor on breath, vomiting, abdominal pain, bloody diarrhea—eventual dehydration and shock, dysrhythmias (prolonged QT, Twave changes), fever, facial edema, altered mental status, multisystem organ failure that eventually leads to death, Mee's lines in fingernails, peripheral neuropathy with no known cause, irritation of mucosa in pharynx, larynx, and bronchi; pulmonary edema; tracheobronchitis; bronchial pneumonia; nasal septum perforation</p>	<p>Standard precautions</p>	<p>Hemodynamic stabilization</p> <p>Gut decontamination</p> <p>Hydration</p> <p>Ingestion: gastric lavage</p> <p>Hemodialysis for severe acute renal failure</p> <p>Chelating agents</p>
<p>Bromine (CA) Pulmonary/choking agent</p> <p>(naturally occurring element, brownish red with musty/fruity odor) Bromine gas is heavy so settles in low-lying areas</p>	<p>Inhalation: cough, difficulty breathing headache, irritation of mucous membranes, dizziness, lacrimation</p> <p>Ingestion: N/V/D, abdominal pain, hemorrhagic gastroenteritis</p>	<p>Standard unless clothing is contaminated, then contact</p> <p>Contact</p>	<p>Supportive</p> <p>Hydration</p> <p>Oxygen</p> <p>Treatment of burns</p> <p>Dimercaprol or MucoMyst may be indicated</p>

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Carbon Monoxide Blood agent (Colorless, odorless)	Shortness of breath, hypoxia, angina, seizures, respiratory depression, coma, delayed neurological sequelae	Standard precautions	Supportive care Hyperbaric oxygen chamber
Chlorine Pulmonary/choking agent (Pungent, irritating odor-similar to bleach; gas is yellow/green in color)	Blurred vision, pain/erythema/blisters if dermal exposure, burning in eyes/nose/throat, cough, chest tightness, pulmonary edema, N/V, lacrimation, bronchospasm	Standard precautions unless clothes are saturated	Removal of agent Supportive care Bronchodilators Oxygen Intubation, if necessary
Chloroacetophenone Riot control agents (Colorless or gray, apple blossoms odor)	Burning in eyes/nose/throat, cough, sore throat, nausea, shortness of breath, rhinorrhea, chest tightness, wheezing, metallic taste	For decontamination: SCBA mask, TECP suit, chemical resistant outer and inner gloves, chemical resistant boots with steel toe After decontamination: standard precautions	Supportive care Airway support Oxygen, if necessary Intubation, if necessary Symptom control: antiemetics, bronchodilators, fluids
Phosgene oxime Vesicating/blister agent (urticant or nettle agent, colorless when solid and yellowish/brown when liquid)	Inhaled: irritation to upper respiratory tract, rhinorrhea, hoarseness, sinus pain, pulmonary edema, cough, shortness of breath Skin: Intense itching similar to hives, causes corrosive damage to skin, blanching of skin surrounded by red rings within 30 seconds of exposure, whitened areas become necrotic after Eyes: severe pain, irritation, lacrimation, temporary blindness	For decontamination: SCBA mask, TECP suit, chemical resistant outer and inner gloves, chemical resistant boots with steel toe After decontamination: standard precautions	Removal of agent Supportive care Washing the body Eye irrigation Symptom management for respiratory issues Anticonvulsants Hydration

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<p>Hydrogen Chloride Pulmonary/choking agent</p> <p>(Colorless to slightly yellow with pungent odor at room temp)</p>	<p>Inhalation: cough, burning to nose/throat, shortness of breath, laryngedema, respiratory arrest, Reactive Airway Dysfunction Syndrome</p> <p>Ingestion: Abdominal pain, dysphagia, N/V, corrosive injuries to upper GI tract</p>	<p>Standard Precautions unless clothes/skin are saturated, then SCBA with chemical protective clothing</p>	<p>Inhalation: supportive, give oxygen, may consider racemic epi, bronchodilators, intubation if necessary</p> <p>Ingestion: do NOT induce vomiting, give 4-8 ounces of water or milk</p>
<p>Mustard Gas Vesicating/blister agent</p> <p>(Smells like garlic, onions, or mustard; can be odorless)</p>	<p>Inhalation: rhinorrhea, sneezing, laryngitis, sinus pain, epistaxis, shortness of breath, cough, ocular irritation/pain/lacrimation, photosensitivity, respiratory arrest</p> <p>Ingestion: abdominal pain, diarrhea, fever, nausea, vomiting</p>	<p>Standard precautions For decontamination, utilize SCBA with chemical protective clothing</p>	<p>Supportive Eye irrigation Wash skin Monitor respiratory status Bronchodilators Oxygen For ingestion, orogastric lavage may remove some of the chemical—be aware of the risk for bleeding and perforation. Do not give activated charcoal.</p>
<p>Osmium Tetroxide Pulmonary/choking agent</p> <p>(Colorless to pale yellow, pungent odor)</p>	<p>Inhalation: burning sensation, cough, headache, wheezing, shortness of breath, visual disturbances</p> <p>Ingestion: Burning sensation, abdominal cramps, shock or collapse</p> <p>Skin/eyes: redness, burning, blurred vision, severe deep burns, blisters, lacrimation</p>	<p>Standard precautions For decontamination, use SCBA</p>	<p>Supportive Eye irrigation Wash skin Monitor respiratory status Bronchodilators Oxygen</p>
<p>Lewisite Vesicating/blister agent Contains arsenic</p> <p>(Smells like geraniums)</p>	<p>Inhalation: onset rapid; cough, dyspnea, pneumonitis, acute lung injury Ingestion: onset 15-20 min; vomiting, hypotension, shock Skin/eye: onset 15-20 min; erythema, blistering, lacrimation, pain,</p>	<p>Decontamination occurs outside the ED For decontamination: Pressure-demand, self-contained breathing apparatus PPE Butyl rubber chemical protective gloves</p>	<p>Supportive Inhalation: protect airway Oxygenation Intubation Maintain circulation Bronchodilators</p> <p>Ingestion: do NOT induce emesis</p>

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<p>Sodium Monofluoroacetate Blood agent</p>	<p>Ingestion</p>		
<p>Soman and Sarin Nerve agent</p> <p>(clear, colorless, tasteless liquid with a slight odor-mothballs or rotten fruit, potent acetylcholinesterase inhibitor)</p>	<p>Inhalation or ingestion: hypo/hypertension, blurred vision, chest tightness, confusion, cough, diarrhea, increased oral secretions, diaphoresis, headache, increase urinary output, N/V/abd pain, tachypnea, rhinorrhea, brady/tachycardia, pinpoint pupils, lacrimation, weakness, convulsions, loss of consciousness, paralysis, respiratory failure</p>	<p>Decontamination occurs outside the ED for liquid exposure/none required for vapor exposure For decontamination: Pressure-demand, self-contained breathing apparatus PPE Butyl rubber chemical protective gloves</p>	<p>Supportive Oxygen IV Access Intubation with severe toxicity Suction ready Atropine after oxygenation and ventilation (Atropine and pralidoxime are antidotes to nerve agents)</p> <p>Do NOT induce vomiting or give fluids to drink</p>
<p>VX Nerve agent</p> <p>(clear, amber-colored, odorless, oily liquid; least volatile nerve agent; potent acetylcholinesterase inhibitor)</p>	<p>Inhalation, ingestion, or skin/eye contact: rhinorrhea and tightness in throat and chest, pinpoint pupils, shortness of breath, excessive salivation, diaphoresis, N/V/abd pain, involuntary defecation and urination, muscle twitching, confusion, seizures, flaccid paralysis, coma, respiratory failure, and death</p>	<p>Decontamination occurs outside the ED For decontamination: Pressure-demand, self-contained breathing apparatus PPE Butyl rubber chemical protective gloves</p>	<p>Supportive Oxygen IV Access Intubation with severe toxicity Suction ready Atropine after oxygenation and ventilation (Atropine and pralidoxime are antidotes to nerve agents)</p> <p>Do NOT induce vomiting or give fluids to drink</p>

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