

Isoprenaline

Newborn use only

2023

Alert	Also known as Isoproterenol.									
Indication	Temporary treatment of symptomatic bradyarrhythmia or heart block especially if caused by beta blocker overdose.									
Action	β_1 - and β_2 -adrenoceptor agonist. Its action on cardiac β_1 -adrenoceptors results in positive inotropic and chronotropic effects on the heart elevating blood pressure. Its action on arteriolar β_2 -adrenoceptors results in vasodilation and lowering of diastolic blood pressure. The overall effect is to decrease mean arterial pressure due to the β_2 -adrenoceptor mediated vasodilation. [1]									
Drug type	Catecholamine, β -adrenoceptor agonist drug									
Trade name	Isuprel Monico - Isoprenaline Hydrochloride 0.2mg/mL (SAS product)									
Presentation	1 mg/5 mL ampoule = 200 microgram/1 mL.									
Dose	0.05–1 microgram/kg/minute. Doses may need to be many times higher in the management of beta blocker overdose. Consult with a clinical toxicologist (Poisons Information Centre 131126).									
Dose adjustment										
Maximum dose	2 microgram/kg/minute. Higher doses may be needed for management of B-blocker overdose. Consult with a clinical toxicologist (Poisons Information Centre 131126).									
Total cumulative dose										
Route	IV infusion.									
Preparation	LOW concentration IV infusion <table><tr><th>Infusion strength</th><th>Prescribed amount</th></tr><tr><td>1 mL/hour = 0.05 microgram/kg/minute</td><td>150 microgram/kg isoprenaline and make up to 50 mL</td></tr></table> Draw up 150 microgram/kg (0.75 mL/kg) isoprenaline and add glucose 5% or sodium chloride 0.9% to make a final volume of 50 mL. Infusing at a rate of 1 mL/hour = 0.05 microgram/kg/minute . HIGH concentration IV infusion (can be used for infants up to 2.1 kg) <table><tr><th>Infusion strength</th><th>Prescribed amount</th></tr><tr><td>1 mL/hour = 0.5 microgram/kg/minute</td><td>1500 microgram/kg isoprenaline and make up to 50 mL</td></tr></table> Draw up 1500 microgram/kg (7.5 mL/kg) of isoprenaline and add glucose 5% or sodium chloride 0.9% to make a final volume of 50 mL. Infusing at a rate of 1 mL/hour = 0.5 microgram/kg/minute . *Maximum reported concentration of the infusion preparation is 64 microgram/mL.(12)		Infusion strength	Prescribed amount	1 mL/hour = 0.05 microgram/kg/minute	150 microgram/kg isoprenaline and make up to 50 mL	Infusion strength	Prescribed amount	1 mL/hour = 0.5 microgram/kg/minute	1500 microgram/kg isoprenaline and make up to 50 mL
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Administration	Continuous IV infusion preferably via central line. Change infusion every 24 hours.									
Monitoring	Continuous heart rate, ECG and blood pressure monitoring preferable. Assess urine output and peripheral perfusion frequently. Blood glucose.									
Contraindications	Tachyarrhythmias; tachycardia or heart block caused by digitalis intoxication; ventricular arrhythmias which require inotropic therapy; coronary insufficiency; hypersensitivity to isoprenaline. Isoprenaline should not be given simultaneously with adrenaline because their combined effects may induce serious arrhythmia.									
Precautions	Isoprenaline infusion may produce an increase in myocardial work and oxygen consumption. Titrate drug dose to heart rate. Correct acidosis prior to commencement. Ensure adequate circulating blood volume prior to commencement. As isoprenaline is a vasodilator, additional volume expansion may be required during infusion. Stimulates insulin secretion.									
Drug interactions	Inhalational anaesthetics can increase the effects of isoprenaline. Use of isoprenaline hydrochloride in conjunction with aminophylline and corticosteroids may be additive in cardiotoxic properties.									
Adverse reactions	Tachycardia.									

	Cardiac arrhythmias. Systemic vasodilation and hypotension. Hypoglycaemia. Extravasation (12)
Compatibility	Fluids (14): Glucose 5%; sodium chloride 0.9%. Y-site (12,14): Aciclovir, adrenaline (epinephrine), amikacin, amiodarone, amphotericin B liposomal, atracurium, atropine, azithromycin, aztreonam, benzylpenicillin, calcium chloride, calcium gluconate, cefazolin, cefotaxime, ceftazidime, ceftriaxone, chloramphenicol, clindamycin, dexamethasone, digoxin, dobutamine, dopamine, erythromycin, fentanyl, fluconazole, gentamicin, heparin, hydrocortisone, lidocaine (lignocaine), linezolid, magnesium sulfate, metronidazole, milrinone, morphine, nitroprusside, nitroglycerin, noradrenaline (norepinephrine), pamidronate, pancuronium, piperacillin-tazobactam, potassium acetate, potassium chloride, propofol, ranitidine, remifentanyl, ticarcillin-clavulanate, vancomycin, vasopressin, vitamin K.
Incompatibility	Aminophylline, ampicillin sodium, amphotericin B conventional colloidal, amphotericin B lipid complex, , diazepam, diazoxide, furosemide, ganciclovir, hydralazine, ibuprofen, indomethacin, insulin, pantoprazole, phenobarbitone (phenobarbital), phenytoin, sodium bicarbonate, sulfamethoxazole-trimethoprim.
Stability	Do not administer if the solution is pinkish or darker than slightly yellow or if a precipitate is present. Change the infusion every 24 hours.
Storage	Store below 25°C. Protect from light.
Excipients	Disodium edetate, sodium citrate dihydrate, citric acid, sodium chloride, hydrochloride acid or sodium hydroxide. Monico - Isoprenaline Hydrochloride: sodium metabisulphite and water for injections.
Special comments	
Evidence	Efficacy: The efficacy and dosing of isoprenaline in newborns has only been assessed in case reports. Infants with congenital complete heart block: Case reports of response to isoprenaline infusion in newborns with congenital heart block.[2-4] (LOE IV, GOR D) The European Society of Cardiology Guidelines recommend for patients with bradyarrhythmia, positive chronotropic drug infusion (e.g. isoprenaline, adrenaline (epinephrine), etc.) may be preferred for a limited time, unless there is a contra-indication, compared to use of a temporary pacemaker. [5] There are insufficient data reported to determine its safety or efficacy in newborns with pulmonary hypertension. Safety: Case reports of arrhythmia/tachycardia [6] [4], elevated serum CPK-MB levels [7] and hypotension.[8] In animal studies, use of isoprenaline hydrochloride in conjunction with aminophylline and corticosteroids have been shown to be additive in cardiotoxic properties and can lead to myocardial necrosis and death.[11] Pharmacokinetics: In children age 2 days to 14 years, average plasma half-life 4.2 ± 1.5 minutes, with linear relationship between steady state concentration and dosing rate.[10]
Practice points	
References	- Noori S, Seri I. Neonatal blood pressure support: the use of inotropes, lusitropes, and other vasopressor agents. Clinics in perinatology. 2012;39:221-38. - Deloof E, Devlieger H, Van Hoestenbergh R, Van den berghe K, Daenen W, Gewillig M. Management with a staged approach of the premature hydropic fetus due to complete congenital heart block. European Journal of Pediatrics. 1997;156:521-3. - Glatz AC, Gaynor JW, Rhodes LA, Rychik J, Tanel RE, Vetter VL, Kaltman JR, Nicolson SC, Montenegro L, Shah MJ. Outcome of high-risk neonates with congenital complete heart block paced in the first 24 hours after birth. The Journal of thoracic and cardiovascular surgery. 2008;136:767-73. - Quek SC, Low KT, Sim EK, Joseph R. A case report on the perinatal management of a 30-week preterm baby with congenital complete heart block. Annals of the Academy of Medicine, Singapore. 2000;29:510-3.

	5. Brignole M, Auricchio A, Baron-Esquivias G, Bordachar P, Boriani G, Breithardt OA, et al. 2013 ESC Guidelines on cardiac pacing and cardiac resynchronization therapy: the Task Force on cardiac pacing and resynchronization therapy of the European Society of Cardiology (ESC). Developed in collaboration with the European Heart Rhythm Association (EHRA). European heart journal. 2013;34:2281-329. 6. Steiner P, Rao M, Ehrlich R, Padre R. The use of intravenous isoproterenol in the treatment of status asthmaticus. The Journal of asthma research. 1975;12:215-9. 7. Maguire JF, Geha RS, Umetsu DT. Myocardial specific creatine phosphokinase isoenzyme elevation in children with asthma treated with intravenous isoproterenol. The Journal of allergy and clinical immunology. 1986;78:631-6. 8. Kussman BD, Madril DR, Thiagarajan RR, Walsh EP, Laussen PC. Anesthetic management of the neonate with congenital complete heart block: a 16-year review. Paediatric anaesthesia. 2005;15:1059-66. 9. Reyes G, Schwartz PH, Newth CJ, Eldadah MK. The pharmacokinetics of isoproterenol in critically ill pediatric patients. Journal of clinical pharmacology. 1993;33:29-34. 10. Vick J, Joseph X, Whitehurst V, Herman E, Balazs T. Cardiotoxic effects of the combined use of caffeine and isoproterenol in the minipig. J Toxicol Environ Health. 1989;26(4):425-35. 11. Merative™ Micromedex® Complete IV Compatibility (electronic version). Merative, Ann Arbor, Michigan, USA. Available at: https://www.micromedexsolutions.com/ (cited: 25th July 2023).
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