# Atropine Sulfate

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| **Brand names** | Atropine sulfate, generic; AtroPen (auto-injector) |
| **Medication error potential** | None |
| **Contraindications and warnings** | **Contraindications:** Patients with glaucoma, tachycardia, or any condition that inhibits postganglionic cholinergic nerves. Patients with asthma should not receive atropine as it can cause an excessive drying effect or mucous plugs in the bronchi.[1]<br><br>In the event of life-threatening exposure to organophosphate insecticides or nerve agents, there are no absolute contraindications to treatment with atropine sulfate. However, caution should be observed when used in individuals with the diseases listed above.[1]<br><br>**Warnings:** Caution in children with spastic paralysis or brain damage.[1] Children are at increased risk for elevations in body temperature because of suppression of sweat. Children who receive larger doses are at risk for paradoxical hyperexcitability. Infants with Down syndrome may have increased sensitivity to cardiac effects and mydriasis. Use with caution in patients with hernia associated with esophageal reflux, hyperthyroidism, or cardiovascular disease. Psychosis may occur in some patients. |
| **Infusion-related cautions** | Doses given by slow IV administration or doses <0.1 mg[3] have been reported to cause paradoxical bradycardia; however, a report in 2015 of 60 infants (<15 kg) found no association between a dose of 5 mcg/kg given as rapidly as possible and bradycardia or arrhythmias.[25] |
| **Dosage** | **CPR (bradycardia, pulseless arrest):** Generally reserved for symptomatic bradycardia that does not respond to oxygen, ventilation, and epinephrine.[26]<br><br>**Neonates:** Atropine is not included in the neonatal resuscitation guidelines.[9] If used give IV/IO 0.02 mg/kg/dose q 3–5 min.[28] When given ET, administer 0.04–0.06 mg/kg/dose (may repeat once).<br><br>**Infants and children:** 0.02 mg/kg (minimum 0.1 mg, maximum 0.5 mg) IV or IO; repeat if needed.[10] If given ET, use 0.04–0.06 mg/kg.[10]<br><br>**Adolescents:** 0.02 mg/kg (minimum 0.1 mg, maximum 0.5–1 mg) IV or IO; repeat if needed.[2,3,10]<br><br>**Hypertrophic pyloric stenosis:** Several have reported the successful use of IV atropine in doses that ranged from 0.005–0.02 mg/kg/dose IV given q 3–6 hr (before each feeding).[14-17]<br><br>**Nerve agent poisoning with cholinergic symptoms in children:** 0.05–0.1 mg/kg up to 4 mg repeated q 5–10 min until respiratory status improves or secretions resolve[13,18,19]<br><br>*AtroPen (auto-injector) should only be used for insecticide or nerve agent exposure and should only be administered IM by a trained individual.*[1,2] (See Stability in the Preparation and Delivery section.) Patients with two or more mild symptoms (see the Comments section) due to either nerve gas or insecticide exposure should receive one 0.25 mg dose. Two additional doses given in rapid succession are recommended 10 minutes later if the victim has any of the severe symptoms. (See the Comments section.) If the patient has severe symptoms administer three injections IM into the victim's midlateral thigh in rapid succession using the appropriate weight-based AtroPen dose.<br><br>**<7 kg (generally <6 months of age):** 0.25 mg (yellow)<br><br>**7–18 kg (generally 6 months to 4 years of age):** 0.5 mg (blue)<br><br>**18–41 kg (generally 4–10 years of age):** 1 mg (dark red)<br><br>**≥41 kg (generally >10 years of age):** 2 mg (green) |

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| **Dosage *(cont.)*** | Children with accidental wartime exposures who were given atropine doses ranging from 0.01–0.17 mg/kg had few adverse events that included dilated pupils, tachycardia, dry mucous membranes, flushed skin, temperature >37.8°C, and neurologic abnormalities.[18] No fatalities or life-threatening dysrhythmias were reported.<br><br>**Organophosphate insecticide exposure:** Parlidoximine is often given in conjunction with atropine for organophosphate poisoning. (See Pralidoxime monograph.) Dose of atropine may vary depending on the severity of the exposure. Patients with a significant exposure may exhibit tolerance; hence, large doses may be required.<br><br>When used give 0.05–1 mg/kg (2–5 mg in *adults*) via slow IV; may be doubled and repeated q 10–20 min until desired response (e.g., drying of excessive bronchial secretions).[11,12] Atropinization can be maintained by infusing 10% to 20% of the loading dose every hour.[29,30] Frequent observations are necessary to ensure that atropinization is achieved without toxicity (delirium, hyperthermia, and ileus). (See Nerve Agent Poisoning with Cholinergic Symptoms in Children in the Dosage section for information on the AtroPen.)<br><br>**Preanesthesia (to decrease secretions and block cardiac vagal reflexes during surgery) or for intubation**<br><br>**Infants:** 0.02 mg/kg 30–60 minutes preoperatively and then q 4–6 hr as needed.[4-6] Doses of 0.04 mg/kg have been given IM.[3]<br><br>**Children:** 0.01–0.02 mg/kg (0.1–0.4 mg) 30–60 minutes preoperatively and then q 4–6 hr if needed[7,8] |
| **Dosage adjustment in organ dysfunction** | None noted for use in preanesthesia, CPR, or physostigmine toxicity.[20] However, caution should be used in those with significant renal insufficiency who require multiple doses as in organophosphate insecticide exposure or nerve agent poisoning.[1] |
| **Maximum dosage** | **CPR/bradycardia:** 0.5 mg (child),[10] 0.5–1 mg (adolescent)[3,10]<br><br>**Nerve agent exposure:** 6 mg. Larger doses may be required in those with apnea, convulsions, cardiopulmonary arrest, or rapid progression of symptoms.[10,19]<br><br>**Organophosphate poisonings:** Large doses may be required.[10,12] In one pediatric report, a patient received 86 doses, another patient received 61 doses (0.005–0.1 mg/kg/dose) in 24 hours, and another received 26 doses totaling 25 mg/kg over several days.[18] |
| **Additives** | Multiple-dose vials may contain methylparaben or benzyl alcohol.[21] (See Appendix C for specific information about potential adverse effects and toxicity.) |
| **Suitable diluents** | NS.[21] The AtroPen auto-injector should not be diluted.[2] |
| **Maximum concentration** | 1 mg/mL (available commercially).[21] AtroPen doses are 0.25 mg, 0.5 mg, 1 mg, and 2 mg (available commercially).[1] |
| **Preparation and delivery** | *Parenteral products should be visually inspected for particulate matter and discoloration before use. Refer to appropriate references for more information on compatibility with other drugs and solutions; compatibility following Y-site delivery, and suggested storage and extended stability.*[21]<br><br>**Preparation:** Extemporaneously compounded atropine sulfate 2 mg/mL (diluted with NS) packaged in polypropylene syringes for use in the event of a terrorist nerve gas attack showed no visible changes and high-performance liquid chromatography (HPLC) analysis found no loss of the drug over 364 days at 5°C protected from light, 364 days at 23°C exposed to light, and 28 days at 35°C exposed to light.[21] |