

Epinephrine

Epinephrine - Potent Alpha-1, Beta-1, and Beta-2 Adrenergic Agonist

Vasopressors & Inotropes / Vasopressors

Evidence status: current

ICU High-Yield Summary

Potent direct alpha/beta agonist for anaphylactic shock, cardiac arrest, post-cardiac arrest shock, and refractory septic shock - powerful inotrope and bronchodilator with transient hyperlactatemia.

Mechanism of Action

Pan-Adrenergic Receptor Agonism

1. Low dose (0.01-0.05 mcg/kg/min): Predominant Beta-1 and Beta-2 agonism Increased CO, HR, and bronchodilation. 2. High dose (>0.1 mcg/kg/min): Alpha-1 agonism predominates Potent systemic vasoconstriction and MAP rise. 3. Beta-2 hepatic stimulation accelerates glycolysis, causing transient type B hyperlactatemia.

ICU Clinical Reasoning

Why I Choose It

First-line treatment for anaphylaxis; give IM epinephrine promptly in the anterolateral thigh unless IV epinephrine is specifically required in a monitored refractory setting. | First-line vasopressor/inotrope in Cardiac Arrest (ACLS 1 mg IV q3-5 min). | An additional vasoactive option in septic shock when norepinephrine-based therapy is insufficient; current sepsis guidance also allows epinephrine in selected patients with persistent hypoperfusion or escalating vasopressor needs.

Why I Avoid / Key Limitations

Profound tachyarrhythmias and myocardial ischemia. | Causes non-hypoxic Type B hyperlactatemia (can obscure sepsis clearance). | Splanchnic vasoconstriction.

Bedside Pearl

Epinephrine stimulates hepatic beta-2 receptors causing glycogenolysis and transient hyperlactatemia - do not confuse epinephrine-induced Type B hyperlactatemia with worsening tissue hypoperfusion!

Dosing & Administration

Routine ICU Dosing

Septic-shock hypotension (current U.S. label): 0.05-2 mcg/kg/min IV infusion, titrated to the desired MAP and weaned gradually. Adult anaphylaxis: 0.3-0.5 mg IM in the anterolateral thigh; may repeat every 5-10 minutes as needed. Adult cardiac arrest: epinephrine 1 mg IV/IO every 3-5 minutes per AHA ALS guidance.

Hemodialysis

No label-based dialysis-specific regimen is required; titrate to hemodynamic response rather than assuming dialysis clearance is clinically relevant.

CRRT

No CRRT-specific numeric regimen is established; titrate to hemodynamic response.

Renal Dose Table

Renal impairment: Current U.S. labeling does not provide a renal dose-adjustment table; titrate the infusion to hemodynamic response and monitor renal perfusion.

Organ Failure Considerations

Renal Failure & AKI

Current labeling does not provide a renal dose-adjustment algorithm for shock infusion; titrate to effect and monitor perfusion, arrhythmia and ischemic complications.

Hepatic Impairment

Rapidly metabolized; no universal hepatic dose-adjustment algorithm is provided in current labeling, so titrate to effect.

Toxicity & Safety

Major Warnings

Tachyarrhythmias, myocardial ischemia, extravasation necrosis, severe hypertension.

Organ Toxicities

Cardiovascular: Ventricular tachycardia, angina, hypertension, myocardial necrosis.

Drug Interactions

Bedside Interactions

Non-selective Beta-Blockers: Unopposed alpha-1 stimulation; consequence: Severe hypertension and bradycardia; ICU action: Use alternative inotrope.

Monitoring & TDM

Monitoring

Continuous arterial blood pressure | Heart rate and ECG rhythm | Serum lactate and blood glucose

Evidence & Source Traceability

Claim-Level Citations

Current labeling supports epinephrine infusion for septic-shock hypotension at 0.05-2 mcg/kg/min, titrated to MAP; AHA adult ALS recommends 1 mg every 3-5 minutes during cardiac arrest. - Epinephrine Injection U.S. Prescribing Information, DailyMed 2026; AHA Adult Advanced Life Support guidance. (<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=4f83895f-638c-4515-af03-7c41ae60a42e>)

Guideline IDs

shock-guideline-esicm-2025 | cardiac-arrest-guideline-aha-2025