INSULIN (ACTRAPID) HYPERGLYCAEMIA

DESCRIPTION
The principal hormone derived from the beta cells of the pancreas and is required for glucose utilization in the body. It enhances glycogen and fat synthesis, the uptake of glucose by insulin-sensitive tissues, amino acid uptake by muscle tissue and cellular uptake of potassium. It inhibits lipolysis and gluconeogenesis. Its plasma half-life is about 9 minutes in adults. Insulin degrades in liver and kidneys.

IV insulin infusion administration improves glycaemic control, increases calorie intake and weight gain and a possibly decreases incidence of sepsis.6,7

USE
USE ONLY AFTER INFORMING AND DISCUSSING WITH CONSULTANT
1. Hyperglycaemia >10mmol/l in <1500g infants with persistent glucose intolerance confirmed by formal blood glucose in blood gas machine. 10-13
2. Hyperkalaemia4 – see separate protocol
3. Neonatal Diabetes

PRECAUTIONS
Consider and treat underlying cause first!
Infection, PDA, NEC, postnatal steroid, excessive glucose load, acute postsurgery stress.

PRESENTATION
100U/ml multiuse vial marked with opening date

DOSE
AIM FOR BLOOD GLUCOSE 6-10MMOL/L WITH GLYCOEURIA ≤1+

1. HYPERGLYCAEMIA 0.1U/kg/hr

<table>
<thead>
<tr>
<th>Infusion strength</th>
<th>Prescribed amount</th>
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<tbody>
<tr>
<td>1ml/hr=0.1U/kg/hr</td>
<td>5U/kg Insulin to make a 50ml solution</td>
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Starting dose is 0.05U/kg/hr titrated according to the infants’ blood glucose level as per insulin sliding scale between 0.01-0.15U/kg/hr.

Note Glucose IV load should not be reduced below 6 mg/kg/min (equivalent of 10%dextrose running at 90 ml/kg/day) before insulin is commenced.

INSULIN SLIDING SCALE

<table>
<thead>
<tr>
<th>Blood Glucose</th>
<th>Action</th>
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<tbody>
<tr>
<td>&gt; 15 mmol/l</td>
<td>INCREASE infusion by 0.02 U/kg/hr</td>
</tr>
<tr>
<td>&gt; 10 mmol/l</td>
<td>INCREASE infusion by 0.01 U/kg/hr</td>
</tr>
<tr>
<td>8 -10 mmol/l</td>
<td>KEEP infusion THE SAME</td>
</tr>
<tr>
<td>6 - 8 mmol/l</td>
<td>REDUCE infusion by 0.01 U/kg/hr</td>
</tr>
<tr>
<td>&lt; 6 mmol/l</td>
<td>STOP INFUSION</td>
</tr>
</tbody>
</table>

If there is a SHARP fall in blood glucose insulin infusion rate MUST be reduced by 0.02- 0.04 U/kg/hr or halved if the drop is significant.
INSULIN HYPERGLYCAEMIA cont

2. HYPERKALEAMIA  
   see separate protocol

3. NEONATAL DIABETES  0.02-0.12 U/kg/hr
   This rare condition which presents with acidosis, dehydration and hyperglycaemia (usually > 20mmol/l), but little ketosis responds to a very low dose insulin infusion.

ROUTE  
IV infusion

RECONSTITUTION  
Add 0.5ml of 100U/ml Actrapid HM insulin to 24.5ml of 5%dextrose to make a 2U/ml solution. 
FURTHER DILUTE the calculated insulin amount with 5%dextrose to make a total of 50ml solution that makes 0.1U/kg/hr = 1ml/hr. 
   The solution concentration can be doubled if > 1ml/hr infusion is required.

ADMINISTRATION  
1. Continuous IV infusion via same line as intravenous fluid therapy to be able to administer or cease both at the same time.

2. Before commencing infusion, prime the line with 20ml of prepared solution to saturate the plastic binding sites.  
3. Change solution and tubing every 48 hours with TPN.

4. **DO NOT INFUSE THE INSULIN SOLUTION THROUGH AN IN-LINE FILTER!**

5. Run the infusion as extra to maintenance fluids.

6. Administer IV bolus medication via separate IV access to avoid insulin bolus administration.

STORAGE  
Store in refrigerator protected from light.  
Discard unused portion after 30 days.

MONITORING  
1. Blood glucose estimation 1-2 hourly until stable, then 6 hourly.  If alteration is made to the insulin infusion rate, blood glucose MUST be repeated within 1 hour.

2. Urinalysis 4 hourly.

3. Signs of hypoglycaemia.

4. UEC.

ADVERSE EFFECTS  
1. Hypoglycaemia causing coma or severe CNS injury.

2. Hypokalaemia

3. Hyponatraemia

4. Rebound hyperglycaemia

5. Urticaria and anaphylaxis (extremely rare)

6. Insulin resistance may develop resulting in a larger dose requirement

COMPATIBLE FLUIDS  
Dextrose, 0.9% and 0.45% sodium chloride
INSULIN HYPERGLYCAEMIA cont

INCOMPATIBILITY  aminophylline, dopamine, chlorthiazide, lignocaine, nafcillin, phenobarbitalone, phenytoin, sodium bicarbonate.

TERMINAL INJECTION SITE COMPATIBILITY  amino acid and fat emulsion, amiodarone, ampicillin, aztreonam, dobutamine, cefazolin, cefotaxime, cimetidine, digoxin, esmolol, famotidine, gentamicin, heparin, hydrocortisone, imipenem, indomethacin, meropenem, metoclopramide, midazolam, milrinone, morphine, nitroglycerine, pentobarbital, potassium chloride, propofol, ranitidine, sodium nitroprusside, ticarcillin, tobramycin, vancomycin.

REFERENCES