Hutt Maternity Policies provide guidance for the midwives and medical staff working in Hutt Maternity Services. Please discuss policies relevant to your care with your Lead Maternity Carer.

**Purpose:**

The purpose of this document is to describe the prevention and management of neonatal hypoglycaemia at Hutt Hospital.

**Scope:**

This policy applies to all medical, nursing and midwifery staff caring for newborn infants at Hutt Hospital.

For the purposes of this document, staff will refer to:

All staff within Hutt Valley DHB. This includes staff not working in direct contact with patients/consumers. Staff are taken to include anyone engaged in working to the Hutt Valley DHB. This may include but is not limited to:

- Employees irrespective of their length of service
- Agency workers
- Self-employed workers
- Volunteers
- Consultants
- Third party service providers, and any other individual or suppliers working in Hutt Maternity, including Lead Maternity Carers, personnel affiliated with third parties, contractors, temporary workers and volunteers
- Students

**Definitions:**

- SGA: Small for gestational age (less than 10th centile)
- LGA: Large for gestational age (greater than 95th centile)
- Hypoglycaemia: Blood glucose <2.6mmol/L

**Roles and Responsibilities:**

It is the responsibility of all medical, nursing and midwifery staff caring for infants at Hutt Hospital to ensure that infants at risk of hypoglycaemia are screened appropriately, and then treated as required.
Guideline

1. HYPOGLYCAEMIA IN INFANTS

Hypoglycaemia in infants is defined as a blood glucose < 2.6 mmol/L. Glucose is an essential nutrient for the brain, and low levels of glucose may cause cerebral injury and neurodevelopmental delay. Current evidence suggests that repeated blood sugar values < 2.6 mmol/l may be associated with long term neuro-cognitive deficits.1-3 Hypoglycaemia is common, with as many as half of those identified as being at risk becoming hypoglycaemic.4-5

Refer to the NOC NEWS chart for identification of newborns at risk of hypoglycaemia.

2. MEASUREMENT OF BLOOD GLUCOSE

- Use a heel prick sample unless the baby has a badly bruised heel
- Use the glucometer, or ideally the blood gas analyser in SCBU.
- If the blood glucose is <2.0mmol/L, a venous blood sample needs to be sent to the lab (but do not wait for result before starting treatment).

3. HIGH RISK INFANTS

Infants at risk of hypoglycaemia include:

- Infant of diabetic mother
- Small for gestational age (SGA) <10th centile on customised centile chart 6 as per ‘GROW’ chart
- Large for gestational age (LGA) >95th centile on customised centile chart
- If customised charts not available, all infants <10th centile or >95th centile for gestation on standard centile charts*
- If standard centile charts not available, all term infants with a birth weight < 2.8kg or > 4.5kg.
- Preterm Infants (<37 weeks gestation)
- Stressed infants with
  - Perinatal asphyxia (5 minute APGAR <7)
  - Traumatic delivery
  - Respiratory distress or sepsis
  - Hypothermia, temperature <36.6°C

* (the centile determination for “small” and “large” needs to be pragmatic. For growth charts showing the 9th and 98th centiles, these are the appropriate thresholds to use.)

SGA: Note that some significantly growth restricted infants are above the 10th percentile; if the infant appears very thin and dysmature then treat as SGA.

4. SYMPTOMS OF HYPOGLYCAEMIA

- Jitteriness
- Irritability
- Lethargy
- Hypotonia
- Apnoea or cyanosis
- Poor feeding
- Seizures
- Hypothermia
- Temperature instability
- Poor/inadequate suck
Admit to SCBU the following infants
- Infants <35 weeks
- Birth weight <2.3kg
- *Consider* admitting babies of mothers requiring insulin in pregnancy combined with one or more of the following additional risk factors:
  1. Prematurity <37 weeks
  2. Perinatal asphyxia (e.g. 5 minute Apgar score ≤7)
  3. Small for gestational age
  4. Large for gestational age

5. WHEN TO MONITOR
1. All high risk infants (see above) should receive milk feeds, either breastfeed or formula – maternal preference (or intravenous dextrose if unable to give an oral milk feed) as soon as feasible, ideally within first 1 hour of life.
2. Check blood glucose 1 hour after first feed (< 2 hours of age).
3. Monitor glucose 3-hourly, pre-feeds
4. Stop monitoring once feeding well and has 3 consecutive blood glucose ≥2.6mmol/L

Note: If the baby has symptoms of hypoglycaemia (see 4.), check the blood glucose before the above recommended times.
- Maintain baby’s temperature at 36.6 – 37.0°C
- Inform the paediatrics SHO/registrar of any blood glucose < 2.6mmol/L. This scores a 2 on the NOC NEWS chart and requires treatment (see 6.) and Paediatric review within 30 minutes. Use the escalation pathway on the NOC NEWS chart.
6. INITIAL MANAGEMENT OF HYPOGLYCAEMIA

1. **INITIAL BLOOD GLUCOSE 2 - 2.5mmol/L**
   **AND ASYMPTOMATIC**

   If tolerating oral feeds
   
   Give 0.5mL/kg oral 40% dextrose gel AND
   Give **supervised** breast feed / EBM or formula - initially 5mL/kg feed, aiming to increase to 60 mL/kg/day.

   If not tolerating oral feeds
   
   **Admit to SCBU.**
   Give 0.5mL/kg oral 40% dextrose gel and insert IV line.
   Give 10% dextrose at 60mL/kg/day.
   (See next protocol).

2. Recheck blood glucose in 30-60 minutes

   Blood glucose ≥2.6mmol/L
   
   Give 0.5mL/kg oral 40% dextrose gel.
   Give supervised breast feed/EBM/formula feed at 60mL/kg/day every 3 hours.

   Blood glucose 2.0 - 2.5mmol/L
   
   Give 0.5mL/kg oral 40% dextrose gel AND
   Give supervised breast feed/EBM or formula feed initially 5ml/kg feed, aiming to increase to 60 ml/kg/day.

   Blood glucose < 2.0mmol/L
   
   (Check on blood gas analyser)

3. Recheck blood glucose in 30-60 minutes

   Blood glucose ≥ 2.6mmol/L
   
   Continue 3 hourly feeds.
   Check pre-feed blood glucose.
   If 3 consecutive blood glucose ≥2.6mmol/L then stop monitoring.

   Blood glucose < 2.6 mmol/L
   
   **Admit to SCBU.**
   Give 0.5mL/kg oral 40% dextrose gel and insert IV line.
   Give 10% dextrose @ 60mL/kg/day.
   (See next protocol).
Do not increase oral feeds >100mls/kg/day in the first 24 hours. Feeding with low birth weight formula in order to maintain blood sugars is discouraged.

See Appendix 1 for standing orders for how to give dextrose gel.
7. SCBU MANAGEMENT OF PERSISTENTLY LOW BLOOD GLUCOSE

Once the baby is on intravenous dextrose, calculate the mg/kg/min of glucose being administered:

\[
\text{mg/kg/min} = \frac{\% \text{ dextrose} \times \text{rate (ml/hr)}}{\text{weight} \times 6}
\]

- The initial intravenous dextrose infusion should deliver 6-8 mg/kg/min to be effective.
- The glucose can be increased to 12mg/kg/min, but a more concentrated glucose solution may be required to achieve the higher rate.
- If >10mg/kg/min of IV glucose is required, perform the investigations detailed below.

**Increasing the dextrose concentration**

If the infant is fluid restricted or already on 105mls/kg/day of IV fluid in the first 24 hours, the dextrose concentration may require to be increased to deliver sufficient mg/kg/min:

- A dextrose concentrations >12.5% requires a central line (UVC or longline).

Note: The percentage of dextrose in a bag = the number of grams of dextrose per 100ml e.g. 10% dextrose contains 10g of dextrose in 100ml water for injection

**Preparation using a burette:**

Intravenous fluids are to be prepared and administered aseptically and administered to the patient directly following preparation. **Please double check all calculations**

1. Ensure solution of 50% dextrose vial is clear and free of any particulate matter
2. Withdraw the required volume of 50% dextrose and add to the required volume of 10% dextrose in the burette to create a final total volume of 100ml.

See table below:

<table>
<thead>
<tr>
<th>Dextrose Concentration</th>
<th>12%</th>
<th>14%</th>
<th>16%</th>
<th>18%</th>
<th>20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dextrose 50%</td>
<td>5ml</td>
<td>10ml</td>
<td>15ml</td>
<td>20ml</td>
<td>25ml</td>
</tr>
<tr>
<td>Dextrose 10%</td>
<td>95ml</td>
<td>90ml</td>
<td>85ml</td>
<td>80ml</td>
<td>75ml</td>
</tr>
</tbody>
</table>

Note: Due to the inaccuracy of measurement on a burette (10% deficit), safe practice is to measure the amounts required of each fluid into a syringe before adding to the burette.

If concentrations of greater than 12% dextrose are required, the fluid must NOT go through a peripheral intravenous line or UAC.
Preparation using a syringe:

Intravenous fluids are to be prepared and administered aseptically and administered to the patient directly following preparation. **Please double check all calculations**

1. Ensure solution of 50% dextrose vial is clear and free of any particulate matter
2. Withdraw the required volume of 50% dextrose into the syringe then draw up required volume of 10% dextrose to create a final total volume of 50ml.

*See table below:*

<table>
<thead>
<tr>
<th>Dextrose Concentration</th>
<th>12%</th>
<th>14%</th>
<th>16%</th>
<th>18%</th>
<th>20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dextrose 50%</td>
<td>2.5ml</td>
<td>5ml</td>
<td>7.5ml</td>
<td>10ml</td>
<td>12.5ml</td>
</tr>
<tr>
<td>Dextrose 10%</td>
<td>47.5ml</td>
<td>45ml</td>
<td>42.5ml</td>
<td>40ml</td>
<td>37.5ml</td>
</tr>
</tbody>
</table>

**Avoid using repeated boluses** of IV dextrose to avoid rebound hypoglycaemia. Rather increase the rate of IV dextrose administration.

**Continue some oral feeding if possible** e.g. 25mls/kg/day

**If persistent severe hypoglycaemia** or requiring > 10mg/kg/min of IV glucose, investigate further.

The following investigations should be taken during an episode of hypoglycaemia:

- Blood glucose (venous sample to be sent to lab)
- Blood and urinary ketones [Ketostix]
- pH + lactate [capillary gas]
- Insulin + Free fatty acids [2 x EDTA on ice]
- Growth hormone [red top]
- Cortisol [red top]
- Carnitine [Guthrie card circle x 1]
- Urine reducing substances, urine amino acids and organic acids [1st urine passed]

Other bloods to be done at some stage: Ammonia, Thyroid function tests, serum amino acids.

Continue monitoring blood glucose every 30mins until ≥2.6mmol. Further monitoring is dependent on the clinical situation.

Once IV fluids have been stopped 3 consecutive blood glucose ≥2.6 mmol/L are required before monitoring is discontinued.
8. HYPERINSULINISM

Infants with hypoglycaemia due to hyperinsulinism (infant of a diabetic mother requiring insulin during pregnancy or some SGA infants) may need >10mg/kg/min of glucose.

- Initially start with 6-8mg/kg/min (the maximum rate is 12mg/kg/min)
- Use glucagon early if the infant is needing >10mg/kg/min IV glucose. The dose is
  - 300mcg/kg (0.3mg/kg) IV or IM if not SGA
  - 200mcg/kg (0.2mg/kg) IV or IM if SGA
- If 12mg/kg/min IV glucose is required and glucagon has been given, use hydrocortisone 5mg/kg/day in 4 divided doses

Infants with hyperinsulinism may require transfer to a tertiary unit.
In some babies, diazoxide and somatostatin infusions may be required.

Implementation and monitoring compliance

- One important measurement to ensure this protocol is adhered to, and for the safety of infants, is to check that all three consecutive pre-feed BSLs are checked, and are ≥ 2.6mmol/L. This could be audited by a notes review looking the recording of three BSLs ≥ 2.6mmol/L.
- The addition of dextrose gel to the neonatal hypoglycaemia protocol may prevent some admissions of infants to SCBU.
- NOC NEWS charts are subject to audit as per the Health Quality & Safety Commission recommendations and are accountable to the HVDHB EWS Governance Group.

Related Documents:

- HVDHB NOC NEWS Chart

Keywords for searching:

- Hypoglycaemia
- Newborn
- Neonatal
- MATY104

Informed Consent:

The right of a consumer to make an informed choice and give informed consent, including the right to refuse medical treatment, is enshrined in law and in the Code of Health and Disability Consumers’ Rights in New Zealand. This means that a woman can choose to decline treatment, referral to another practitioner, or transfer of clinical responsibility. If this occurs follow the process map on page 18 of the Referral Guidelines (Ministry of Health, 2012).
Tangata Whenua Statement:

The Women’s Health Service recognises the rights and responsibilities of Māori as tangata whenua and Treaty Partners. This allows and acknowledges the importance of cultural diversity in all aspects of our care and practice in Aotearoa New Zealand.

As stated in Te Pae Amorangi (Hutt Valley DHB Māori Health Strategy) 2018-2027, Hutt DHB as a Crown agency is committed to our role in maintaining active relationships with iwi, under Te Tiriti o Waitangi. This strategy recognises the established principles of Partnership, Participation and Protection and recognises steps towards the reviewed interpretation of Te Tiriti principles to date (from the Wai 2575 claim into health). These are tino rangatiratanga, equity, active protection, partnership and options.

Attention in particular is drawn to:

- **Article one – Kāwanatanga**: actively engaging and working alongside with local iwi through the Hutt Valley Māori Health Unit
- **Article two – Tino Rangatiratanga**: Self-autonomy, self-determination; the responsibility to enable Māori to exercise their authority over their own health, determinants and definition of health
- **Article three – Ōritetanga**: equal health outcomes of peoples; ensuring that policy, guidelines or programmes do not further perpetuate any inequity
- **Article four (the ‘oral clause’) – Wairuatanga**: spirituality; thriving as Māori and the importance of health providers understanding health in te ao Māori (the Māori world), acknowledging the interconnectedness and inter-relationship of all living and non-living things.

- **Appendices:**
  
  Appendix 1. Dextrose gel treatment protocol

**References:**

6. [http://www.gestation.net/cc/3/172546.htm](http://www.gestation.net/cc/3/172546.htm)
Appendix 1

40% DEXTROSE GEL
FOR HYPOGLYCAEMIA

INDICATIONS: Infants with Hypoglycaemia
(Whole blood glucose <2.6 mmol/L)

METHOD: 1. Draw up 0.5 mL/kg of 40% Dextrose Gel into 2 ml syringe.
          2. Dry infant's buccal mucosa with gauze swab.
          3. Place 40% Dextrose Gel on your gloved finger and massage into infant's buccal mucosa.
          4. Check blood sugar level 30-60 minutes after administration of 40% Dextrose Gel and feeding, as per flow chart.
          5. Continue to give feeds as charted, as tolerated.
          6. Inform and explain to parents.

CAUTIONS: Infants who are unconscious or experiencing hypoglycaemic seizures should receive an urgent bolus of Dextrose IV or Glucagon IM, as prescribed by medical staff. However, dextrose gel can be administered while venous access is gained.

N.B. - 40% Dextrose Gel may be given immediately by midwifery, nursing or medical staff. It should be recorded on the infant's record sheet and Stat Prescription Sheet.

Under Section 29 of the Medicines Act it is a legal requirement to supply details of administration. It is important to record the administration on the Stat Prescription Sheet (to advise pharmacist for ordering purposes), and on form titled “Medicines Supplied Under Section 29 of the Medicines Act for Named Patient.”