

# Newborn Use Only

## Isoprenaline infusion

2016

| <b>Alert</b>                         |   |                   |                   |                                      |  |                   |                   |                                     |   |
|--------------------------------------|---|-------------------|-------------------|--------------------------------------|--|-------------------|-------------------|-------------------------------------|---|
| <b>Indication</b>                    | Temporary treatment of symptomatic bradyarrhythmia or heart block especially if caused by beta blocker overdose.  |                   |                   |                                      |  |                   |                   |                                     |   |
| <b>Action</b>                        | Isoprenaline is a $\beta_1$ - and $\beta_2$ -adrenoceptor agonist. Its action on cardiac $\beta_1$ -adrenoceptors results in positive inotropic and chronotropic effects on the heart elevating blood pressure. Its action on arteriolar $\beta_2$ -adrenoceptors results in vasodilation and lowering of diastolic blood pressure. The overall effect is to decrease mean arterial pressure due to the $\beta_2$ -adrenoceptor mediated vasodilation. [1]  |                   |                   |                                      |  |                   |                   |                                     |   |
| <b>Drug Type</b>                     | Catecholamine, $\beta$ -adrenoceptor agonist drug   |                   |                   |                                      |  |                   |                   |                                     |   |
| <b>Trade Name</b>                    | Isuprel Solution for injection  |                   |                   |                                      |  |                   |                   |                                     |   |
| <b>Presentation</b>                  | Solution for injection 1:5000: 1 mg/5 mL ampoule = 200 microgram/1 mL.  |                   |                   |                                      |  |                   |                   |                                     |   |
| <b>Dosage / Interval</b>             | 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).  |                   |                   |                                      |  |                   |                   |                                     |   |
| <b>Maximum daily dose</b>            | 2 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).   |                   |                   |                                      |  |                   |                   |                                     |   |
| <b>Route</b>                         | Continuous IV infusion.   |                   |                   |                                      |  |                   |                   |                                     |   |
| <b>Preparation/Dilution</b>          | <p><b>Isoprenaline hydrochloride (1:5000)*</b></p> <p><b>LOW concentration IV infusion</b></p> <table border="1"> <thead> <tr> <th>Infusion strength</th> <th>Prescribed amount</th> </tr> </thead> <tbody> <tr> <td>1 mL/hour = 0.05 microgram/kg/minute</td> <td>150 microgram/kg isoprenaline and make up to 50 mL</td> </tr> </tbody> </table> <p>Draw up 150 microgram/kg [0.75 mL/kg] of 1:5000 isoprenaline and add glucose 5% or sodium chloride 0.9% to make a final volume of 50 mL. Infusing at a rate of <b>1 mL/hour = 0.05 microgram/kg/minute</b>.</p> <p><b>HIGH concentration IV infusion (can be used for infants up to 2.2 Kg)</b></p> <table border="1"> <thead> <tr> <th>Infusion strength</th> <th>Prescribed amount</th> </tr> </thead> <tbody> <tr> <td>1 mL/hour = 0.5 microgram/kg/minute</td> <td>1500 microgram/kg isoprenaline and make up to 50 mL</td> </tr> </tbody> </table> <p>Draw up 1500 microgram/kg [7.5 mL/kg] of 1:5000 isoprenaline and add glucose 5% or sodium chloride 0.9% to make a final volume of 50 mL. Infusing at a rate of <b>1 mL/hour = 0.5 microgram/kg/minute</b>.</p> <p><b>*Maximum reported concentration of the infusion preparation is 64 microgram/mL.</b></p> | 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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| 1 mL/hour = 0.5 microgram/kg/minute  | 1500 microgram/kg isoprenaline and make up to 50 mL   |                   |                   |                                      |  |                   |                   |                                     |   |
| <b>Administration</b>                | Continuous intravenous infusion. Change infusion every 24 hours.  |                   |                   |                                      |  |                   |                   |                                     |   |
| <b>Monitoring</b>                    | Continuous heart rate, ECG and blood pressure monitoring preferable. Assess urine output and peripheral perfusion frequently. Blood glucose.  |                   |                   |                                      |  |                   |                   |                                     |   |
| <b>Contraindications</b>             | Tachyarrhythmias; tachycardia or heart block caused by digitalis intoxication; ventricular arrhythmias which require inotropic therapy; coronary insufficiency; hypersensitivity to isoprenaline.<br>Isoprenaline should not be given simultaneously with adrenaline because their combined effects may induce serious arrhythmia.  |                   |                   |                                      |  |                   |                   |                                     |   |
| <b>Precautions</b>                   | Isoprenaline infusion may produce an increase in myocardial work and oxygen consumption.<br>Titrate drug dose to heart rate.<br>Correct acidosis prior to commencement.<br>Ensure adequate circulating blood volume prior to commencement. As isoprenaline is a   |                   |                   |                                      |  |                   |                   |                                     |   |

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|                          | vasodilator, additional volume expansion may be required during infusion.<br>Monitor for hypoglycaemia – stimulates insulin secretion.  |
| <b>Drug Interactions</b> | Inhalational anaesthetics can increase the effects of isoprenaline.<br>Use of isoprenaline hydrochloride in conjunction with aminophylline and corticosteroids may be additive in cardiotoxic properties.   |
| <b>Adverse Reactions</b> | Tachycardia.<br>Cardiac arrhythmias.<br>Systemic vasodilation and hypotension.<br>Hypoglycaemia.  |
| <b>Compatibility</b>     | Fluids: Glucose 5%; sodium chloride 0.9%.<br>Y-site: Aciclovir, adrenaline (epinephrine), amikacin, amiodarone, amphotericin B liposomal, atracurium, atropine, azithromycin, aztreonam, benzylpenicillin, caffeine citrate, calcium chloride, calcium gluconate, cefazolin, cefotaxime, ceftazidime, ceftriaxone, chloramphenicol, clindamycin, dexamethasone, digoxin, dobutamine, dopamine, fentanyl, fluconazole, gentamicin, heparin, hydrocortisone, lignocaine, metronidazole, milrinone, morphine, nitroprusside, nitroglycerin, noradrenaline (norepinephrine), pancuronium, penicillin, piperacillin(-tazobactam), potassium chloride, propofol, ranitidine, remifentanil, ticarcillin, vasopressin, vitamin K.   |
| <b>Incompatibility</b>   | Aminophylline, ampicillin sodium, amphotericin B conventional colloidal, amphotericin B lipid complex, diazepam, diazoxide, frusemide, ganciclovir, hydralazine, ibuprofen, indomethacin, insulin, pentobarbitone (pentobarbital), phenytoin, sodium bicarbonate, sulfamethoxazole-trimethoprim.  |
| <b>Stability</b>         | 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.   |
| <b>Storage</b>           | Store below 25°C. Protect from light.   |
| <b>Special Comments</b>  |   |
| <b>Evidence summary</b>  | <p><b>Efficacy:</b><br/>The efficacy and dosing of isoprenaline in newborns has only been assessed in case reports.</p> <p><b>Infants with congenital complete heart block:</b> Case reports of response to isoprenaline infusion in newborns with congenital heart block.[2-4] (LOE IV, GOR D)</p> <p><b>Children with asthma:</b> Case series report response to isoprenaline infusion in infants and children with asthma. [5, 6] (LOE IV, GOR D)</p> <p>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. [7]</p> <p>These are insufficient data reported to determine its safety or efficacy in newborns with pulmonary hypertension.</p> <p><b>Safety:</b><br/>Case reports of arrhythmia/tachycardia [8] [6], elevated serum CPK-MB levels [9] and hypotension.[10] 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.<sup>13</sup></p> <p><b>Pharmacokinetics:</b><br/>In children age 2 days to 14 years, average plasma half-life <math>4.2 \pm 1.5</math> minutes, with linear relationship between steady state concentration and dosing rate.[11]</p> |
| <b>References</b>        | <ol style="list-style-type: none"> <li>Noori S, Seri I. Neonatal blood pressure support: the use of inotropes, lusitropes, and other vasopressor agents. Clinics in perinatology. 2012;39:221-38.</li> <li>Deloof E, Devlieger H, Van Hoestenberghe 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.</li> </ol>   |

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