

Adrenaline (epinephrine)

APPLICABLE AREAS

THIS SECTION WILL BE LEFT BLANK FOR EACH HOSPITAL TO COMPLETE IN ACCORDANCE WITH LOCAL PRACTICE. EXAMPLES: ICU, ED, OR, WARD 2B

MECHANISM OF ACTION/PHARMACOLOGY

Adrenaline is a non-selective adrenergic agonist with potent β_1 and moderate α_1 and β_2 -receptor activity.

Increased myocardial force of contraction (positive inotrope) and heart rate (positive chronotrope) occur as a result of β_1 receptor stimulation. Systemic vascular resistance is increased overall because the stimulation of α_1 receptors results in peripheral vasoconstriction, which counters the vasodilation due to β_2 receptor activation. These β_2 effects also relax bronchial smooth muscle and stabilise mast cells.¹⁻³

Onset of action: 1–2 minutes.⁴

Duration of action: 2–10 minutes.⁴

Half-life: 5 minutes.⁵

INDICATIONS

To increase cardiac output and heart rate, mean arterial blood pressure and coronary blood flow.⁶

Septic shock: If needed, may be used in addition to noradrenaline (the preferred first-line single-agent vasopressor) to raise mean arterial blood pressure to target.⁷

Additional indications not covered in this guideline include cardiac arrest, anaphylaxis and bronchospasm causing respiratory distress.

PRECAUTIONS

- Hypersensitivity to noradrenaline or sulfites (some brands contain sodium metabisulfite)¹
- Hypotension due to uncorrected hypovolaemia¹
- Tachycardia and arrhythmias¹
- Risk of systolic anterior motion of the mitral valve and/or dynamic left ventricular outflow tract obstruction
- Narrow angle glaucoma¹
- Pheochromocytoma.¹

MEDICATION PRESENTATION

1 mg/1 mL (1:1000) of adrenaline base per vial.

MEDICATION STORAGE

Store vials below 25°C. Do not refrigerate or freeze. Protect from light.¹⁸

Infusion solutions are stable for up to 24 hours.⁹

PREPARATION

| | Infusion pump | | Syringe driver |
|---|---------------------------|---------------------------|--|
| Prescribe | 6 mg in 100 mL | 12 mg in 200mL | 3 mg in 50mL |
| Make up infusion in | 100 mL bag of glucose 5%* | 250 mL bag of glucose 5%* | Glucose 5%* |
| Volume to be removed from IV bag | 6 mL | 62 mL | Not applicable Draw up 47 mL in the syringe |
| Drug dose to be added | 6 mg (6 mL of 1:1000) | 12 mg (12 mL of 1:1000) | 3 mg (3 mL of 1:1000) |
| Final volume | 100 mL | 200 mL | 50 mL |
| Final concentration | 60 microg/mL | 60 microg/mL | 60 microg/mL |
| 1 mL/hr = | 1 microg/min | 1 microg/min | 1 microg/min |

*Adrenaline is also compatible with glucose in sodium chloride solutions, Hartmann's solution and sodium chloride 0.9%.⁸

Adrenaline acid tartrate vials are commonly used in practice despite the lack of compatibility and stability information. Inspect solutions for signs of incompatibility after preparation and during infusion.⁸

ADMINISTRATION – THIS GUIDELINE IS INTENDED FOR CENTRAL ACCESS ONLY

Administer continuous intravenous infusion through a central access line.¹⁰

Infusions should be administered via a syringe driver or infusion pump, preferably with medication error reduction software enabled.

Avoid administration in lines where other drugs or fluids may be bolused or flushed.

DOSING

Starting dose: 1 to 4 microg/min.⁸

Titrate in accordance with prescribed blood pressure and heart rate parameters – for example, by increments of 0.5 to 1 microg/min.

Usual dose range: 1 to 20 microg/min.

Maximum dose: up to 100 microg/min in extreme cases.¹¹

Wean gradually to avoid hypotension.

MONITORING

- Continuous blood pressure and cardiac monitoring for the duration of the infusion⁸
- Monitor fluid balance and electrolytes
- Assess for organ ischaemia (including myocardium, kidneys, gastrointestinal tract and peripheral extremities) – see 'Side effects' for more information
- Regular blood glucose monitoring.

SIDE EFFECTS

- Angina, tachycardia, arrhythmias and palpitations¹
- Tissue ischaemia or necrosis due to vasoconstriction³
- Hyperglycaemia³
- Lactic acidaemia.

COMPATIBILITIES

Consult the following references, which are available online through the Clinicians Health Channel:

- Australian injectable drugs handbook
- Trissel's™ in IV compatibility (Micromedex) – from the site homepage, select the 'IV Compatibility' tab.

IMPORTANT DRUG INTERACTIONS

- **Monoamine oxidase inhibitors (MAOIs)** (including reversible, non-selective agents such as linezolid) inhibit the metabolism of adrenaline. Dose adrenaline conservatively.^{1,12}
- **Ergot derivatives** enhance the vasoconstrictive effects of adrenaline and increase the risk of severe hypertension. Avoid adrenaline use.^{1,12}
- **Tricyclic antidepressants (TCAs)** may enhance the vasopressor effects of adrenaline. Dose adrenaline conservatively.^{1,12}
- **Entacapone** is a catechol-O-methyltransferase (COMT) inhibitor, which may reduce the metabolism of adrenaline, increasing the risk of side effects. Dose adrenaline conservatively.^{1,12}
- **β-antagonists** allow the α-receptor stimulation of adrenaline to predominate and may potentially cause hypertensive crises and reflex bradycardia.^{1,12}
- **Cocaine** enhances sympathomimetic effects of adrenaline and increases the risk of hypertension, tachycardia and fatal arrhythmias. Avoid this combination in cocaine misusers if it is less than 24 hours since they last used it.¹²

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