1.0 PURPOSE AND INTENT:

1.1 To provide guidelines for the management of hyperglycemia including initiation and maintenance of insulin infusion and monitoring of blood glucose levels.

2.0 PRACTICE OUTCOME

2.1 To reduce the risk of intracranial hemorrhage, death, late onset bacterial and fungal infections, retinopathy of prematurity, necrotizing enterocolitis, bronchopulmonary dysplasia and increased length of stay associated with hyperglycemia. The goal is to have the blood glucose 4-6 mmol/L within 6-18 hours.

Note: All recommendations are approximate guidelines only and practitioners must take into account individual patient characteristics and situation. Concerns regarding appropriate treatment must be discussed with the attending neonatologist.

3.0 DEFINITIONS

3.1 Normal Blood Glucose: 2.6 – 7 mmol/L

3.2 Normal glucose requirements: for growth and to prevent hypoglycemia:
- 5 – 8 mg/kg/min. (Term infant)
- 6-9 mg/kg/min (Preterm infant)

3.3 Glucose level: plasma or whole blood glucose level, measured in mmol/L regardless of method of measurement (for example, central sample or point of care).

4.0 GUIDELINES

4.1 Consider starting insulin treatment when blood glucose level > 8. If blood glucose level is > 10 mmol/L
- Check urine for glucose. (Very low birth weight infants may have a lower renal threshold for glucose and are at an increased risk of osmotic diuresis related to hyperglycemia so checking for glycosuria at a lower glucose level may be prudent in these infants)
- Document the glucose intake in mg/kg/min.
- Draw a lab sample to confirm hyperglycemia, but do not delay treatment.

4.2 Consider decreasing glucose infusion rate and/or concentration. If the glucose intake cannot be decreased consider the introduction of insulin if the blood glucose level is
1. Persistently (minimum of 2 samples 4 hours apart) ≥ 11.1 mmol/L, or
2. Persistently (minimum of 2 samples 4 hours apart) ≥ 10 mmol/L with persistent (2 samples) glycosuria and failure to thrive.

4.3 Initiate insulin infusion according to the table below. Insulin boluses are not recommended.

<table>
<thead>
<tr>
<th>Blood Glucose</th>
<th>Insulin infusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-10</td>
<td>0.02 units/kg/hour</td>
</tr>
<tr>
<td>&gt; 10 ≤12 mmol/L plus glucose in urine</td>
<td>0.04 units/kg/hour</td>
</tr>
<tr>
<td>&gt; 12 ≤16 mmol/L</td>
<td>0.06 units/kg/hour</td>
</tr>
<tr>
<td>&gt; 16 mmol/L</td>
<td>0.1 units/kg/hour</td>
</tr>
</tbody>
</table>
For further guidance on insulin administration see:
- HSC Pediatric Parenteral Drug Manual Insulin Monograph
- SBH Parenteral Drug Insulin Monograph
- SBH Medication Administration Policy
- WRHA High Alert Medications Policy

Titrate insulin according to the table below. The goal is to keep blood glucose between 6 -10 mmol/L while the infant is on an insulin infusion. This goal should be achieved 6-18 hours after the initiation of the therapy.

<table>
<thead>
<tr>
<th>Glucose</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;10 mmol/L</td>
<td>Repeat in 1 hour</td>
</tr>
<tr>
<td>&gt;10 mmol/L on repeat test</td>
<td>Increase insulin by 30% or 0.01 - u/kg/hr, whichever is greater</td>
</tr>
<tr>
<td>&lt;6 mmol/L</td>
<td>Repeat in 1 hour</td>
</tr>
<tr>
<td>&lt;6 mmol/L on repeat test</td>
<td>Decrease insulin by 30% or 0.01 u/kg/hr, whichever is greater</td>
</tr>
<tr>
<td>&lt;4 mmol/L</td>
<td>Discontinue insulin and repeat blood glucose in 15-30 minutes</td>
</tr>
<tr>
<td>6-10 on same insulin rate over 24-48 hours</td>
<td>Attempt insulin wean: Decrease insulin every 4-8 hours by 0.01 u/kg/hr</td>
</tr>
</tbody>
</table>

After initiation and any change in insulin infusion check blood glucose:
- Q1 - 2h x 3 then a minimum of q4 h while on insulin infusion.

5.0 PRIMARY AUTHORS
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6.0 REFERENCES