

# MCN for Neonatology

## West of Scotland Neonatal Guideline



### Hypoglycaemia : Preterm Infants

Guidance on the screening and management of hypoglycaemia in the first 48 hours of life for **late preterm infants (born at 34+0-36+6 weeks gestation)**.

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Signs and Symptoms of Hypoglycaemia

Measuring Blood Glucose

Monitoring the Asymptomatic Late Preterm Baby

Managing the Late Preterm Baby - Based on Blood Glucose Results With or Without Clinical Signs of Hypoglycaemia

Hypoglycaemia Monitoring Chart

Parental Information Leaflet

**This document and complementary flow charts describe the criteria for screening and the subsequent management of hypoglycaemia in late preterm infants. For the purpose of this guidance this includes all infants born at 34+0 -36+6 gestation.**

Such infants are at risk of hypoglycaemia during the first 48 hours due to impaired metabolic adaptation, and be potentially at risk of neurological damage when their blood glucose levels fall. They therefore require prompt and appropriate intervention.

This guidance **does not apply to infants born 37 week and above**; such infants should be managed separately according the Hypoglycaemia in Infants  $\geq$  37 weeks guideline [LINK](#)

#### **Introduction**

**All infants born at 34+0-36+6 week gestation should undergo routine screening for hypoglycaemia as detailed in this document.**

Use of glucose buccal gel is **not** appropriate in late preterm infants and is therefore **not** part of this guideline.

All the advice regarding feeding and fluids within this document assume that there are no other medical issues. Where this is not the case individualised care plans will be required.

The importance of parents as partners in care is reinforced throughout this guidance which includes a parent information leaflet which explains why their baby is receiving extra monitoring for blood glucose levels and how to raise concerns about their baby's feeding pattern or well being.

## Signs and Symptoms of Hypoglycaemia

All staff involved the screening and management for hypoglycaemia should be familiar with the signs and symptoms of hypoglycaemia.

### Signs and Symptoms of Hypoglycaemia in the Neonate

Hypoglycaemia may present in a number of ways within the first 48 hours of life. These include;

- Hypotonia
- Lethargy (excessive sleepiness with or without abnormal tone)
- Poor feeding
- Hypothermia
- Apnoea
- Irritability
- Pallor
- Tachypnoea
- Tachycardia or bradycardia
- Seizures
- Abnormal feeding behaviour (not waking for feeds, not sucking effectively, appearing unsettled and demanding very frequent feeds especially after a period of feeding well)

This list is not exhaustive. Medical review should be obtained for any generally unwell infant as these symptoms may warrant further investigation and consideration of other causes including sepsis

## Measuring Blood Glucose

A late preterm infant who is at risk of hypoglycaemia should be screened with regular monitoring of the capillary glucose concentrations.

Near patient testing devices tend to be less accurate in the lower range, especially  $< 2.0\text{mmol/l}^1$  and therefore all low values ( $\leq 2.6\text{mmol/L}$ ) require confirmation using blood gas analysis as this is considered the gold standard for measuring blood glucose.

Hand held glucometers should meet ISO standards (ISO15197:2013). If a handheld glucometer is used, low levels must be confirmed using an accurate method as cot-side monitors may be inaccurate in the lower ranges and require checking using a True Blood Glucose (TBG) to guide therapy. A TBG can be obtained by sending a formal laboratory sample but significant delays can occur in obtaining a result, alternatively a TBG can also be obtained from a blood gas analyser, where available, as these are equally reliable<sup>2</sup>. All units must ensure they have readily accessible methods for accurate measurement of a TBG. Each unit must be aware of the characteristics of any near patient testing device used in their hospital.

### Local Arrangements for Confirming Blood Glucose $< 2.6\text{mmol/L}$

## **Monitoring the Asymptomatic Late Preterm Baby**

- a. Identify all late preterm babies at birth and commence a hypoglycaemia/NEWS monitoring chart in labour ward. **All babies** should be risk assessed for criteria for hypoglycaemia monitoring and/or NEWS monitoring **prior** to leaving a labour ward environment
- b. Aim to prevent hypoglycaemia
  - **Keep the baby warm** - dry the baby well at birth, cover the baby whilst receiving skin to skin contact, put a hat on and avoid bathing until the temperature is stable and a warm environment is assured. This is likely to be after 24 hours of age. When dressing the baby, ensure that clothing is warmed first. Utilise skin-to-skin to warm the baby whenever needed.
  - **Skin to skin and the first feed** – it is vital that this baby has the opportunity to have uninterrupted skin contact immediately after the birth (including instrumental and caesarean birth). The baby should have the full “*magical hour*” episode.

Do not assist the baby to feed too early before it is ready to attach correctly and feed effectively. Ideally the first feed should commence within the first 60 minutes. Assist the mother to recognise feeding cues (rapid eye movements under the eye lids, mouth and tongue movements, body movements and sounds, sucking on a fist).

If the baby has not feed by 90 minutes after the birth or is reluctant to feed, follow reluctant feeder guidance , LINK) then start hand expressing and give the colostrum to the baby.

For women who wish to formula feed give 10-15ml/kg 3 hourly.
  - **Blood glucose monitoring and clinical surveillance** – The first blood glucose should be taken **prior to the second feed** usually at around 2-4 hours old<sup>3 4</sup>. Check the baby’s temperature, tone and respiratory rate at least 3 hourly to coincide with blood glucose measurements. Ensure that the baby is alert and normally responsive for their age and gestation. If the baby is unwell or has clinical signs of hypoglycaemia check the blood glucose immediately and alert the Paediatrician urgently.
  - **Encourage effective feeding** – Following the second feed, continue to offer lots of feeding opportunities, at least 3hly until blood glucose measurements have been  $> 2.5\text{mmol/l}$  on three consecutive occasions. Reinforce feeding cues; teach hand expressing and biological nurturing techniques to the mother early on as these will be essential for the late preterm baby who needs to feed often. Continue feeding support until mother and midwife are satisfied that effective feeding is established.
- c. Screen capillary blood samples for hypoglycaemia immediately prior to each feed (3 hourly) using a cot-side testing device. Aim to maintain a pre-feed blood glucose of  $\geq 2.5\text{ mmol/l}$ . If blood glucose values  $< 2.5\text{ mmol/l}$  are obtained follow the management pathways.
- d. Discontinue monitoring when blood glucose concentrations have been  $> 2.5\text{mmol/l}$  on three consecutive occasions at least 3 hours apart. Observe feeding in hospital for at least a further 24 hours ensuring it is effective while remaining vigilant for the signs of hypoglycaemia. If signs of hypoglycaemia develop or there are concerns about feeding discuss with medical staff and consider taking a further blood glucose.
- e. After discontinuing regular glucose monitoring, continue feeding input
  - If the baby is alert and keen to waken and feed, then promote responsive feeding.
  - If the baby is still a bit sleepy, continue to waken and proactively offer feeds.
- f. Do not transfer babies with risk factors for impaired metabolic adaptation and hypoglycaemia to community care for at least 24 hours until you are satisfied that the baby is maintaining blood glucose levels and feeding well

## Managing the late Preterm Baby - Based on Blood Glucose Results With or Without Clinical Signs of Hypoglycaemia

### **Normal Pathway – Blood Glucose >2.5mmol/l**

- If 3 consecutive values, at 3hly intervals, fall in this zone, monitoring may cease.

### **Green Zone – Blood Glucose 2.0 – 2.5 mmol/l - Increased vigilance and feeding support**

- Offer an additional feed if willing and continue frequent feeds at least 3hly thereafter.
- Observe a breastfeed and ensure good attachment and effective feeding. Encourage skin contact and biological nurturing. Proactively encourage hand expressing.
- If two consecutive measurements fall within the Green Zone - --> Treat as Amber Pathway

### **Amber Zone – Blood Glucose 1.0 - 1.9 mmol/l - Supplement and Paediatric review**

- Inform Paediatrician
- Feed volumes must be increased. Initially by an extra 10ml/kg/feed above current intake. For breast fed babies this will require top-ups. *Top ups should be **EBM**\* if sufficient available, otherwise formula should be used. Donor Breast Milk is an option and ensure families are aware this is available and can be used in this scenario.*
- Measure Glucose 1hr post feed. If >2.5mmol/l, continue supplements and resume prefeed testing
- If subsequent prefeed glucose values have improved to lie in the green zone but still remain <2.6 mmol/l, increase top up volumes by one further increment of 5-10 ml/kg/feed
- If baby will not take, or does not tolerate, supplements then admit to SCBU/TC for NG feeds
- Two consecutive measurements in the Amber Zone --> Treat as Red Pathway

### **Red Zone – Blood Glucose <1.0 mmol/l - Admit to SCBU**

- Notify Paediatrician immediately for all babies who are symptomatic or whose blood Glucose is <1.0mmol/l
- Admit to SCBU and check TBG on the blood gas machine. Take one of the following actions immediately:

#### **1- Babies who are asymptomatic and have not had an adequate feed prior to admission**

- Administer an immediate feed of at least 10 ml/kg (*EBM by preference or formula*).
- If the baby will not feed orally, administer the feed by NG tube. Re-check blood glucose after 1hr.

- If > 2.6 mmol/l resume frequent, 3 hly, feeding of at least 10ml/kg/feed and monitor Glc before each feed
- If 2.0-2.6 mmol/l start hourly feeds of 5ml/kg/feed (120ml/kg/day) check glucose before each feed (hourly).
- If < 2.0 mmol/l after initial feed or if still hypoglycaemic on 1hly feeds, treat with IV Glucose as below

#### **2 - Babies who cannot tolerate enteral feeds or whose blood glucose remains <2.6mmol/l despite frequent NG feeds (as above) OR who become symptomatic**

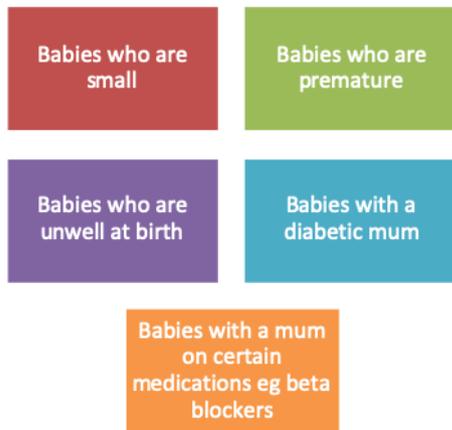
- Site IV and, if symptomatic or Glc <1.0mmol/l, give 2.5ml/kg 10% Dextrose slow IV bolus
- Start 90ml/kg/day of 10% dextrose or TPN
- Enteral feeds may continue initially but if hypoglycaemia persists despite increasing volumes of IV Glucose then a temporary cessation of enteral feeds may be required.
- Monitor Blood Glucose hourly and titrate the glucose infusion rate to achieve normoglycaemia
- If the baby has an ongoing requirement of ≥120 ml/kg/day of milk / 10% glucose **to maintain normoglycaemia**, refer to the guideline for refractory hypoglycaemia [LINK](#)

*\*It is usual to use the mother's own breast milk for top-ups. However mother's own EBM may be unavailable or insufficient for the required volume of top-up. Under these circumstances donor EB<M or infant formula should be used.*

## Protecting your baby from Low Blood Sugar

You have been given this leaflet because your baby is at increased risk of having low blood glucose (also called low blood sugar or hypoglycemia).

### Who is at risk of low blood sugar?



### What does this mean for my baby?

If your baby is in one of these “at risk” groups, it is recommended that they have some blood tests to check their blood glucose level.

Extremely low blood glucose, if not treated, can cause brain injury resulting in developmental problems. If low blood glucose is identified quickly, it can be treated to avoid harm to your baby.

### How is my baby’s blood glucose tested?

Your baby’s blood glucose is tested by a heel-prick blood test. A very small amount of blood is needed and you will know the result of the test straight away.

The first blood test should be done before the second feed (2-4 hours after birth), and repeated until the blood glucose levels are stable. You and your baby will need to stay in hospital for the blood tests.



## How to avoid low blood glucose

### 1. Skin-to-skin contact

Skin-to-skin contact with your baby on your chest helps keep your baby calm and warm and helps establish breastfeeding. During skin-to-skin contact your baby should wear a hat and be kept warm with a blanket or towel.

### 2. Keep your baby warm

Put a hat on your baby for the first few days while he/she is in hospital. Keep your baby in skin contact on your chest covered with a blanket and look into your baby’s eyes to check his / her well-being in this position, or keep warm with blankets if left in a cot.

### 3. Feeding

- **Feed as soon as possible after birth**
- Feed as often as possible in the first few days
- Feed for as long, or as much, as your baby wants
- Feed as often as baby wants, but **do not leave your baby more than 3 hours between feeds**

Ask a member of staff to support you with feeding until you are confident, and make sure you know how to tell if breastfeeding is going well, or how much formula to give your baby.

Whenever you notice “feeding cues” which include rapid eye movements under the eyelids, mouth and tongue movements, body movements and sounds, sucking on a fist, offer your baby a feed. Don’t wait for your baby to cry – this can be a late sign of hunger.

If your baby is not showing any feeding cues yet, hold him/her skin-to-skin and start to offer a feed about 3 hours after the start of the previous feed.

### 4. Express your milk (colostrum).

If you are breastfeeding and your baby struggles to feed, try to give some expressed breast milk. A member of staff will show you how to hand express your milk. If possible, it is good to have a small amount of expressed milk saved in case you need it later. Try to express a little extra breast milk in between feeds. Ask your midwife how to store your expressed milk.



### What happens if my baby's blood glucose level is low?

If the blood glucose test result is low, your baby should **feed as soon as possible and have skin-to-skin contact**. If the level is very low the neonatal team may advise urgent treatment and this could require immediate transfer to the Neonatal Unit.

If you are breastfeeding and your baby does not breastfeed straight away, a member of staff will review your baby to work out why. If your baby is clinically well, then you will be supported with expressing and giving expressed breast milk to your baby using an oral syringe or a cup. If you are unable to express any milk, you will be advised to offer formula. Donor breast milk may be an option to offer as a supplement rather than formula. If you are breastfeeding and advised to give formula or donor breast milk (if available) this is likely to be for a small number of feeds and you should continue to offer breastfeeds and try to express milk as often as possible to ensure your milk supply is stimulated.

If your baby has a low blood glucose level but is clinically well, the team may prescribe a dose of glucose (sugar) gel because this can be an effective way to bring your baby's glucose level up.

Very occasionally, if babies are too sleepy or unwell to feed, or if the blood glucose is still low after feeding, your baby may need to go to the Neonatal Unit / Special Care Baby Unit. Staff will explain any treatment that might be needed. In most cases, low blood glucose quickly improves within 24-48 hours and your baby will have no further problems.

Another blood glucose test will be done before the next feed or within 2-4 hours.

### How do I know my baby is well?



Your baby should feed at least every 3 hours in the first few days then at least 8 times in 24 hours after that.

**If you are worried about your baby, please do not hesitate to tell the staff on the ward,** as your baby's blood sugar level may be low. The staff will review your baby.

### Going Home

It is recommended that your baby stays in hospital for 24 hours after birth. After that, if your baby's blood glucose is stable and baby is feeding well, you will be able to go home.

Before you go home, make sure you know how to tell if your baby is getting enough milk.

There is no need to continue waking your baby to feed every 2-3 hours as long as he / she has had **at least 8 feeds over 24 hours**, unless this has been recommended for a particular reason. You can now start to feed your baby responsively.

If you are bottle feeding, make sure you are not overfeeding your baby. Offer the bottle when your baby shows feeding cues and observe for signs that he/she wants a break.

Once you are home, no special care is needed. As with all newborn babies, you should continue to look for signs that your baby is well, and seek medical advice if you are worried about your baby.

Once at home, if you are concerned your baby is unwell, call your community midwife, call NHS 111 or if you are really worried, take your baby to your nearest A&E or call 999.



**West of Scotland  
Neonatal Network**  
**Hypoglycaemia Monitoring Chart**  
**Late Preterm Infants 34-36+6**  
**Weeks Gestation**

**Patient Details**  
(use sticker if available)  
**Name**  
**DOB**  
**CHI**

Gestation \_\_\_\_\_

Date of Birth \_\_\_\_\_ Time of Birth \_\_\_\_\_ Feeding Preference: Breast / Formula

Time of First Feed \_\_\_\_\_

Age - Hrs	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
- Mins																								
Blood Glucose																								
Breast Feed (minutes)																								
EBM (mls)																								
Formula (mls)																								
4.0 -																								
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- Measure Glucose 1hr post feed. If >2.5mmol/l, continue supplements and resume prefeed testing
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- <sup>1</sup> Beardsall K. Measurement of glucose levels in the newborn. *Early HumDev.* 2010;86(5):263-267 (this seems to be the most appropriate of the 3 references provided)
- <sup>2</sup> Dahlberg M, Whitelaw A. Evaluation of HemoCue Blood Glucose Analyzer for the instant diagnosis of hypoglycaemia in newborns. (1997) *Scand J Clin Lab Invest Dec*; 57(8):719-24 1
- <sup>3</sup> Aynsley-Green A, Soltesz G. (1986) Disorder of blood glucose homeostasis in the neonate. In: Robertson NRC, ed. *Textbook of neonatology.* Edinburgh: Churchill Livingstone,.
- <sup>4</sup> Hetenyi G, Cowan JS. Glucoregulation in the newborn. (1980) *Can J Physiol Pharmacol* ;58:879-88.

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Next Review 01/07/23