





ADRENALINE (epinephrine)

Indication	<ul style="list-style-type: none"> • Cardiac arrest in the absence of ventricular fibrillation (not for cardiac failure, haemorrhagic, traumatic or cardiogenic shock)¹ <ul style="list-style-type: none"> ○ Use in cardiopulmonary resuscitation only if effective ventilation and cardiac massage have not restored effective circulation • Anaphylactic shock² • Bronchospasm³ and post-extubation stridor (uncertain benefit⁴) • Inotropic support in the setting of moderate to severe haemodynamic compromise²
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INTRAVENOUS	IV injection		
	Presentation	<ul style="list-style-type: none"> • Ampoule: 1 mg in 10 mL (1:10,000) 1 mg in 1 mL (1:1000) 	
	Dosage¹	<ul style="list-style-type: none"> • 0.01–0.03 mg/kg (10–30 microgram/kg) (0.1–0.3 mL/kg) every 2 to 3 minutes as required 	
	Preparation (1:10,000)	<ul style="list-style-type: none"> • Use 1:10,000 <ul style="list-style-type: none"> ○ Nil required ○ <i>Concentration equal to 0.1 mg/mL (100 microgram/mL)</i> 	
	Preparation (if 1:10,000 not available)	<ul style="list-style-type: none"> • Use 1:1000 <u>only</u> if 1:10,000 not available⁵ <ul style="list-style-type: none"> ○ Draw up 1 mg of 1:1000 (1 mL) ○ Make up to 10 mL total volume with 0.9% sodium chloride ○ <i>Concentration now equal to 0.1 mg/mL (equivalent to 1:10,000)</i> 	
Administration	<ul style="list-style-type: none"> • Draw up prescribed dose and administer as a rapid IV bolus • Follow with 0.9% sodium chloride 2 mL IV flush¹ 		

INTRAVENOUS	IV infusion		
	Presentation	<ul style="list-style-type: none"> • Ampoule: 1 mg in 10 mL (1:10,000) 	
	Dosage^{1,5}	<ul style="list-style-type: none"> • 0.05–1 microgram/kg/minute <ul style="list-style-type: none"> ○ Titrate to response ○ Higher doses up to 1.5 microgram/kg/minute have been used in acute haemodynamic compromise² 	
	Preparation (use 1:10,000)	<ul style="list-style-type: none"> • Use 1:10,000 <ul style="list-style-type: none"> ○ Draw up 0.3 mg/kg (0.3 mL/kg of 1:10,000) ○ Make up to 50 mL total volume with 5% glucose (preferred) or 0.9% sodium chloride ○ <i>Concentration now equal to 6 microgram/kg/mL</i> ○ <i>Refer to Quick guide for other strengths</i> 	
Administration	<ul style="list-style-type: none"> • Infuse at prescribed dose via medication safety pump <ul style="list-style-type: none"> ○ <i>A 6 microgram/kg/mL solution infused at 1 mL/hour, delivers 0.1 microgram/kg/minute</i> 		

INHALATION	Endotracheal (ETT)		
	Presentation	<ul style="list-style-type: none"> • Ampoule: 1 mg in 10 mL (1:10,000) 	
	Dosage¹	<ul style="list-style-type: none"> • 0.05–0.1 mg/kg (50–100 microgram/kg) 	
	Preparation	<ul style="list-style-type: none"> • Use 1:10,000 <ul style="list-style-type: none"> ○ Nil required ○ <i>Concentration equal to 0.1 mg/mL (100 microgram/mL)</i> 	
Administration	<ul style="list-style-type: none"> • Draw up prescribed dose • Via ETT • Follow with positive pressure ventilation¹ 		

INHALATION	Nebuliser		
	Presentation	<ul style="list-style-type: none"> • Ampoule: 1 mg in 1 mL (1:1000) 	
	Dosage⁶	<ul style="list-style-type: none"> • 0.5 mg/kg (0.5 mL/kg of 1:1000) every 4 to 6 hours 	
	Preparation²	<ul style="list-style-type: none"> • Use 1:1000 <ul style="list-style-type: none"> ○ Draw up the prescribed dose ○ Make up to 2 mL total volume with 0.9% sodium chloride 	
	Administration	<ul style="list-style-type: none"> • Via nebuliser mask with oxygen flow at around 4 L/minute 	

Special considerations	<ul style="list-style-type: none"> • For resuscitation <ul style="list-style-type: none"> ○ Refer to Queensland Clinical Guideline: <i>Neonatal resuscitation</i>⁷ ○ UVC or PVL preferred ○ Intraosseous may be an alternative route, dependent on local capabilities ○ ETT if vascular access cannot be obtained • For infusion <ul style="list-style-type: none"> ○ Ensure centrally placed catheters are well positioned (i.e. UVC is past the ductus venosus) ○ Use a dedicated IV line or Y site to avoid accidental bolus⁸ ○ Giving other drugs via Y-site may change the infusion rate of adrenaline (epinephrine)⁸ ○ Do not stop infusion suddenly; gradually reduce dose⁸ ○ Low stiction (static friction) syringe recommended. Do not delay treatment if unavailable • <i>Current gestational age is the same as post-menstrual age (PMA)</i>
Monitoring	<ul style="list-style-type: none"> • If IV route, continuous cardiac monitoring⁸, BP⁵, oxygen saturation⁵ • Urinary output⁵, peripheral perfusion • Extravasation risk; may cause local ischaemia and necrosis⁸
Compatibility	<ul style="list-style-type: none"> • Fluids (limited compatibility and stability data/references although used in clinical practice. Inspect solutions for signs of incompatibility) <ul style="list-style-type: none"> ○ 5% glucose⁸ (preferred solution as protects against oxidation¹), 0.9% sodium chloride⁸, 10% glucose⁸ (avoid unless concerns with BGL maintenance due to severely restricted infusion rates) • Y site <ul style="list-style-type: none"> ○ Amikacin⁸, amiodarone⁸, atracurium⁸, cefazolin⁸, ceftazidime⁸, cefotaxime⁸, ceftazidime⁸, ceftriaxone⁸, clindamycin⁸, dexamethasone⁸, dobutamine⁸, dopamine⁸, esmolol⁸, fentanyl⁸, fluconazole⁸, gentamicin⁸, glyceryl trinitrate⁸, heparin sodium⁸, lidocaine⁸, magnesium sulfate⁸, methylprednisolone sodium succinate⁸, metoclopramide⁸, midazolam⁸, milrinone⁸, morphine sulfate⁸, phenylephrine⁸, potassium chloride⁸, sodium nitroprusside⁸, tobramycin⁸ • Product information for adrenaline (epinephrine) acid tartrate injection states it is incompatible with noradrenaline (norepinephrine), however several studies have demonstrated compatibility of adrenaline (epinephrine) hydrochloride and noradrenaline (norepinephrine) at various concentrations.⁸ Discuss options with SMO
Incompatibility	<ul style="list-style-type: none"> • Fluids <ul style="list-style-type: none"> ○ Sodium bicarbonate⁸ • Drugs <ul style="list-style-type: none"> ○ Aciclovir⁸, azathioprine⁸, cefalotin⁸, digoxin³, diazepam³, indometacin⁸, micafungin⁸, phenobarbital (phenobarbitone)⁸, phenytoin⁹, sodium bicarbonate⁸
Interactions	<ul style="list-style-type: none"> • Esmolol, propranolol, sotalol, timolol: predicted to increase the risk of hypertension and bradycardia when given with adrenaline/epinephrine. Manufacturer advises caution²
Stability	<ul style="list-style-type: none"> • Ampoule <ul style="list-style-type: none"> ○ Store below 25 °C³. Do not refrigerate or freeze.⁸ Protect from light³ ○ Discard if solution not clear and colourless⁸ • Infusion <ul style="list-style-type: none"> ○ Cover or use light protective tubing/syringe ○ Change infusion after 24 hours

Side effects	<ul style="list-style-type: none"> Blood pathology: severe metabolic acidosis (with prolonged use)¹⁰, hyperglycaemia¹, hypokalemia² Circulatory: tachycardia¹, arrhythmias¹, hypertension¹ Nervous: restlessness, tremor¹⁰ Urinary; renal necrosis (with prolonged use or higher doses¹)
Actions	<ul style="list-style-type: none"> Sympathomimetic acting on both alpha and beta adrenergic receptors (most potent alpha receptor activator)³ <ul style="list-style-type: none"> Increases systolic BP and relaxes bronchial spasm¹⁰ Onset of action is 1–2 minutes; duration of effect is short and half-life is 5 minutes⁸
Abbreviations	BP: blood pressure, ETT: endotracheal tube, IV: intravenous, PVL: peripheral venous line, SMO: most senior medical officer, UVC: umbilical venous catheter
Keywords	Adrenaline, neonatal resuscitation, cardiac arrest, anaphylactic shock, anaphylaxis, sympathomimetic

The Queensland Clinical Guideline *Neonatal Medicines* is integral to and should be read in conjunction with this monograph. Refer to the disclaimer. Destroy all printed copies of this monograph after use.

Quick Guide: adrenaline 1:10,000 IV injection during resuscitation

Adrenaline 1:10,000	Current gest age (weeks)	Dose: 0.03 mg/kg IV	Frequency
	Less than 26+6	0.1 mL	Every 2-3 minutes while heart rate less than 60 bpm (despite adequate ventilation and compressions)
	27+0–37+6	0.25 mL	
	38+0–43	0.5 mL	Follow with 0.9% sodium chloride 2 mL IV flush

Quick Guide: adrenaline 1:10,000 IV infusion

Adrenaline 1:10,000	Infusion strength	Dose:	Diluent (concentration)	Dose at 0.1 mL/hour	Dose at 1 mL/hour	Rate at (maximum dose)
	Single strength	0.3 mg/kg (3 mL/kg)	Make up to 50 mL total volume with 5% glucose (6 microgram/kg/mL)	0.01 microgram/kg/minute	0.1 microgram/kg/minute	15 mL/hour (1.5 microgram/kg/minute)
	Double strength	0.6 mg/kg (6 mL/kg)	Make up to 50 mL total volume with 5% glucose (12 microgram/kg/mL)	0.02 microgram/kg/minute	0.2 microgram/kg/minute	7.5 mL/hour (1.5 microgram/kg/minute)
	Quad strength	1.2 mg/kg (12 mL/kg)	Make up to 50 mL total volume with 5% glucose (24 microgram/kg/mL)	0.04 microgram/kg/minute	0.4 microgram/kg/minute	3.75 mL/hour (1.5 microgram/kg/minute)

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Document history

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