Nerve Agents

Information for Healthcare Facilities

Adapted with permission from the Kansas Poison Control.

Last revised: August 2026

MINNESOTA REGIONAL POISON CENTER

Causative Agent	Nerve agents including Cyclosarin, Sarin, Soman, Tabun, VX, and Novichok agents. These gases are generally colorless and tasteless (though VX may be amber-colored).
Hospital Precautions	Hospital personnel performing hospital-based decontamination procedures should dress in appropriate chemically protective equipment. In the absence of more specific information, Level B-C PPE for hospital personnel will be adequate.
Transmission	Decontaminated patients do not pose a risk of transmission. Human to human transmission via liquid contamination is probable if the patient has not been decontaminated.

Decontamination

Asymptomatic patients exposed ONLY TO VAPOR may not require any action other than removal of clothing. All dermal exposures, patients with moderate or severe symptoms, and all non-ambulatory patients should be decontaminated using copious amounts of soap and water. Irrigate eyes for a minimum of 15 minutes. Clothing exposed within the past 12-24 hours, and all exposed leather goods should be removed, contained, and handled as toxic waste.

Mechanism

Nerve agents are very strong organophosphate compounds. These agents inhibit cholinesterase enzymes, thereby disrupting transmission of impulses through the nervous system and result in overstimulation of muscarinic and nicotinic receptors. When enough time has passed, this binding becomes irreversible and is known as “aging”.

Routes

These agents can be liquid or vapor. Exposure generally would occur by dermal contact, inhalation, or ocular; ingestion and injection are less likely.

Symptoms/ Onset

- If exposed to nerve agent liquid, symptoms can begin from 30 minutes to 18 hours. Vapor exposure effects may begin within seconds. Novichok agents may have delayed onset up to 3 days.
- Aging times vary per nerve agent. Cyclosarin: ~40 hours. Sarin: 3-5 hours. Soman: 2-6 minutes. Tabun: ~14 hours. VX: 48 hours.
- A combination of some or all of the following muscarinic and nicotinic effects may occur: miosis, salivation, lacrimation, urination, defecation, emesis, diaphoresis, bradycardia, shortness of breath, and bronchorrhea, muscle fasciculations, hypertension, muscle weakness, seizures, or coma.

Treatment

- Immediately support airway, breathing and circulation. Do not delay administration of atropine to maintain breathing or circulation.
- Atropine treats excess secretions, small pupils, other muscarinic effects. Adult: 2 to 5 mg IV, every 5 mins, until complete control of secretions and hemodynamic stability. Children: 0.02-0.05 mg/kg IV every 5 mins. Very large or repetitive bolus may be necessary. After control of symptoms is achieved, repeat dosing of atropine every 5 - 30 minutes PRN or until an IV infusion can be started at the total dose (mg) required to achieve control per hour.
- Scopolamine may be used as a single dose with the initial dose of atropine to decrease the amount of atropine needed to treat severe nerve effects, specifically if atropine needs to be conserved. Adult: 1 mg IM, IV, or inhalation.
- Pralidoxime (2-PAM, Protopam®) can help treat nicotinic symptoms if given prior to aging, including hypertension, tachycardia and fasciculations. Adults: 1-2 g IV bolus followed by 250-500 mg/hr IV infusion for 24-48 hours. Children: bolus is 20-50 mg/kg IV over 15-30 mins, then given 10-20 mg/kg/h infusion for 24 hours. Boluses may be repeated.
- Diazepam (or midazolam, at equivalent dose) is the drug of choice for seizures, 5 to 10 mg IV for adults, 0.2 to 0.5mg/kg for children.
- All of these agents can be given IM pre-hospital or if IV is unavailable.
- Duodote is a single auto-injector which delivers 2.1 mg atropine and 600 mg pralidoxime. These can be used to rapidly treat many patients quickly by administering 1 to patients with mild toxicity, 2 for moderate, and 3 for severe symptoms.
- NOTE – Organophosphate pesticide exposures follow the same treatment recommendations.

REFERENCES

Region VII Disaster Health Response Ecosystem, 2023. Available from: Chemical Resources — Region VII Disaster Health Ecosystem

Advanced Hazmat Life Support-Provider Manual. 4th ed. Arizona Board of Regents. Advanced Hazmat Life Support International Headquarters-Tuscan, Arizona. 2023.

Medical Management Guidelines for Nerve Agents. ATSDR. Updated January 12, 2017. Available from: Nerve Agents (GA, GB, GD, VX) | Medical Management Guidelines | Toxic Substance Portal | ATSDR