

# INSULIN – HYPERKALAEMIA **This drug must be guardrailed** **No filter on the line**

<b>Trade Name</b>	Actrapid (Human) (Novo-Nordisk)										
<b>Class</b>	Neutral rapid acting insulin										
<b>Mechanism of Action</b>	<p>Insulin stimulates the Na<sup>+</sup>-K<sup>+</sup> ATPase pump in skeletal muscle, cardiac muscle and liver driving potassium into cells.</p> <p>Serum potassium concentration is therefore lowered however simultaneous administration of glucose is necessary in order to prevent hypoglycaemia.</p>										
<b>Indications</b>	Hyperkalaemia (serum potassium greater than 6mmol/L) See Neonatal Handbook for further information										
<b>Contraindications</b>	Hypoglycaemia Hypersensitivity to human insulin										
<b>Supplied As</b>	100 unit/mL 3 mL vial										
<b>Dilution</b>	<p><b>See Insulin for hyperkalaemia infusion sheet</b></p> <table border="1"> <thead> <tr> <th>Drug</th> <th>50% Dextrose Added</th> <th>Total Volume</th> <th>Concentration</th> </tr> </thead> <tbody> <tr> <td>0.5mL (50 unit)</td> <td>49.5mL</td> <td>50mL</td> <td><b>1 unit/mL</b></td> </tr> </tbody> </table> <p><b>Then further dilute</b> by taking 12.5mL and make up to 50mL with 50% dextrose to make <b>final concentration of 0.25 unit/mL</b> <b>1mL/kg/hr = 0.25 unit/kg/hr</b></p>			Drug	50% Dextrose Added	Total Volume	Concentration	0.5mL (50 unit)	49.5mL	50mL	<b>1 unit/mL</b>
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<b>Dosage</b> <b>*Must chart guardrail and use Alaris pump*</b>	0.25 unit/kg/hr (infused with glucose 50%)										
<b>Guardrails</b>	<p>Concentration: 0.25unit/mL</p> <p>Soft Alert Min: 0.1 unit/kg/hr    Hard Alert Max: 0.3 unit/kg/hr</p> <p>Soft Alert Max: 0.25 unit/kg/hr    Default Setting: 0.25 unit/kg/hr</p>										
<b>Interval</b>	Continuous intravenous Infusion										
<b>Administration</b>	<p>Flush the tubing to ensure that plastic receptor binding occurs.</p> <p><b>Filters are not be used</b> on the insulin line and if present must be removed as they can absorb the insulin</p> <p>Infuse through the same iv line as continuous TPN or 10% glucose and <b>do not give any boluses</b> through this iv to avoid the baby receiving any boluses of insulin.</p> <p>Gradually wean infusion when hyperkalaemia is resolving (ie: potassium &lt;5.5 mmol/L). This usually peaks at 24 hours of age and improves over the next 24 hours in the extreme preterm infant.</p>										

<p><b>Compatible With</b></p>	<p><b>Solutions:</b> glucose 5%, glucose 10%, glucose 50% lactated ringers, sodium chloride 0.9%, SMOF Lipid, TPN.</p> <p><b>Y-site:</b> Aciclovir, adrenaline*, aminophylline, amiodarone*, amphotericin B complex, atenolol, ascorbic acid, atropine, aztreonam, benzylpenicillin, calcium chloride, calcium gluconate, cefazolin, cefepime, cefotaxime, ceftazidime, ceftriaxone, cefuroxime, clarithromycin, digoxin, dobutamine, epoetin, ephedrine, ertapenem, erythromycin, fluconazole, folic acid, furosemide, ganciclovir, gentamicin* heparin, hydrocortisone sodium succinate, ibuprofen, imipenem /cilastatin, indometacin, lidocaine, magnesium sulphate, meropenem, methylprednisolone, metronidazole, milrinone, morphine, midazolam, noradrenaline*, octreotide, paracetamol, pancuronium, phenobarbital, potassium chloride, propofol, ranitidine, sodium bicarbonate, sodium nitroprusside, thiamine, ticarcillin, vancomycin.</p> <p>*There are mixed reports on compatibility of insulin with these medications. Check with the pharmacist, in some cases it may be necessary to use a separate line.</p>
<p><b>Incompatible With</b></p>	<p>Chlorothiazide, diazepam, diazoxide, glycopyrrolate, labetalol, phenylephrine, phenytoin, phentolamine, piperacillin tazobactam, sulfamethoxazole/trimethoprim, thiopentone, tobramycin, vasopressin.</p> <p>Dopamine (data from studies using higher concentrations than we use for both infusions suggest variable compatibility). We have used insulin in combination with dopamine without detectable problems for several years. If concerned change to dobutamine which is compatible at any concentration.</p>
<p><b>Interactions</b></p>	<p>Concurrent use of betablockers eg atenolol, sotalol, ace inhibitors eg enalapril, alpha blockers eg doxazosin, anabolic steroids eg testosterone, octreotide, quinine, quinidine and sulfonamides may reduce insulin requirements.</p> <p>Furosemide, glucocorticoids e.g. hydrocortisone, sympathomimetics eg adrenaline, noradrenaline, salbutamol, octreotide growth hormone and diazoxide may increase insulin requirements.</p> <p>Betablockers may mask the symptoms of hypoglycaemia.</p>
<p><b>Monitoring</b></p>	<p>Measure blood glucose concentrations every 15 – 30 minutes after starting the insulin infusion and after changes are made to the infusion rate. When there is stability the glucose can be checked at 2 hour intervals. Aim for normal BSL between 3-10mmol/L</p> <p>Monitor potassium levels every 30-60 minutes on blood gases initially and if stable then check at 2 hour intervals</p> <p>Repeat formal lab potassium levels every 4-8 hours until hyperkalaemia has resolved</p>

<b>Stability</b>	Single use vial only Continuous infusions must be changed after 24 hrs
<b>Storage</b>	Store Actrapid insulin vials in the refrigerator at 2 – 8 °C. <b>Do not freeze</b> Do not use any insulin solution that is cloudy, unusually viscous, precipitated, or even slightly coloured
<b>Adverse Reactions</b>	Hypoglycaemia Over supplementation of insulin with insufficient glucose cover may cause metabolic acidosis
<b>Metabolism</b>	Liver, more than 50% (Paterson et al, 1983). Kidney, 30% (Paterson et al, 1983). Adipose tissue/muscle, about 20% (Paterson et al, 1983).
<b>Comments</b>	It is Christchurch Neonatal Service policy that all Actrapid Insulin vials should be discarded after opening. *This is because Actrapid doesn't contain preservative and is a potential cause of infection for neonates who most commonly receive insulin by IV infusion (rather than subcutaneous injection which is the most common route of administration for insulin in older patients).
<b>References</b>	<ol style="list-style-type: none"> <li>1. Paterson KR, Paice BJ &amp; Lawson DH: Undesired effects of insulin therapy. Adverse Drug React Acute Poisoning Rev 1983; 2:219-234.</li> <li>2. Trissell Handbook of injectable Drugs 10th Edition.</li> <li>3. NZHPA Notes on injectable Drugs 5th Edition</li> <li>4. Rennie JM, Robertson NRC, Textbook of Neonatology 3<sup>rd</sup> Edition, 1999.</li> <li>5. BNF for Children 2005</li> <li>6. Dunedin Hospital NICU guidelines 2007</li> <li>7. <a href="http://www.micromedexsolutions.com">www.micromedexsolutions.com</a></li> <li>8. <a href="http://www.anmfonline.org">www.anmfonline.org</a></li> </ol>
<b>Updated By</b>	P Schmidt & B Robertshawe December 2005 A Lynn, B Robertshawe December 2007, A Lynn July 2009 A Lynn, B Robertshawe September 2009 A Lynn, B Robertshawe October 2012 (re-order profile, 2 dilutions) A Lynn, B Robertshawe August 2024 (routine review)