

IDENTIFICATION AND MANAGEMENT OF HYPOGLYCAEMIA IN THE FULL-TERM INFANT UNTIL 72 HOURS OF AGE

This guideline has been adapted from the BAPM framework for practice
Flowcharts and appendices are part of the BAPM framework for practice

Which babies at risk of hypoglycaemia to test:

This guidance is intended for infants in the first 72 hours after birth during the transition period.

Many babies who require IV glucose during this period will be able to wean quickly back on to enteral milk. However, other babies will require a slower wean due to potential hyperinsulinism. If in doubt about how quickly to wean IV glucose during this period please discuss with the middle grade or consultant.

The following infants are at risk of impaired metabolic adaptation:

- Intrauterine growth restriction (birth weight $\leq 2^{\text{nd}}$ centile – see table 1 below), or clinically wasted (>2 centiles discrepancy between OFC and birth weight using age and sex normalised charts)
- Infants of diabetic mothers
- Infants of mothers taking beta-blockers in the third trimester and/or at time of delivery

Weight on 2nd centile / kg

Gestational age/weeks	Boys	Girls
37	2.10	2.00
38	2.30	2.20
39	2.50	2.45
40	2.65	2.60
41	2.80	2.75
42	2.90	2.85

Table 1. Second centile weights for boys and girls by week of gestation (from BAPM Newborn Early Warning Trigger and Track Framework for Practice)

In addition infants with one or more of the following diagnoses or clinical signs should have a blood glucose measured and urgent medical review. If the babies are well and remain on the post natal ward, their blood glucose measurement should follow the guidance in this document. If they are admitted to NICU there is a separate guideline on how to manage hypoglycaemia:

- Perinatal acidosis (cord arterial or infant pH < 7.1 and base excess ≥ -12 mmol/l)
- Hypothermia (< 36.5 degrees C) and not attributed to environmental factors
- Suspected/confirmed early onset sepsis
- Cyanosis
- Apnoea
- Altered level of consciousness
- Seizures
- Hypotonia
- Lethargy
- High pitched cry
- Abnormal feeding behaviour especially after a period of feeding well may be indicative of hypoglycaemia and should prompt a full clinical assessment and consideration of BG measurement

Signs of abnormal feeding behaviour include:

- Not waking for feeds: babies may only wake for feeds 3-5 times in the first 24 hours; after the first 24 hours babies should feed at least 8 times in 24 hours.
- Very frequent feeding: Babies who breastfeed frequently without appearing satisfied, frequent breastfeeds where baby tires rapidly or stops feeding within the first five minutes.
- Not sucking effectively: weak suck or inability to suck. Jitteriness, defined as excessive repetitive movements of one or more limbs, which are unprovoked and not in response to a stimulus, is common and is not by itself an indication to measure BG.

How to test blood glucose:

Infants at risk of hypoglycaemia (identified above) should commence **flowchart A** and should receive their first feed within 60 minutes of birth.

Provide parents with verbal and written information that explains: why their baby is receiving extra support and blood glucose monitoring; how the likelihood of hypoglycaemia can be minimized, the signs that could indicate that baby is becoming unwell; and how to raise concerns about their baby's well-being or feeding pattern to staff (print off **Appendix 1** (4 pages) to give to parents).

Blood glucose should be measured using one of the blood gas analysers on NICU/SCBU or labour ward. This is much quicker than sending a sample to the lab. *Hand held glucometers are not always accurate and should not be used.*

Based on the result of the first blood glucose (BG) measurement, place the baby on one of the following care pathways:

- FLOWCHART B: First pre-feed BG 1.0 – 1.9 mmol/l, and no abnormal signs
- FLOWCHART C: First pre-feed BG <1.0 mmol/l, and/or clinical signs consistent with hypoglycaemia at higher BG concentration

Babies to be referred urgently to Doctor/ANNP

A newborn with persistent (more than 2 measurements <2.0 mmol/l within the first 72 hours after birth) or severe hypoglycaemia (<1.0 mmol/l at any time), and infants with signs of acute neurological dysfunction and blood glucose <2.5 mmol/l should be referred urgently to the neonatal team for assessment and the following investigations during the period of hypoglycaemia:

- Blood glucose, insulin, cortisol, growth hormone, fatty acids, ketone bodies, carnitine, acylcarnitine profile, ammonia, lactate, C-peptide
- Urine ketones and organic acids
 - Consider evaluation for early onset sepsis

Further investigations should be based on the results of the initial screen and taken following specialist advice.

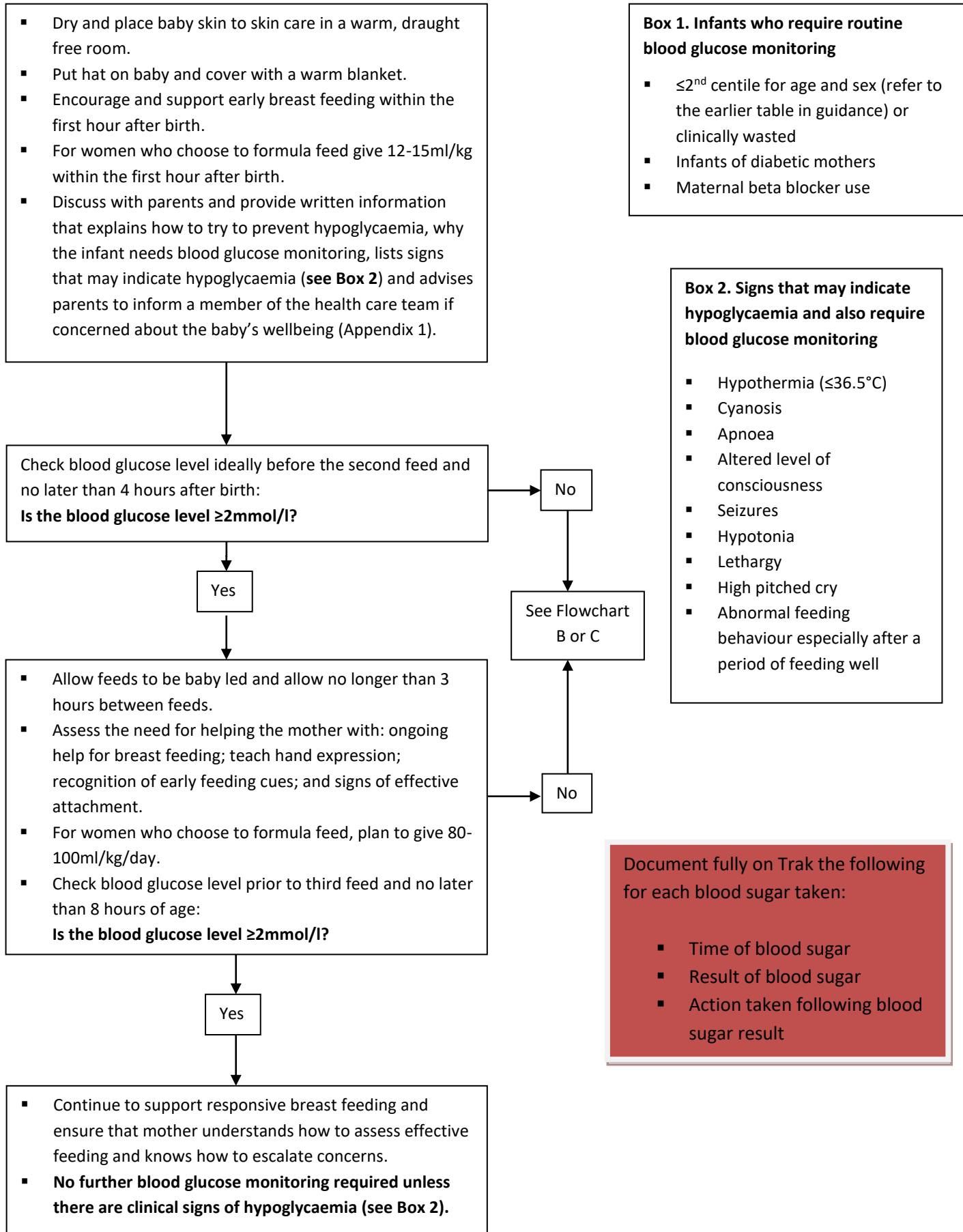
In cases of suspected or confirmed hyperinsulinism, aim to maintain blood glucose concentration >3.0 mmol/l for the first 48 hours after birth, and consider switching to the hyperinsulinism guideline after 48 hours.

Infants with abnormal neurological signs should be admitted to NICU for neurocritical care investigations and monitoring. The consultant will decide on need for MRI and/or neurodevelopmental follow up.

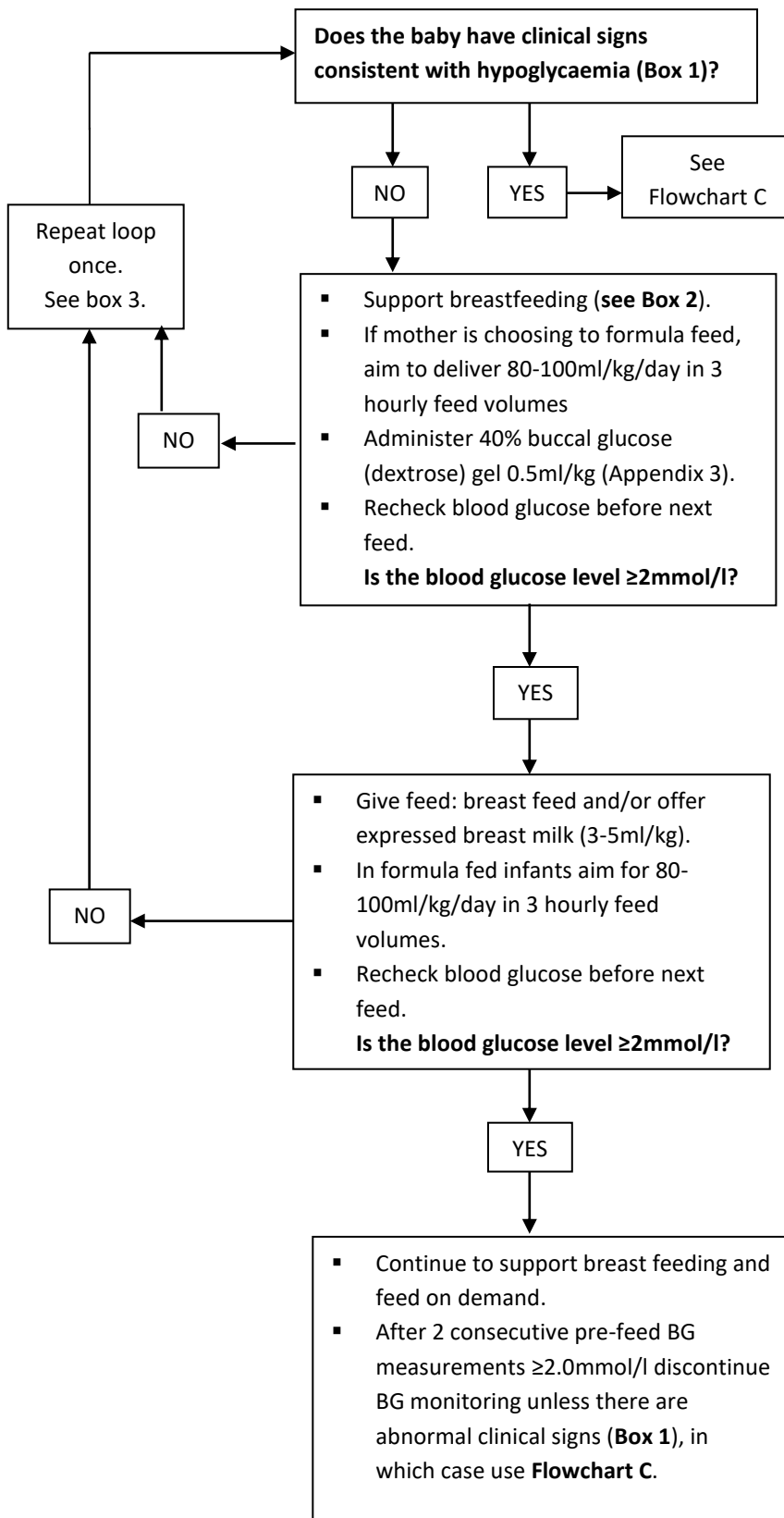
Management of the reluctant feeder with no risk factors for hypoglycaemia

A thorough clinical assessment should be made and documented within 6 hours after birth, at which time practitioners should differentiate between a well baby who is reluctant to feed versus a baby whose feeding pattern suggests an abnormal clinical state due to illness. Signs of reluctant feeding include not waking for feeds, not latching at the breast, not sucking effectively, and appearing unsettled. Skin to skin contact will stimulate the baby to use innate abilities and help his / her mother recognize feeding cues. Feeding support should be provided to reluctant feeders using **Flowchart D** and **Appendix 2**, and medical review should be prompt if there are concerns that feeding behaviours may reflect an abnormal clinical state. Blood glucose should be measured in all babies who are deemed to be reluctant feeders after a period of effective feeding or in a baby with abnormal clinical signs to ensure they are not hypoglycaemic.

Flowchart A. Management of infants at risk of hypoglycaemia (Birth – 24 hours)



Flowchart B. First pre-feed BG 1.0-1.9mmol/l and no abnormal clinical signs (Birth - 72 hours)



Box 1. Signs that may indicate hypoglycaemia

- Hypothermia ($\leq 36.5^{\circ}\text{C}$)
- Cyanosis
- Apnoea
- Altered level of consciousness
- Seizures
- Hypotonia
- Lethargy
- High pitched cry
- Abnormal feeding behaviour especially after a period of feeding well

Box 2. Supporting breast feeding

- Encourage continuous skin-to-skin contact.
Teach mother to hand express breast milk.
- Give colostrum obtained to baby by the method suitable to parents.
- Continue to encourage hand expression at least 8-10 times in 24 hours and support feeding on the breast until infant is feeding effectively.

Box 3.

- If **more than two** blood glucose measurements 1.0- 1.9 inform Paediatrician/ANNP.
- If **more than 2** measurements 1.0- 1.9mmol/l infant should be examined and screened for causes of persistent hypoglycaemia, consider sepsis and consider NNU admission.

Flowchart C. Blood glucose < 1.0mmol/l and/or clinical signs consistent with hypoglycaemia (Birth – 72 hours)

THIS IS A MEDICAL EMERGENCY REQUIRING IMMEDIATE TREATMENT AND MANAGEMENT

- Admit baby immediately to Neonatal Unit.
- Obtain intravenous (IV) access.
- Collect blood sample for: laboratory confirmation of blood glucose, hypoglycaemia screening tests and site a urine bag.
- Consider screening and treatment for sepsis.
- The consultant in charge of the baby's management will decide whether MRI imaging +/- developmental follow up is required

Unable to obtain immediate IV access

- Give IV bolus 10% glucose 2.5ml/kg.
- Start IV infusion of 10% glucose at 60ml/kg/day.

- 40% glucose (dextrose) gel 0.5ml/kg massaged into the buccal mucosa can be given while IV access is obtained OR intramuscular glucagon (200micrograms/kg)

- Do not stop the establishment of breast feeding unless the baby is too sick to feed or there is a clinical contraindication to enteral feeding. Support expression of breast milk.
- In formula fed infants, continue feeds if no contraindication to enteral feeding.
- Recheck blood glucose 30 minutes after the previous blood glucose.

Blood glucose <1.0mmol/l or abnormal clinical signs.

- Give IV bolus 10% glucose 2.5ml/kg.
- Increase glucose delivery rate by 2mg/kg/minute by increasing volume and/or concentration of glucose infusion.
- If glucose infusion rate >8mg/kg/min test for hyperinsulinism
- Recheck blood glucose 30 minutes after previous blood glucose.
- **Repeat cycle if BG <1.0mmol/l or there are abnormal clinical signs**

Is the blood glucose 1.0-2.5mmol/l and no abnormal clinical signs?

- Increase glucose delivery rate by 2mg/kg/minute by increasing volume and/or concentration of glucose infusion.
- If glucose infusion rate >8mg/kg/min test for hyperinsulinism
- Continue to feed if no contraindication.
- Recheck blood glucose 30 minutes after previous blood glucose.

Blood glucose >2.5mmol/l.

- Slow wean of IV infusion.
- Continue enteral feeds.
- Continue to monitor blood glucose until infant is on full enteral feeds and blood glucose values are >2.5mmol/l or >3.0mmol/l (first 48 hours) or >3.5 (after 48 hours) in cases of suspected hyperinsulinism over several fast-feed cycles for at least 24 hours.
- (After 72h this threshold increases to >3.5mmol/l for all babies).

Flow chart D. Information to Support Feeding from Birth and Management of Reluctant Feeding in the Full-Term Infant

Immediately post birth

- Is baby at risk of hypoglycaemia?
If yes, refer to identification and management of hypoglycaemia in the full-term infant guideline
- Dry baby/keep warm.
- Initiate and maintain skin contact for at least 1 hour or until after 1st feed. (see **Skin to skin contact immediately after birth guideline**).
- Encourage responsiveness with mother.
- Discuss signs of readiness to feed.
- First feed in skin to skin contact preferably within 1 hour for all mothers and babies.

Has baby attached and fed at the breast/taken colostrum /formula (if bottle feeding)?

NO

YES

By 6-8 hours following birth assess baby well-being*. Has baby attached and fed at the breast/taken colostrum/formula (if bottle feeding)? (2nd feed)

If yes, complete Breastfeeding Assessment Tool (yellow form) Assess:

- Signs of effective feeding
- Pain free
- Maternal concerns
- Breast/shape of nipple following feed/nipple damage
- Baby readiness to feed

Encourage mother to feed responsively. If formula feeding, teach responsive bottle feeding and assess using Bottle Feeding Assessments Tool (green form)

If no, initiate **Active feeding plan****

***Assessment of baby well-being**

Assess:

- Risk for sepsis
- Tone
- Colour
- Respiratory well-being
- Temperature
- Alertness/level of consciousness
- Any maternal concerns

At 2-3 hours following birth review baby

- Does baby appear well? – see **Assessment of baby well-being***

If no, commence NEWS and refer to neonatal team

Otherwise

- Maintain skin-to-skin contact
- Encourage mother to hand express.

Has baby attached and fed at the breast/taken colostrum/formula if bottle feeding? (1st feed)

If yes, complete Breastfeeding Assessment Tool (yellow form). Assess:

- Signs of effective feeding
- Pain free
- Maternal concerns
- Breast/nipple damage
- Baby readiness to feed

If formula feeding, teach responsive bottle feeding and assess using Bottle Feeding Assessment Tool (green form)

Review every 4-6 hours

If baby has not attached and fed at the breast/taken colostrum/formula initiate **Active feeding plan**** and refer to neonatal team if any concerns.

****Active feeding plan**

Review every 2-4 hours, completing NEWS as clinically indicated or if baby is at risk of hypoglycaemia

- Maintain skin-to-skin contact.
- Stimulate baby as before and attempt at the breast. The following can help:
 - Circling the baby's lips
 - Massaging palms of baby's hands or soles of baby's feet
 - Expressing milk onto baby's lips
- Hand express at least 8-10 times in 24 hours (commence pumping after 24-48 hours if mother chooses to do so).
- Continue to give all EBM until successfully breastfeeding.
- Offer feeds according to feeding cues at least 8-10 times in 24 hours when feeding is established.
- Any formula supplementation should be fully discussed with mother - **refer to Supplementation guideline**.
- Avoid teats, dummies and nipple shields.
- Support mother and listen/action any concerns voiced regarding ill health.
- Refer to neonatal team immediately if any concerns.
- If baby has lost >10% weight by day 3 of life, follow the **Weight Loss guideline**.

If at any time a baby is deemed to be a reluctant feeder after a period of effective feeding or if there are any abnormal clinical signs check a blood glucose level and refer to neonatal team

Oral feeding should be formally assessed at 72 hours or before hospital discharge to CMW and HV using the Breast-feeding Assessment Tool (yellow) or Bottle-Feeding Assessment Tool (green)

T, James Boardman Neonatal Consultant

References

British Association of Perinatal Medicine, April 2017, Identification and Management of Neonatal Hypoglycaemia in the Full Term Infant – A Framework for Practice

British Association of Perinatal Medicine, January 2024, Identification and Management of Neonatal Hypoglycaemia in the Full Term Infant (Birth to 72h) – A Framework for Practice

Appendix 1 (4 pages).

[Parent Information Sheet](#)

Link may not work-find under Parent Information leaflets below

Appendix 2. Management of reluctant feeding in healthy breast-feeding infants > 37 weeks.

See **flow chart D**.

Managing breastfed healthy term infants

Healthy term babies may feed enthusiastically at birth and then sleep for many hours. In order to prevent a potential negative effect on a baby's wellbeing, establishment of feeding and the stimulation of lactation follow the flow chart overleaf from birth for all well, term babies.

Feeding Cues

Feeding cues indicate the beginning of feeding readiness when babies are more likely to latch on and suck and can occur during periods of light sleep as well as when a baby is awake. Cues include rapid eye movements under the eyelids, mouth and tongue movements, body movements and sounds, sucking on a fist. Crying can be a way of indicating that the feeding cues have been missed. Some babies will develop their readiness to feed following delivery. If this doesn't occur, support should be provided and documented until effective feeding is established.

Syringe feeding

It is useful to give a baby small amounts of colostrum in a syringe. To give a syringe feed safely, the baby should be held in the mother's arms slightly upright, not flat. The syringe is gently placed in between the gum and cheek and a little colostrum gently squirted in, no more than 0.2ml at a time. Allow the baby time to enjoy the milk. Move onto cup feeding once you have more than 5ml to give. If there is a clinical indication to provide formula or a mother makes an informed choice to provide formula this can also be given in a cup.

Boosting confidence

You can help and support the mother and boost her confidence by teaching her to hand express. Give her a supply of feeding syringes and feeding cups, encourage skin contact, especially in the laid-back position and help her to recognize her baby's feeding cues. Encourage the mother to offer her breast to her baby when he/she is ready, and to feed her baby expressed breast milk until he/she is breastfeeding actively and effectively. Mother-led feeding will empower the mother as well as saving you time.

If the mother does not want to hand express

The length of labour and the type of birth may influence the mother's feelings about hand expressing and giving colostrum intensively for the first few hours. The mother may ask to give formula instead (see below). Remember that in order to establish good milk supply, ideally the mother needs to start hand expressing within 6 hours of birth

If the mother chooses not to express colostrum

If the mother cannot, or chooses not to express her colostrum it is the responsibility of the midwife to ensure this is an informed decision based on awareness of the benefits of breastfeeding. This will be documented by the midwife in the woman's notes. The milk should be given by cup in volumes appropriate to the baby's age i.e. first day 5-10mls per feed, second day 10-15mls per feed, third day 20mls per feed. Formula should not exceed 20mls per feed once lactation is established.

Recognising effective feeding - ensuring mothers and staff are able to identify

Alert baby, actively sucking that is settled at the breast and ends breastfeeding spontaneously and remains settled for short periods. The feed should be pain free and the baby should demonstrate adequate wet and dirty nappies.

Appendix 3.

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[Use of glucose \(dextrose\)40% w/w gel Monograph](#)

Link may not work find under Other drugs section