

SCOPE: Maternity and Neonatal Unit**GUIDELINE: Management of infants AT RISK of hypoglycaemia or with hypoglycaemia of the newborn infant****AUTHOR:** NNU Quality Coordinator and Dr Stanley Ng**PURPOSE:**

To provide safe and effective management for infants at risk of – or who develop – hypoglycaemia

DEFINITIONS:

Glucose is an essential nutrient for the brain. Abnormally low levels can cause long term neurological developmental impairment.

There is controversy over the definition of a 'safe' blood glucose concentration. The WHO recommends that blood sugar concentrations should be maintained at **2.6mmol/L or above** in newborns at risk of hypoglycaemia.

GUIDELINE

Symptomatic hypoglycaemia does not **usually** occur in well, full term babies. The physiological dip in blood glucose is compensated by the production of ketones which are used as a fuel for metabolism. However, if the baby is not feeding adequately the ability to generate ketones will be eventually exhausted and the baby will become at risk of hypoglycaemia.

For all babies, the aim should be to ensure that needs are met as far as possible by breast feeding, or by using expressed colostrum/breast milk (EBM). Exclusive breast feeding optimises health outcomes. Also it appears that breast milk may enhance the baby's ability to counter-regulate whereas large volumes of infant formula suppress this ability.

It is essential that planning and evaluation of observations and management of the infant at risk of hypoglycaemia are recorded.

The greatest risk of hypoglycaemia is in the first few hours of life. After 24 hours of life control has usually stabilised.

Pre-term infants (<37+0 weeks gestational age) are at greater risk than term infants for neurological developmental impairment due to hypoglycaemia.

Infants at risk of hypoglycaemia include:

- Infants of diabetic mothers (see separate guideline)
- Infants who are small for gestational age (<10th centile on a Customised Birth Weight Centile [BWC] calculation)
- Infants who are large for gestational age (i.e. >95th centile by Customised BWC calculation) and **possibility of diabetes in pregnancy has not been excluded**; OR: if BWC cannot be calculated infants who weigh more than 4500gms and the **possibility of diabetes in pregnancy has not been excluded**. Preterm infants (<37+0 weeks gestational age)
- Others at risk include neonates exposed to:
 - Hypothermia

- Stressed infants i.e. those with birth asphyxia (low Apgar scores and/or abnormal blood gases), sepsis, haemolytic disease, respiratory distress or congenital heart disease
- Maternal medications – Beta Blockers eg Labetalol and SSRI Anti depressives (Selective Serotonin Reuptake Inhibitors)

CLINICAL SIGNS AND SYMPTOMS OF HYPOGLYCAEMIA

NB Half of hypoglycaemic infants are asymptomatic

- Irritability, tremors or jitters. *Jitteriness is excessive repetitive movements of one or more limbs which are unprovoked and usually relatively fast. It is important to be sure that this movement is not simply a response to stimuli.*
- Exaggerated Moro reflex
- High pitched cry
- Lethargy, limpness, hypo tonus
- Apnoea or irregular breathing
- Cyanosis
- Hypothermia, temperature instability
- Poor or inadequate sucking reflex
- Seizures

ASSESSMENT OF THE BABY

Frequent monitoring of the baby's well being is essential. The baby should be assessed prior to feeds and at least 3 hourly for the following:

- *Level of consciousness*
- *Tone*
- *Temperature*
- *Respirations*
- *Colour/perfusion*

Observations (including the BSL) should be recorded in the baby's MCIS record under "general observations – daily". Staff should consider initiating a paper observations/feeding chart as well.

MANAGEMENT OF ALL INFANTS AT RISK OF HYPOGLYCAEMIA OF THE NEWBORN

1. Skin to skin care will help baby achieve early respiratory and thermal stability and will enhance successful breast feeding (see *Hauora Tairāwhiti Breast feeding Policy*).
2. Encourage the baby to feed in the first hour of life and thereafter at least 3 hourly.
3. All infants at risk of hypoglycaemia should have had an initial feed by 3 hours of age.
4. If the infant is pre-term (<37+0 weeks gestation), discuss the management plan with the neonatal service and document in the clinical notes.
5. **All infants at risk of hypoglycaemia will be assessed and have observations of temperature and respirations recorded hourly for the first 3 hours and subsequently 3 hourly and charted for at least 24 hours.**
6. **If the baby is unwell** or has any clinical signs and symptoms of hypoglycaemia, the blood glucose should be measured immediately and the baby referred to the neonatal service.

7. Appropriate management for infants to avoid environmental temperature instability [temperature <36.5 degrees C or >37.5 degrees C] is vital. Maintenance of body temperature reduces energy demands that contribute to hypoglycaemia.
8. If the baby is not interested in feeding, **be proactive, keep baby warm, encourage skin to skin contact and expressing**. Any EBM will be given to the baby.
9. If the mother has chosen to exclusively formula feed, the baby should be formula fed in the first hour of life and thereafter 2-3 hourly approximately 60 mls/kg/day with her choice of formula (see *formula feeding guideline*).
10. **Monitor blood glucose after 2 hours of age and prior to the second feed. All babies at risk of hypoglycaemia should have blood glucose testing by 4 hours of age.** Bed side testing is performed with the Hemocue monitor. It is important to ensure that the foot is warm and the first drop of blood is wiped away prior to sampling. This acts as a screening device. If the test result is displayed as "LO" the blood glucose level may be lower than 1.1 mmol/L. *If required I-Stat machine samples are collected in capillary tubes. Blood glucose samples to be processed in the laboratory are collected in a gold top SST Microtainer.*
11. **Continue to monitor the blood sugar 3 hourly prior to feeds until the level is 2.6mmol/L or above three times and the baby is asymptomatic and feeding.**
12. If the level is less than 2.6mmol/L at any stage see below.
13. Infants at risk of hypoglycaemia should **not** be discharged until they are feeding well and their condition is stable.

MANAGEMENT OF INFANTS WITH BLOOD GLUCOSE LESS THAN 2.6mmol/L

1. The management of hypoglycaemia will depend on the clinical condition of the baby and the severity of the hypoglycaemia.
2. If the baby is unwell or has symptoms of hypoglycaemia he/she should be referred **promptly** to the neonatal service for further management.
3. Very low blood sugar levels below **1.2mmol/L** require immediate referral to the neonatal service and may require treatment with IV Glucose infusion; 40% Dextrose gel may be given while waiting for review with the goal of raising blood glucose levels to 2.6mmol/L. A laboratory sample or I-Stat sample may be taken but instigation of treatment will not be delayed whilst awaiting results.
4. If the Hemocue blood glucose level is less than 2.6mmol/L and the baby is asymptomatic, give the baby 0.5ml/kg 40% Dextrose Gel and proactively support feeding then recheck BSL in 30 minutes (as per Appendix 2 *Flow chart for management of Neonatal Hypoglycaemia 2019*). If the baby remains asymptomatic and blood glucose improves to 2.6mmol/L or more, observe the baby closely and recheck blood glucose prior to next feed/in 3 hours. **(n.b. Dextrose Gel is a short-term treatment for hypoglycaemia until a definitive plan for feeding +/- supplementation is established).**

- a. If a baby's blood sugar is $<2.6\text{mmol/L}$ requiring 2 doses of Dextrose Gel despite attempts at feeding, it shows a need to escalate feeding to ensure adequate caloric intake even if baby is asymptomatic.
 - b. A **Feeding Chart** should be started to record time at the breast and/or amounts of supplementation and Dextrose Gel given.
 - c. Breast feeding infants who require Dextrose Gel should receive usual care and support to optimise feeding. Supplemental feeding with expressed breastmilk/colostrum should still be considered. If there is no expressed milk available, caregivers should be consulted regarding a short period of formula supplementation while baby is at risk of further hypoglycaemia until breastfeeding has been established.
 - d. Similarly, if baby's blood sugar is $<2.6\text{mmol/L}$ following Dextrose Gel and receiving supplemental expressed breastmilk/colostrum, caregivers should be consulted regarding use of formula as a bridging measure to ensure normoglycaemia until breastfeeding is established .
5. If still hypoglycaemic repeat the 40% Dextrose Gel and recheck the blood sugar level after a further 30 minutes. **Feeding Regimens must be reviewed and escalated if blood sugars continue to require treatment.** If the Blood glucose is 2.6 mmol/L or more continue routine care and repeat blood glucose measurements 3 hourly prior to feeds for at least 12 hours after last low level and the baby is feeding well. **The aim is that the baby maintains pre-feed blood glucose levels and does not revert to low levels prior to each feed.**
 6. If the Hemocue monitor blood glucose is **2.0-2.5mmol/L after the second treatment** with oral dextrose gel, the baby should be given supplementary feeding of EBM or Formula (medically indicated) and following consultation and informed verbal consent from the mother or assessed by the neonatal service.
 7. If a baby has had 2 doses of Dextrose Gel and been fed and blood glucose remains less than 2.0mmol/L refer to paediatrician and consider a further dose of Dextrose gel while arranging admission to NNU
 8. When baby's pre-feed blood sugars are stable ($>2.6\text{mmol/L}$) for three consecutive feeds then no further blood sugar checks need to be done provided the feeding regimen remains the same. If the feeding regimen is altered (e.g. reduction or stopping of top-ups) then blood sugar monitoring should be restarted and should continue until three satisfactory levels are obtained. With any subsequent change in the feeding regimen blood sugar levels should be rechecked.

Management of hypoglycaemia may include IV Glucose 10%. A bolus of 2 mls/kg IV Glucose 10% may be ordered if blood glucose $<1.2\text{mmol/L}$.

Blood glucose will be rechecked one hour after instigating IV management, and frequency of testing reduced when the blood glucose is stable.

If there are any concerns about the baby consult with the NNU nurse or a paediatrician for advice.

ASSOCIATED DOCUMENTS

Women, Child and Youth Guideline – Formula Feeding
Women, Child and Youth Guideline – Referral of inpatient neonates to paediatric service
Organisational Policy – Breastfeeding
Procedure: Heel stick blood sampling for blood glucose testing
Women, Child and Youth Guideline – Supplementing the breast fed infant
Weight percentile charts

APPENDICES

1. Standing order for 40% Oral Dextrose gel
2. Flow chart for management of hypoglycaemia of the newborn 2019

REFERENCES

UNICEF Guidance on development of policies and guidelines for the prevention and management of Hypoglycaemia of the newborn. December 2007

www.babyfriendly.org.uk/pdfs/hypo policy

Oral Dextrose Gel to treat Neonatal Hypoglycaemia Flow Chart and Guidelines 2015 University of Auckland

Hypoglycaemia in the neonate – Clinical Guideline, Starship. www.starship.org.nz

WHO/UNICEF. Baby – Friendly Hospital Initiative. Part II. Hospital level implementation.1992. Acceptable medical reasons for supplementation.

WHO Hypoglycaemia of the Newborn. Review of Literature. 1997

Approved By

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APPENDIX 1**STANDING ORDER FOR 40% DEXTROSE GEL FOR TREATMENT OF NEONATAL HYPOGLYCAEMIA**

Oral 40% Dextrose Gel dose 0.5 ml/kg may be given in accordance with this guideline by nurses and midwives at Gisborne Maternity Unit.

Authorised by:

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APPENDIX 2 FLOW CHART FOR MANAGEMENT OF NEONATAL HYPOGLYCAEMIA 2019
