

DIPHENHYDRAMINE (Benadryl)

Classification:	Antihistamine (H1 blocker)
Actions:	Antihistamine; appear to compete with histamine for cell receptor sites on effector cells.
Therapeutic Benefits:	➤ Relieves effects of histamine in allergic reaction.
Indications:	➤ Allergic reactions / anaphylaxis ➤ Per OLMC: Dystonic reactions due to phenothiazine, ketamine
Dose & route:	Adults: 25-50 mg deep IM or slow IVP Pediatric: 1 mg/kg (max 50 mg) IV/IO, IM Supplied in vials 50 mg / 1 mL
Side effects:	➤ CNS: Drowsiness, blurred vision, dilated pupils, hallucinations, vertigo, weakness, ataxia ➤ CV: ↑ HR, ↓ BP ➤ Resp: thickened bronchial secretions ➤ GI: dry mouth, N/V
Precautions:	➤ Use w/ caution in acute asthma attack (thickens secretions); OK w/ PMH of asthma w/ allergic reaction. ➤ Caution in elderly (dizziness, sedation, hypotension likely). ➤ Do not give sub-q (tissue necrosis). ➤ Peds likely to have CNS stimulation (vs sedation). ➤ Use w/ caution in angle closure glaucoma, prostatic hypertrophy.
Drug interactions:	➤ Additive effects with alcohol and other CNS depressants (hypnotics, sedatives, tranquilizers)..

EPINEPHRINE (Adrenalin)

Classification:	Endogenous hormone
Actions:	Nonselective alpha and beta adrenergic agonist; stimulates the release of norepinephrine
Therapeutic Benefits:	<ul style="list-style-type: none">➤ In cardiac arrest, its primary benefit is improvement in cerebral and coronary blood flow by prevention of arterial collapse and increased peripheral vasoconstriction. IT MAKES CPR MORE EFFECTIVE!➤ Alpha effects promote peripheral vasoconstriction which results in an increase in aortic diastolic pressure. This is important in determining the blood flow to the coronary arteries. Maintenance of adequate coronary blood flow is essential in preserving the chance of survival.➤ Improves blood flow to the brain. When CPR is performed without Epinephrine, most of the blood flows to the external carotid artery which supplies the tongue and face, and very little goes to the internal carotid artery which supplies cerebral blood flow. When Epinephrine is administered with CPR, blood is shunted from the external to the internal carotid artery, ↑ cerebral blood flow.➤ May facilitate defibrillation because it ↑ conduction velocity and shortens repolarization.➤ Positive chronotropic (↑ rate) and inotropic (↑ contraction force) effects increase myocardial work and ↓ subendocardial perfusion.➤ At low doses (IM), beta₂ effects predominate = bronchodilation➤ At higher doses (IV/IO), alpha effects override beta₂ effects
Indications:	<ul style="list-style-type: none">➤ Cardiac arrest - all pulseless rhythms➤ Very severe unresponsive bradycardia (used with extreme caution) (OLMC)
Dose & route:	<p>Adults: 1 mg 1:10,000 IVP q. 3-5 minutes during resuscitation followed by 20 mL NS flush</p> <p>ET route: Epinephrine absorption is questionable when given ET. Peak concentrations are not as high as when given IV. All ET doses should be 2-2.5 times the IVP dose. Use 2 1:1000 ampules. Dilute with 8 mL NS or distilled water to make 10 mL of solution.</p> <p>Pediatric cardiac arrest: 0.01 mg/kg (1:10,000; 0.1 mL/kg) (1:10,000) up to 1 mg IV/IO</p> <p>ET: (1:1,000) 0.1 mg/kg up to 1 mg. Dilute w/ NS to volume of 3-5 mL. Follow w/ 3-5 mL NS flush after instillation. Repeat every 3-5 min as long as CPR continues.</p>
Side effects:	None during cardiac arrest, otherwise: <ul style="list-style-type: none">➤ CNS: Headache, dizziness, tremors, restlessness, palpitations,➤ CV: Very potent peripheral vasoconstrictor; dysrhythmias and angina. Increases myocardial O₂ consumption; use with caution in patients with HF Can cause worsening of myocardial ischemia, tachycardia, and hypertension➤ GI: Nausea, vomiting
Precautions:	<ul style="list-style-type: none">➤ Do not mix with sodium bicarbonate in the same tubing at the same time - precipitates➤ Epi's therapeutic effects usually begin about 90 sec after administration. However, because these effects are short lived, it must be given q. 3-5 minutes during resuscitation to maintain therapeutic levels.➤ Beta-adrenergic effects may cause or aggravate myocardial ischemia due to the ↑ work load and O₂ demand that it places on the heart. Adequately ventilate patient using 15 L O₂ to minimize myocardial ischemia.➤ May cause or increase the severity of ventricular ectopic activity. This is of special concern if the patient is taking digitalis, as dig causes the heart to become sensitive to the effects of epinephrine.
Drug interactions:	<ul style="list-style-type: none">➤ Beta blockers may block the beta effects of epi and cause pure alpha responses➤ Use with oxytocics/MAO inhibitors can cause severe hypertension➤ Combination with other beta-adrenergic agonists can cause severe arrhythmias

DOPAMINE (Intropin)

Classifications:

- Pharmacologic: Adrenergic (sympathetic agonist)
- Therapeutic: Inotropic, vasopressor

Actions: Dopamine is a naturally occurring catecholamine that is a precursor of epinephrine and norepinephrine. It is found predominately in the substantia nigra of the midbrain and in the entero-chromaffin like cells of the gastric mucosa. It is chemically related to both epinephrine and norepinephrine and increases BP by acting on both alpha (α), beta-1 (β), and dopaminergic receptors.

Action is dose dependent.

- Acts as a **β agonist** at all doses by stimulating adenocyclase in the cell which converts ATP to cyclic AMP. C-AMP is activated by a protein kinase (phosphokinase) which allows or increases calcium entry into the cell allowing the cross bridging of myosin and actin in the sarcomere. ***This causes a positive inotropic effect (\uparrow myocardial contractility).*** It does not increase myocardial O_2 demand as much as isoproterenol (Isuprel) and epinephrine and does not have the same powerful chronotropic effects.
- In higher doses, acts on **α** adrenergic receptors causing peripheral vasoconstriction. Unlike norepinephrine, when used in therapeutic dosages, dopamine maintains renal and mesenteric blood flow because of its effect on the dopaminergic receptors. For these reasons, dopamine is the most commonly used vasopressor. It will increase both the BP and pulse pressure, but there is generally less effect on the diastolic pressure.

Therapeutic benefit: Increases blood pressure and cardiac output; \uparrow blood flow through kidneys.

- Indications:**
- Hemodynamically significant hypotension (SBP < 70-100) in the absence of hypovolemia
 - To perfuse the heart and \uparrow CO in CHF/pulmonary edema with cardiogenic shock
 - Vasopressor in distributive/low resistance shock: septic, anaphylactic, neurogenic
 - To induce mesenteric vasodilation

Onset of action: 5 minutes

Duration of action: 10 minutes IV

How supplied Stocked as premixed IVPB. Drips are typically mixed at 800 mg/500 mL or 400 mg/250 mL (1600 μ g/mL)

- Dose & route:**
- Beta effects predominate: 2-10 μ g/kg/min
 - Alpha predominates: > 10-20 μ g/kg/min
 - Start at 5 μ g/kg/min IVPB and titrate upwards until BP improves
 - ***EASY DOSING:*** Estimate weight in pounds. Take first two digits of weight. Subtract 2. Remainder = # of microdrops/minute @ 5 mcg/kg/ min.
 Ex. Patient weighs 200 pounds. 20-2 = 18. Patient should receive 18 mcgtts/min
 - May increase infusion rate until BP, UA, and perfusion improve
 - As with all vasoactive drugs, there is substantial variability in the response to Dopamine and the drug must be titrated to hemodynamic effect. The lowest rate that results in satisfactory hemodynamic performance should be used to minimize side effects.

Dose	Major receptors stimulated	Response
5-10 mcg/kg/min Moderate dose	Beta ₁ - dominates Alpha - adrenergic	\uparrow CO & BP via direct inotropic effect on heart. Vasoconstriction modest due to increased venous tone and CVP.
10-20 mcg/kg/min	Alpha - dominates; Beta continues	Renal, mesenteric, and peripheral arterial and venous vasoconstriction, producing marked \uparrow SVR, preload, and BP.
> 20 mcg/kg/min High dose	Alpha – only	Similar to response to norepinephrine, i.e., vasoconstriction, + inotrope

ALBUTEROL (Proventil, Ventolin, AccuNeb)

- Classifications:** ➤ Beta-2 agonist
- Actions:** ➤ Selective B-2 agonist; smooth muscle relaxant effect causes bronchodilation.
➤ Helps return K⁺ into cells by activating the Na-K pump at the cell membrane.
- Therapeutic benefit:** Relieves bronchospasm by relaxing smooth muscle lining the airways.
- Indications:** ➤ Bronchospasm associated w/ asthma, COPD, allergic reaction, croup, cystic fibrosis.
➤ Hyperkalemia
- Onset of action:** 5 minutes
- Duration of action:** 10 minutes IV
- How supplied** 2.5 mg / 3 mL
- Dose & route:** ➤ **Bronchospasm:** 2.5 mg 2/ O₂ at 6-8 L depending on unti, until mist stops (5-15 min. May use w/ HHN, mask or inline w/ BVM.
➤ Give 1st dose w/ ipratropium for adult pts. May repeat albuterol alone.
➤ **Hyperkalemia:** 10-20 mg/neb over 15 min.
➤ Do not wait @ scene to determine response. Begin treatment and transport ASAP.
- Contraindications:** ➤ Allergy
- Precautions & side Effects** ➤ Hypoxia may ↑ incidence of CV SE
➤ SE from MDIs are blunted by using a spacer device
➤ CNS: tremors, nervousness, anxiety, dizziness, HA
➤ CV: ↑ HR, ↑ or ↓ BP, palpitations, dysrhythmias, chest pain, angina
➤ GI: N/V
➤ Resp: paradoxical bronchospasm, hypoxia due to ventilation/perfusion mismatch
➤ Metabolic: hypokalemia
- Drug interactions:** ➤ May cause cardiac stimulation-use w/ caution when using 2 sympathetic stimulants concurrently

IPRATROPIUM BROMIDE (Atrovent)

- Classifications:** ➤ Anticholinergic bronchodilator
- Actions:** ➤ Inhibits parasympathetic stimulation, reversing bronchospasm.
- Therapeutic benefit:** Relieves bronchospasm.
- Indications:** ➤ Bronchospasm associated w/ asthma, COPD, allergic reaction.
➤ Hyperkalemia
- Onset of action:** 15-30 minutes
- Duration of action:** 4-8 hours
- How supplied** 0.5 mg in 2.5 mL
- Dose & route:** ➤ 0.5 mg in 2.5 mL NS added to 1st albuterol HHN.
➤ Combined use results in greater bronchodilation than either drug alone.
➤ Do not wait @ scene to determine response. Begin treatment and transport ASAP.
- Contraindications:** ➤ Hypersensitivity to atropine or ipratropium products.
- Precautions & side Effects**
- GI: dry mouth, abnormal taste, nausea.
 - Eyes: blurred vision, dilated pupils (mist leaks into eyes). Neb preferred over mask in pts with glaucoma.
 - Contact OLMC for pts < 12 yrs.
 - Pts allergic to MDI formulation (peanut allergy) may safely use neb solution (OLMC order)
 - Bladder neck obstruction
 - Prostate hypertrophy
- Drug interactions:** ➤ Avoid with other anticholinergic-containing drugs; may lead to an increase in anticholinergic adverse effects.