

# HYPOGLYCAEMIA OF THE NEWBORN

## INTRODUCTION

Healthy term infants are able to mobilise energy stores through a process known as counter regulation and are unlikely to suffer any ill effects if fed on demand in the first 24-48 hours. Some babies however are less able to mount this response and these babies are at greater risk of hypoglycaemia.

Regular assessment of all babies should occur, including assessment of feeding, regardless of risk factors. All assessments should be documented on the neonatal observation chart (C280106). This Guideline is intended for use in conjunction with the [Neonatal Clinical Resource \(Ref.237435\)](#).

Dextrose Gel has been shown to be better than feeding alone to reverse neonatal hypoglycaemia in babies from 35 weeks and under 48 hours old. This in turn reduces maternal infant separation by reduced admission to Neonatal Unit and encourages the establishment of breastfeeding.<sup>5,6</sup>

## BACKGROUND

Healthy term infants do not require routine monitoring of blood glucose but at risk babies need to be identified and monitored accordingly.

30% of New Zealand babies are born at risk<sup>1</sup> of these at-risk babies, 50% will develop low blood glucose.<sup>2</sup>

Neonatal hypoglycaemia is associated with brain injury and neurodevelopmental delay and death.<sup>3,4</sup>

## DEFINITIONS

- Pre-feed – If a baby has commenced a breastfeed, a measurement can be considered 'pre-feed' if it is taken within 15 minutes of the start of the feed.
- Data suggests that there may be sequelae from blood glucose < 2.6 mmol/L<sup>7</sup>, however, there is no clear consensus as to what threshold to use in treatment of hypoglycaemia. In a recent survey of all units in the Australia, New Zealand Neonatal Network < 2.6 mmol/L was used in all units and is the cut off used in a New Zealand collaboration of clinical practice guidelines on treatment of neonatal hypoglycaemia with oral dextrose gel.<sup>6,8</sup>

**If any baby shows symptoms that could be due to hypoglycaemia, a blood glucose should be measured immediately.**

## INFANTS AT RISK OF HYPOGLYCAEMIA

- Preterm < 37 weeks
- Small for gestational age < 9<sup>th</sup> percentile (on UK-WHO growth chart Ref.6505)
- Large for gestational age baby > 98<sup>th</sup> percentile (on UK-WHO growth chart Ref.6505)
- Baby of mother with diabetes
- Hypothermic baby
- Severe intrapartum foetal distress or lactate > 5.8 mmol/L
- Asymmetric growth in conjunction with either intrapartum fetal distress and/or meconium exposure.
- Unwell baby
- Sepsis

## SIGNS AND SYMPTOMS

Hypoglycaemia may be asymptomatic or symptomatic and both may result in adverse outcomes such as neurological impairment. Hypoglycaemia needs to be suspected and/or prevented and actively investigated and treated in any unwell baby.

General signs of hypoglycaemia may include:

- poor feeding
- sleepiness
- irritability

These babies require regular feeds, preferably breastmilk including expressed breastmilk (EBM) where available and monitoring of temperature regulation, including skin to skin contact.

**Further symptoms** which warrant close observation and calculation of a Newborn Early Warning Score (NEWS) on the neonatal observation chart (C280106) include:

- jitteriness
- tachypnoea
- hypothermia (not a sign of hypoglycaemia but associated)

Call the neonatal team for an **urgent review/retrieval** and admission to the neonatal intensive care unit (NICU) if baby presents with:

- blood glucose < 2.0 mmol/l
- altered level of consciousness
- cyanosis
- seizures
- apnoea
- abnormal tone

## MANAGEMENT

Care is to be provided on the postnatal ward or primary birthing unit initially unless the baby is symptomatic (see flow chart below), has a blood glucose  $<2.0$  mmol/L or is not responding to dextrose gel and feeds. Then refer and transfer to the neonatal unit. This management plan refers to all babies from 35 week's gestation and under 48 hours of age on the postnatal ward, birthing suite and primary birthing units.

Infants at risk of hypoglycaemia should be fed as soon as possible, preferably within the first hour. The first blood glucose is best checked pre-feed 3-4 hours after birth (this is to avoid the natural nadir in blood glucose prior to 3 hours of age). Combine with the repeat lactate measurement if this also needs to be repeated. If there are concerns about the adequacy of any feed or concerns about milk transfer (ie. swallows) then discuss with parents the option of either EBM, harvested colostrum, pasteurised donor breastmilk or infant formula. If formula is indicated, give 5-10 mLs/kg per feed and then re-assess response.

Prior to any administration of infant formula, ensure mothers have had lactation support including LMC/Midwife or lactation consultant and are regularly expressing. Ideally all babies should be skin to skin with their mother whilst feeding by any method.

The Accu-chek monitor is used for blood glucose measurement and is more accurate than previous devices at low levels. If there is any concern regarding the result and the baby is at Christchurch Women's Hospital (CWH), use the blood gas analyser as it is a more reliable measure. The Maternity Clinical Coordinators are able to process blood samples through the blood gas analyser to confirm hypoglycaemia prior to giving intravenous glucose. Do not delay treatment.

The following management plan is outlined in the flowchart in [Appendix 1](#)

- Infants at risk require feeds at least 3 hourly
- If blood glucose is 2.6 mmol/L or above the baby just requires blood glucose monitoring before the 3 hourly feeds until a total of 3 consecutive pre-feed measurements are 2.6 mmol/L or above.

### TREATMENT WITH DEXTROSE GEL 40%

- If blood glucose is between 2.0 mmol/L and 2.6 mmol/L on **first** testing:
  - Contact the neonatal team to discuss and then prescribe 0.5 ml/kg (200 mg/kg) of 40% dextrose gel via buccal mucosal route using the prepared sticker applied to the baby's Drug Treatment Sheet (QMR0004).

<b>DEXTROSE GEL 40%</b>	Massage into buccal mucosa if blood glucose $< 2.6$ mmol/L Ref.2310938
0.5 mL/kg = ..... mL	
Max. 6 doses in 48 hours	

eg. dose for a 3 kg baby is 0.5 mL x 3 = 1.5 mL gel

- Using non-sterile latex-free gloves, dry the baby's inner cheek (buccal mucosa) with sterile gauze and then administer small amounts of the dextrose gel with an oral syringe (orange plunger)
- Massage the dextrose gel into the buccal mucosa, preferably in the parent's presence to reduce separation. Parents may also apply the gel under staff supervision
- Ensure baby is fed, ideally breastmilk
- Recheck blood glucose 30 minutes after dextrose gel administration
- If blood glucose is between 2.0 mmol/L and 2.6 mmol/L on **subsequent** testing:
  - Contact neonatal team to review if at Christchurch Women's or retrieve if at a primary birthing unit
  - Administer dextrose gel as per prescription and directions above
  - Ensure baby is fed, ideally breastmilk
  - Recheck blood glucose 30 minutes after dextrose gel administration

## CONTACT NEONATAL TEAM TO REVIEW

Contact neonatal team to review/retrieve:

- If blood glucose is below 2.0 mmol/L at any stage
- If the blood glucose is < 2.6 mmol/L any time after the second feed
- If more than 4 doses of dextrose gel are required in 48 hours
- If post-feed blood glucose is 2.0-2.5 mmol/L
- If the clinical picture is of significant concern regardless of blood glucose

The desired outcome from this treatment is that the blood glucose is restored quickly to the normal range without disruption to the establishment of breast feeding and maternal-infant bonding.

Hypoglycaemia usually resolves in the first 24-48 hours depending on the cause.

Request neonatal daily review for babies at Christchurch Women's Hospital who develop hypoglycaemia (2.0-2.5 mmol/L) even if the post feed blood glucose improves according to the feeding protocol.

For babies in Midwifery Units, contact the Postnatal Ward NICU Registrar on pager 5039 to discuss the feeding and blood glucoses.

See Neonatal Drug profile for further details in [Appendix 3](#).

## DISCONTINUATION OF BLOOD GLUCOSE

- If any recording of blood glucose less than 2.6 mmol/L has occurred, the baby should be fed at least every 3 hours with pre-feed blood glucose monitoring until a total of 3 consecutive measurements are 2.6 mmol/L or above without top-ups or dextrose gel.
- If a baby has always had BSLs of 2.6 mmol/L or more and the feeding regime changes, ie. from breastfeeds with top-ups to fully breastfeeding a pre-feed blood glucose measurement is recommended 6-8 hours after the last top-up.

## DEXTROSE GEL FOR BABIES IN PRIMARY BIRTHING UNITS

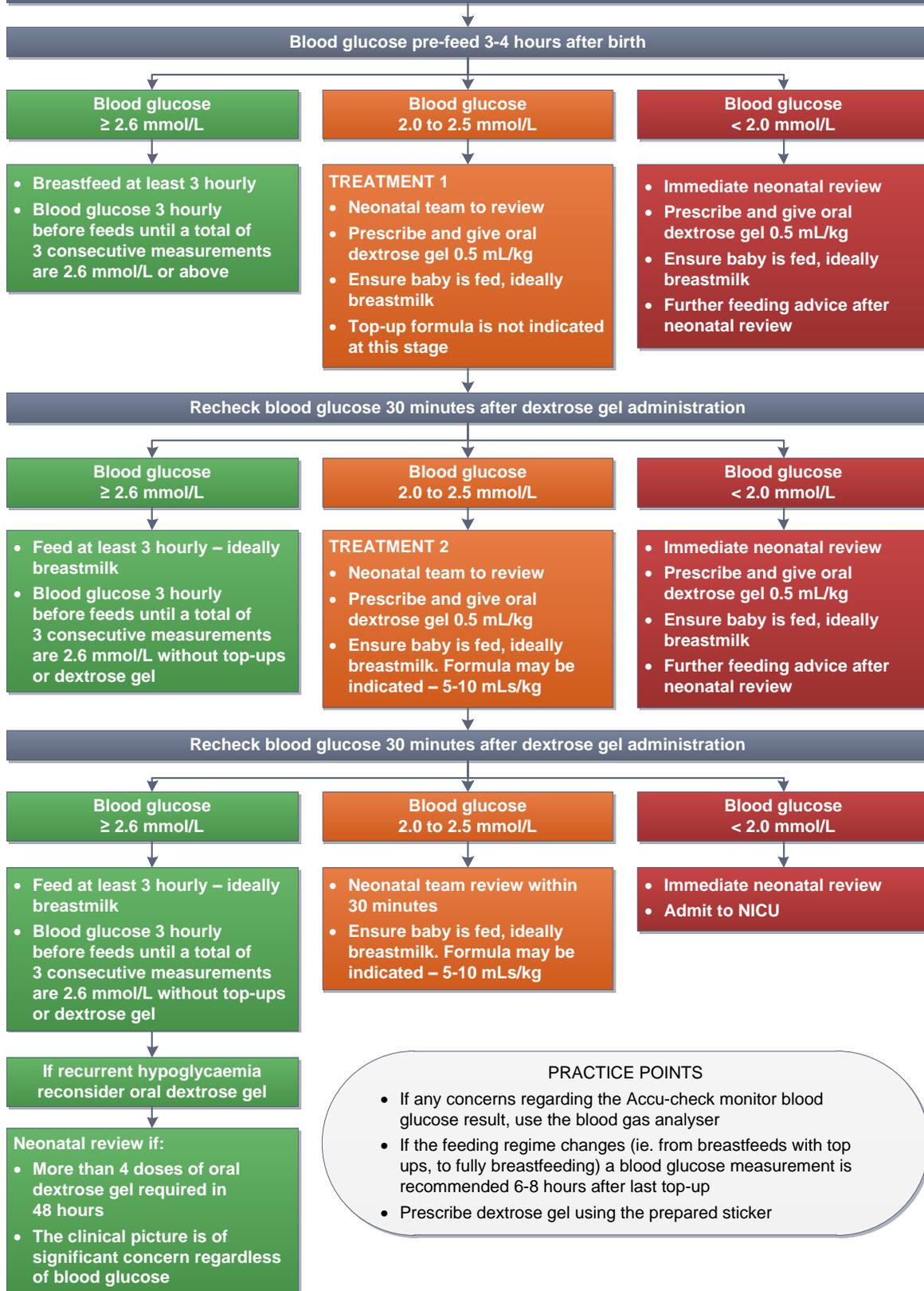
Refer to [Appendix 2](#) flowchart for Primary Birthing Units.

Request a Neonatal retrieval if the blood glucose is < 2.0 mmol/L at any time. Otherwise contact the Neonatal Team if the blood glucose is between 2.0-2.5 mmol/L to discuss management because if the blood glucose responds to dextrose gel and a feed then an immediate retrieval may not be necessary. However, if a second blood glucose is < 2.6 mmol/L then a retrieval needs to be initiated.

**APPENDIX 1 INFANTS AT RISK OF HYPOGLYCAEMIA**

**NOTE: Oral dextrose gel is used to treat neonatal hypoglycaemia  $\geq 35$  weeks and  $< 48$  hours after birth**

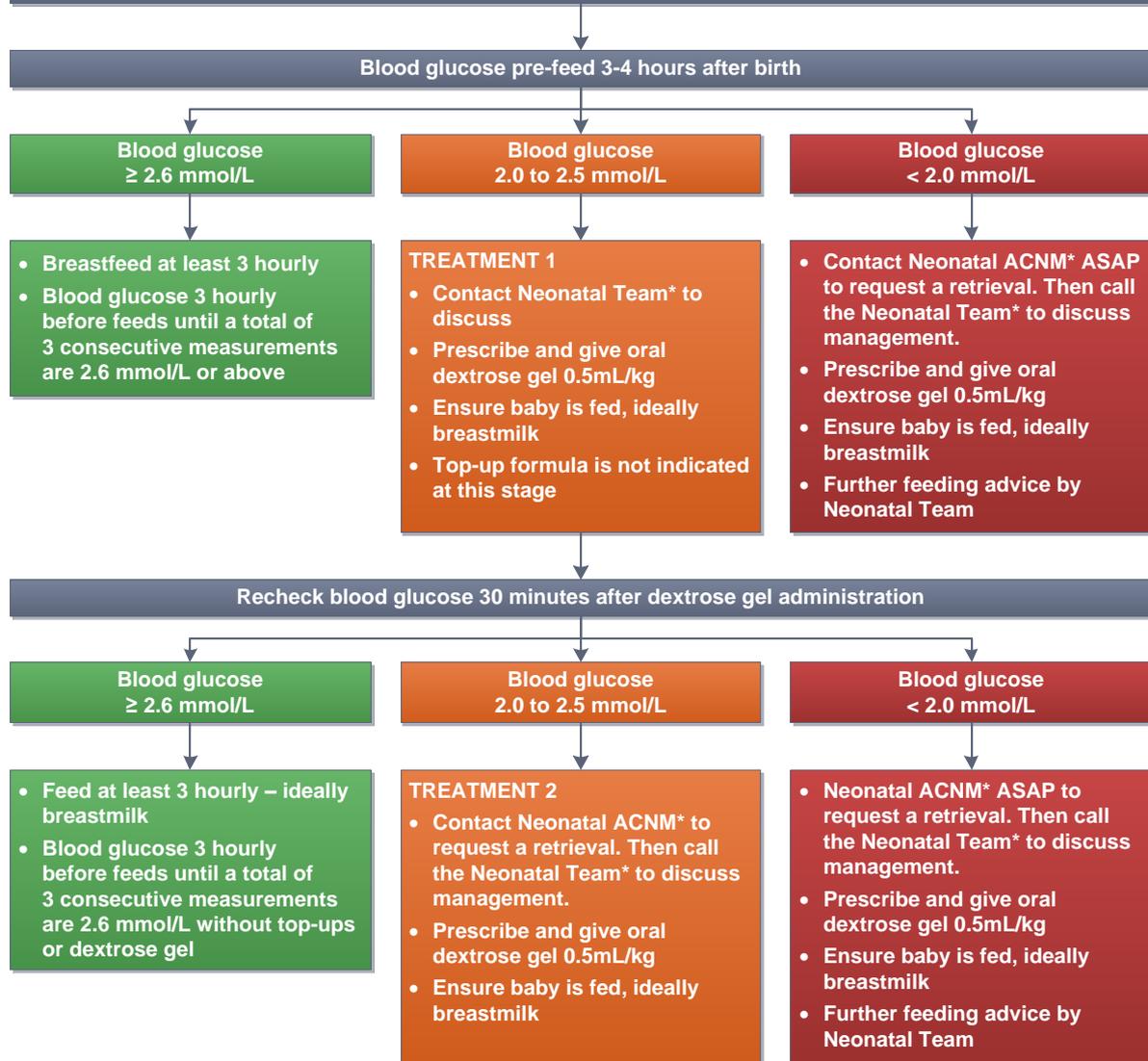
**FEED IN FIRST HOUR THEN AT LEAST 3 HOURLY, KEEP WARM INCLUDING SKIN TO SKIN**



## APPENDIX 2 INFANTS AT RISK OF HYPOGLYCAEMIA – PRIMARY UNITS

**NOTE: Oral dextrose gel is used to treat neonatal hypoglycaemia  $\geq 35$  weeks and  $< 48$  hours after birth**

**FEED IN FIRST HOUR THEN AT LEAST 3 HOURLY, KEEP WARM INCLUDING SKIN TO SKIN**



### PRACTICE POINTS

- If the feeding regime changes (ie. from breastfeeds with top ups, to fully breastfeeding) a blood glucose measurement is recommended 6-8 hours after last top-up
- Prescribe dextrose gel using the prepared sticker

\*Neonatal team: Reg/CNS/NNP pager 5039 Monday-Friday 0830-1630  
 pager 5019 Monday-Friday 1630-0830, weekends, public holidays  
 ACNM pager 5088  
 mobile 027 702 1652

### APPENDIX 3 DEXTROSE 40% (GLUCOSE)

<b>Trade name</b>	Dextrose 40% Gel
<b>Class</b>	Monosaccharide, Anti-hypoglycaemic agent
<b>Mechanism of action</b>	Dextrose gel is absorbed via the buccal mucosa and increases blood glucose
<b>Indications</b>	Management of hypoglycaemia in babies: <ul style="list-style-type: none"> <li>• for the first 48 h after birth</li> <li>• in conjunction with breastfeeding support and neonatal review</li> </ul>
<b>Contraindications</b>	Use with caution in patients with known or family history of hypersensitivity to corn/maize products.
<b>Supplied as</b>	Dextrose gel 40% (100 mL) BIOMED
<b>Dilution</b>	Do not dilute prior to administration
<b>Dosage</b>	0.5 mL/kg per dose
<b>Guardrail</b>	N/A
<b>Interval</b>	As per Neonatal Hypoglycaemia protocol
<b>Administration</b>	Massage the measured dose to a surface of the buccal mucosa previously dried with sterile gauze.
<b>Compatible with</b>	Do not mix with other medications
<b>Incompatible with</b>	Do not mix with other medications
<b>Interactions</b>	N/A
<b>Monitoring</b>	Monitor blood glucose as per Neonatal Hypoglycaemia protocol
<b>Stability</b>	Discard bottle 1 month after opening
<b>Storage</b>	Store at room temperature, protect from light
<b>Adverse reactions</b>	Adverse reactions to dextrose are rare Irritation of the gastrointestinal tract causing nausea and vomiting is possible. Avoid contact of gel with eyes as stinging /irritation will occur.
<b>Metabolism</b>	Onset of action 5-30 minutes
<b>Comments</b>	Dextrose gel is primarily for well babies on the postnatal ward to avoid admission to NICU and separation from their mother which may impact on the ability to establish breastfeeding
<b>References</b>	<ol style="list-style-type: none"> <li>1. <a href="http://www.waikatodhb.health.nz/assets/directory-of-our-services/waikids/sugar-babies/study-guide.pdf">http://www.waikatodhb.health.nz/assets/directory-of-our-services/waikids/sugar-babies/study-guide.pdf</a></li> <li>2. <a href="http://www.ncbi.nlm.nih.gov/pubmed/24075361">http://www.ncbi.nlm.nih.gov/pubmed/24075361</a></li> </ol>
<b>Updated by</b>	A Lynn, B Robertshawe, B Dixon, N Austin Aug 2014, June 2015

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