Wales Neonatal Network Guideline

Guideline for the Prevention & Management of Hypoglycaemia in High Risk Infants on the Postnatal Ward

Neonatal Hypoglycaemia is defined as blood glucose of less than 2.6mmol/L
Three samples of <2.6mmol/L warrant a lab glucose measurement

High Risk Term Infants have an impaired counter-regulatory response for a variety of reasons. Blood glucose should be monitored in infants with diseases associated with: 1) low energy availability; 2) impaired hormone / enzyme; or 3) hyperinsulinism.

Babies without risk factors do not require blood glucose monitoring. However, any baby showing symptoms of hypoglycaemia needs urgent review by the neonatal team.

High Risk Infants to be Placed on The Hypoglycaemia Pathway at Birth

Symptomatic infants (see below)
IUGR - < 2nd centile (using table across not GROW chart)
Evidence of clinical wasting
Evidence of macrosomia caused by hyperinsulinism
Maternal diabetes (gestational or IDDM)
Maternal beta-blockers in 3rd trimester /delivery e.g. Labetalol
Pre-term infants (<37 weeks gestation)
Severe maternal pregnancy induced hypertension
Perinatal asphyxia (Apgar <6 at 5mins)
Rhesus incompatibility
Family History MCADD - Specialist plan and r/v

Birth 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

Babies fulfilling criteria below should have a glucose level documented and be continued on pathway if <2.6mmol/L

Hypothermic infants - <36°C axillary.
Normal core temperature 36.5-37.5°C
Significant clinical concerns of neonatal infection
Respiratory distress
Feeding poorly, particularly after feeding well

If a baby is >2nd centile, treat as normal. Ensure a feeding assessment is completed and documented in the postnatal pathway prior to discharge.

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Symptomatic Infants	
Irritability, tremors (jitteriness*) Hypothermia on greater than one occasions Apnoea; tachypnoea, 'grunting' Pallor/Cyanosis Abnormal cry (weak or high pitched) Apathy, lethargy, limpness Seizures	*"Jitteriness" is a rapid generalised symmetrical tremor of the limbs. It can be stopped by holding the baby and flexing the limbs. It is never accompanied by physiological changes e.g. raised heart rate or apnoea. In a term baby jitteriness is often a benign finding. In an 'at risk' baby, remember to consider hypoglycaemia.

Prevention of Hypoglycaemia:

- Clear identification of 'at risk' infant; follow flow chart (see appendix 1), documenting all feeds, blood glucose results and treatment on feed chart in the notes.
- Assessments of temperature, colour, breathing pattern and muscle tone is required at each feed, to check for symptoms of hypoglycaemia.
- Begin feeding as soon as possible following birth; within one hour, and continue at least 3 hourly until feeding established and the baby is normoglycaemic. Aim to feed the baby at least eight times in 24hrs, including at night.
- Skin-to-skin contact should be encouraged at birth, and subsequent frequent skin to skin contact will aid thermo-regulation and encourage breastfeeding.
- 'At risk' infants who are not able to suckle adequately may be fed either expressed breast milk (EBM) or an appropriate breast milk substitute. Preferentially use EBM if available. Administer milk via syringes in small volumes (<5mls), by cup, spoon or bottle. Feeds to be given by trained personnel according to clinical indication and fully informed parental choice. The NNU team may decide following assessment that a nasogastric tube is required.
- Teach mothers to recognise and respond to early feeding cues and support mothers with breastfeeding at each feed. Encourage mothers of babies who need EBM to express at least 8 times in 24hrs including at least once during the night.
- Calculate the feed requirements for breast milk substitutes using 10mls/kg/feed initially. In some circumstances it may be necessary to increase this according to the guidance of the NNU team.

- Check the first blood glucose measurement at 4 hours of age. However, if the infant is symptomatic perform an immediate blood glucose. (NOTE: In small babies, whose mothers have been prescribed Labetalol, consider earlier blood glucose).
- When 2 consecutive pre-feed glucose measurements are 2.6mmols/L and above, and the baby is frequently feeding (8-12 feeds/24 hours), discontinue further blood glucose measurements. All aspects of care need to be discussed with parents and explanations documented. Babies should be monitored until 24 hours of age in the hospital. The midwife should carry out a feeding assessment prior to discharge and document this in the postnatal pathway.
- At all times breastfeeding, skin to skin and breast milk expression should be encouraged as the primary source of nutrition. Breastfeeding is known to improve health outcomes; additionally breast milk is less insulinogenic than formula thus enhances the baby's ability to counter-regulate in the face of hypoglycaemia.

Please ensure documentation of any reason for deviation from the guideline

Refer to the NNU urgently if infant is:	Unwell Symptomatic Blood glucose <1.4mmol/L at any time Blood glucose <2.6mmol/L on 3 consecutive occasions

Management of Hypoglycaemia 1.5-2.5mmol/L:

1. If pre-feed blood glucose is less than 2.6mmols/L but above 1.4mmol/L and the baby is asymptomatic, first consider use of buccal dextrose at 200mg/kg (see Appendix 2 for dosage) Breastfeed or give EBM or an appropriate breast milk substitute. If the infant is symptomatic, or if there are concerns about the infant that are not categorised in the 'symptomatic' list; inform the neonatal SHO.
2. Check blood glucose 1 hour later. If still <2.6mmols/L and above 1.4mmol/L in an asymptomatic infant, repeat the above step once only.
   Check blood glucose 1 hour later. If glucose remains <2.6mmol/L call neonatal SHO for review and send lab glucose
3. Review by neonatal SHO who will assess general clinical condition and decide if the feed requirement needs to be increased (if using breast milk substitute this may need to be increased up to 15mls/kg/feed).
4. If the baby is unable to cup or bottle-feed, it is likely that the neonatal SHO may decide that a nasogastric tube is required.

5. Recheck a blood glucose 1 hour following the intervention. If this is 2.6mmol/L and above, then subsequently check a further 2 pre-feed blood glucose samples ensuring they are 2.6mmols/L and above.
6. If despite the intervention the pre-feed blood glucose remains <2.6mmols/L, inform the NNU SHO as the baby requires urgent assessment and admission to the NNU.

NOTE: This is a guideline, which is applicable to all maternity and neonatal staff caring for high risk neonates on the postnatal ward. Occasionally, in individual clinical circumstances the neonatal staff may deviate from the above management if considered in the best interests of the baby. Reasons for deviation from the guideline must be clearly documented in the notes by the doctor.

References

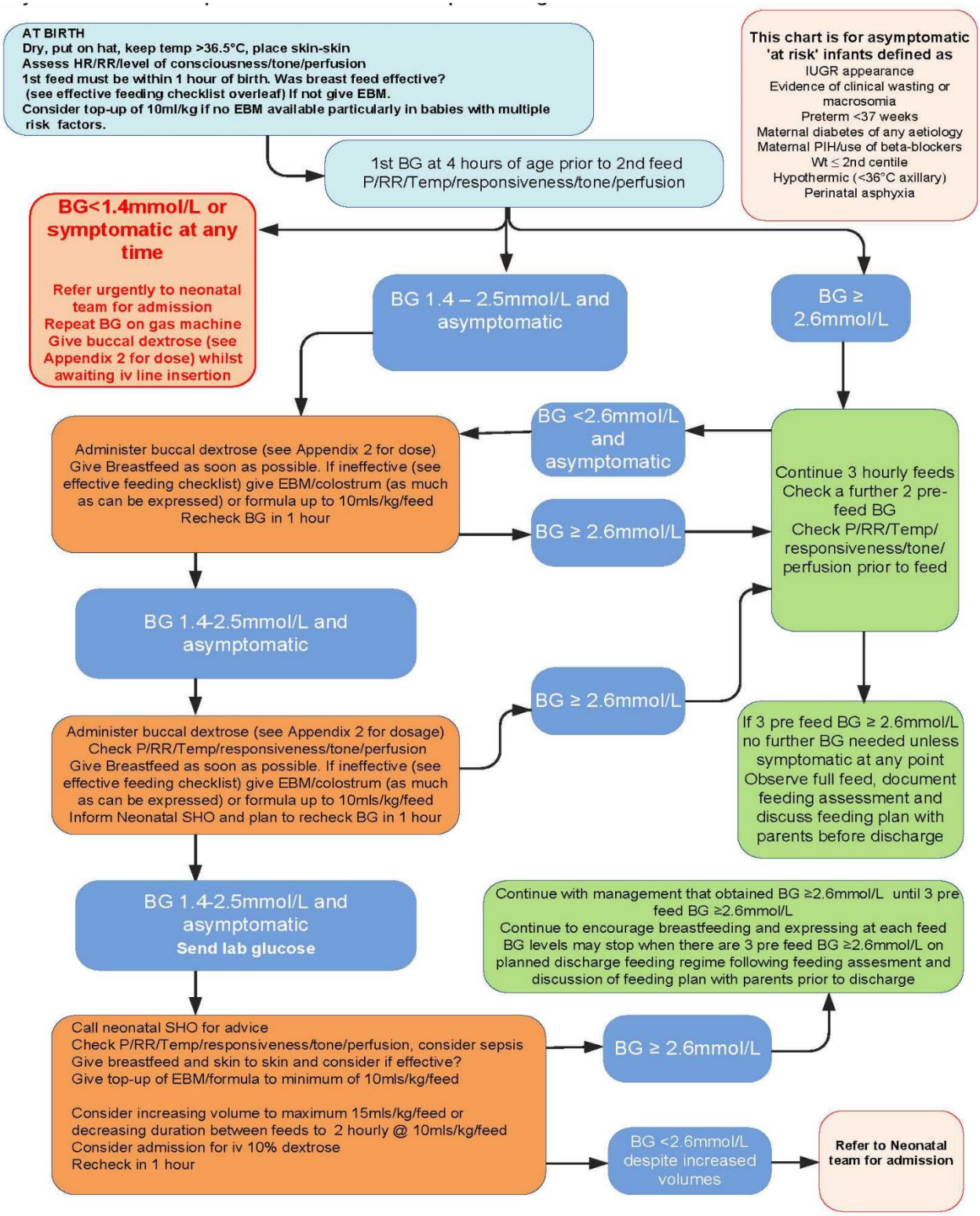
1. UNICEF Baby Friendly Initiative Hypoglycaemia Policy Guidance 2011
2. Hawdon JM, Ward Platt MP, Aynsley-Green A. Patterns of metabolic adaptation for preterm and term infants in the first neonatal week. Arch Dis Child 1992; 67:357-65.
3. Cornblath M, Hawdon JM, Williams AF, Aynsley-Green A, Ward-Platt MP, Schwartz R, Kalhan SC. Controversies regarding definition of neonatal hypoglycemia: suggested operational thresholds. Pediatrics. 2000 May;105(5):1141-5.
4. CEMACH:Diabetes in pregnancy: caring for the baby after birth September 2007
5. BAPM: Identification and Management of Neonatal Hypoglycaemia in the Full Term Infant - A Framework for Practice. April 2017
6. Deborah L Harris, Philip J Weston, Matthew Signal, J Geoffrey Chase, Jane E Harding. Dextrose Gel for Neonatal Hypoglycaemia (the SUGAR babies trial): a randomised, double blind, placebo controlled trial.
7. D Harris et al. Outcome at 2 years after Dextrose Gel Treatment for Neonatal Hypoglycaemia: Follow-Up of a Randomised Trial

Wales Neonatal Network Guideline

Appendix 1

Management of Infants 'AT RISK' of Hypoglycaemia on the Postnatal Ward

Any Deviation from the protocol to be noted and explanation given



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Wales Neonatal Network Guideline

Appendix 2

Standard Operating Procedure for the Use of Glucose Gel for Hypoglycaemia in High Risk Infants on the Postnatal Ward

It is the responsibility of the nursing staff using this SOP to ensure that treatment with this medication is appropriate. **IF IN DOUBT SEEK FURTHER ADVICE BEFORE ADMINISTERING ANY MEDICATION**	
Clinical Condition	
Criteria for Inclusion	• Buccal Glucose must be used in conjunction with a feeding plan • Blood Glucose 1.4-2.5mmol/L in an infant with no abnormal signs • Infants >34+6 gestation and younger than 48 hours after birth • Blood glucose <1.4mmol/L in babies >35 weeks gestation whilst arranging urgent review
Criteria for exclusion	• Babies <35 weeks gestation • Babies >48 hours of age
Seek further advice	• Urgently if any clinical manifestations of hypoglycaemia • Discuss second dose with neonatal team • Request review for examination by neonatal team prior to third dose as per hypoglycaemia guideline

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Wales Neonatal Network Guideline

<table>
<tr><th>Description of treatment</th><th></th></tr>
<tr><td>Name of medicine</td><td>Glucose Gel 40%</td></tr>
<tr><td>Legal status of Medicine</td><td>GSL</td></tr>
<tr><td>Form</td><td>Gel</td></tr>
<tr><td>Strength</td><td>40%</td></tr>
<tr><td>Dosage</td><td>0.5ml/kg of 40% Buccal Glucose Gel
<table>
<tr><th>Weight of Baby (kg)</th><th>Volume of Gel (ml)</th></tr>
<tr><td>1.5-1.99</td><td>1ml</td></tr>
<tr><td>2.0-2.99</td><td>1.5ml</td></tr>
<tr><td>3.0-3.99</td><td>2ml</td></tr>
<tr><td>4.0-4.99</td><td>2.5ml</td></tr>
<tr><td>5.0-5.99</td><td>3ml</td></tr>
<tr><td>6.0-6.99</td><td>3.5ml</td></tr>
</table></td></tr>
</table>

Route of administration	Buccal
Method of Administration	• Draw up correct volume of 40% glucose gel (Glucogel®) using a 2.5 or 5ml oral / enteral syringe • Dry oral mucosa with gauze, gently squirt gel with syringe (no needle) onto the inner cheek and massage gel into the mucosa using latex-free gloves • Offer a feed preferably breast milk, immediately after administering glucose gel • Repeat blood sugar measurement as per guideline
Frequency of administration	Up to 2 doses given at least 30 minutes apart per episode of hypoglycaemia
Duration of treatment	In babies < 48 hours of age
Total treatment quantity	Maximum of 6 doses in 48 hours • **Up to 6 doses can be given over a 48-hour period but any more than one dose should be discussed with the neonatal team and it is advisable for the baby to be examined before the 3rd dose is administered.**
Adverse reactions	None anticipated Document and report any witnessed side effects
Verbal advice for patient/carer	Discussion documented in patient notes
Follow up	As per medical assessment
Arrangements for referral for medical advice	Follow Hypoglycaemia guideline and refer accordingly
Records of administration for audit	Document in Patient Notes

Staff	
Professional qualifications	Registered midwife or doctor
Training	6 months post registration experience.
Signature of individual accepting responsibility and accountability to perform this SOP	Full training log and signature list

Wales Neonatal Network Guideline

Appendix 3

Protecting Your Baby from Low Blood Glucose

What is Low Blood Glucose?

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). Babies who are small, premature, unwell at birth, or whose mothers are diabetic or have taken certain medication (beta-blockers), may have low blood glucose in the first few hours and days after birth, and it is especially important for these babies to keep warm and feed as often as possible in order to maintain normal blood glucose levels.

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.

Blood Glucose Testing

Your baby's blood glucose is tested by a heel-prick blood test. A very small amount of blood is needed and it can be done while you are holding your baby in skin-to-skin contact. 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. You will know the result of the test straight away.

How to Avoid Low Blood Glucose

- **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

- **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 you babies eyes to check his / her well-being in this position, or keep warm with blankets if left in a cot.

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- **Feed as Soon as Possible After Birth**

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.

- **Feed as Often as Possible in the First Few Days**

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.

- **Feed for as Long, Or as Much, As Your Baby Wants**

To ensure your baby gets as much milk as possible

- **Feed as Often as Baby Wants, But Do Not Leave Your Baby More Than 3 Hours Between Feeds.**

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.

- **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, or watch the UNICEF hand expression video (search "UNICEF hand expression"). If possible, it is good to have a small amount of expressed milk saved in case you need it later, so try to express a little extra breast milk in between feeds.

Ask your midwife how to store your expressed milk.

Don't hesitate to tell staff if you are worried about your baby If your baby appears to be unwell, this could be a sign that they have low blood glucose.

As well as doing blood tests, staff will observe your baby to check he / she is well, but your observations are also important, as you are with your baby all the time so know your baby best. It is important that you tell staff if you are worried that there is something wrong with your baby, as parents' instincts are often correct.

The following are signs that your baby is well:

- **Is Your Baby Feeding Well?**

In the first few days your baby should feed effectively at least every 3 hours, until blood glucose is stable, and then at least 8 times in 24 hours. Ask a member of staff how to tell if your baby is attached and feeding effectively at the breast, or how much formula he / she needs. If your baby becomes less interested in feeding than before, this may be a sign they are unwell and you should raise this with a member of staff.

- **Is Your Baby Warm Enough?**

Your baby should feel slightly warm to touch, although hands and feet can sometimes feel a little cooler. If you use a thermometer the temperature should be between 36.50C and 37.50C inclusive.

- **Is Your Baby Alert and Responding to You?**

When your baby is awake, he/she will look at you and pay attention to your voice and gestures. If you try to wake your baby, they should respond to you in some way.

- **Is Your Baby's Muscle Tone Normal?**

A sleeping baby is very relaxed, but should still have some muscle tone in their body, arms and legs and should respond to your touch. If your baby feels completely floppy, with no muscle tone when you lift their arms or legs, or if your baby is making strong repeated jerky movements, this is a sign they may be unwell. It can be normal to make brief, light, jerky movements. Ask a member of the team if you are not sure about your baby's movements.

- **Is Your Baby's Colour Normal?**

Look at the colour of the lips and tongue – they should be pink.

- **Is Your Baby Breathing Easily?**

Babies' breathing can be quite irregular, sometimes pausing for a few seconds and then breathing very fast for a few seconds. If you notice your baby is breathing very fast for a continuous period (more than 60 breaths per minute), or seems to be struggling to breathe with very deep chest movements, nostrils flaring or making noises with each breath out – this is not normal. Who to call if you are worried

- In hospital, inform any member of the clinical staff.
- At home, call your community midwife and ask for an urgent visit or advice.
- Out of hours, call NHS 111 or [local number for urgent assessment]
- If you are really worried, take your baby to your nearest Paediatric A&E or dial 999. [Insert local information]

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What Happens If Your Baby's Blood Glucose Is Low?

If the blood glucose test result is low, your baby should feed as soon as possible and provide skin-to-skin contact. If the level is very low the neonatal team may advise urgent treatment to raise the blood glucose and this could require immediate transfer to the Neonatal Unit. Another blood glucose test will be done before the next feed or within 2-4 hours.

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 he / she is happy that your baby is well, s/he will support you to hand express your milk and give it by oral syringe / finger / cup / spoon. If your baby has not breastfed, and you have been unable to express any of your milk, you will be advised to offer infant formula.

In some hospitals the team may prescribe a dose of dextrose (sugar) gel as part of the feeding plan because this can be an effective way to bring your baby's glucose level up. If you are breastfeeding and advised to give some infant formula, this is most likely to be for one or a few feeds only. You should continue to offer breastfeeds and try to express milk as often as possible to ensure your milk supply is stimulated.

Very occasionally, if babies are too sleepy or unwell to feed, or if the blood glucose is still low after feeding, he / she 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.

Going Home with Baby

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 he / she 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. A member of staff will explain the normal pattern of changes in the colour of dirty nappies and number of wet/dirty nappies.

For further information, if you are breastfeeding, see 'How you and your midwife can recognise that your baby is feeding well' (Search 'UNICEF Baby Friendly assessment tool'). It is important to make sure that your baby feeds well at least 8 times every 24 hours and most babies feed more often than this.

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. Your midwife will explain this.

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If you are bottle feeding, make sure you are not overfeeding your baby. Offer the bottle when he / she shows feeding cues and observe for signs that he / she wants a break. Don't necessarily expect your baby to finish a bottle – let him / her take as much milk as he/she wants.

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 at all about your baby

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Wales Neonatal Network Guideline

Appendix 4

Effective Breastfeeding Check

OBSERVE BABY FEEDING ON THE BREAST	**YES(✓)**	**NO (✓)**
C – Baby held **C**lose to mother		
H – Baby's **H**ead able to tilt back		
I – Baby's head and body **in a straight line**		
N – Baby's **N**ose opposite the mothers **N**ipple		
Baby has wide open mouth with **CHIN** touching the breast first, with head tilted back		
More areola seen above the babies top lip than below the bottom lip (if areola seen)		
Baby has rounded cheeks		
Babies chin indenting the breast		
Rapid sucks followed by slow deep sucks with swallows		
Contented baby who stays on the breast continuing to demonstrate slow deep sucks and swallows for at least 15 minutes		
No nipple/ breast pain for mother		
Check that mothers' nipples are round and not white, "pinched" or misshapen after a feed		

- If any ticks in the "NO" column, then support mum to adjust positioning and attachment, try skin to skin contact.
- If no improvement with attachment, then help mother with hand expressing and give baby expressed breast milk
- Observe baby's vital signs (temperature, colour, breathing, responsiveness)

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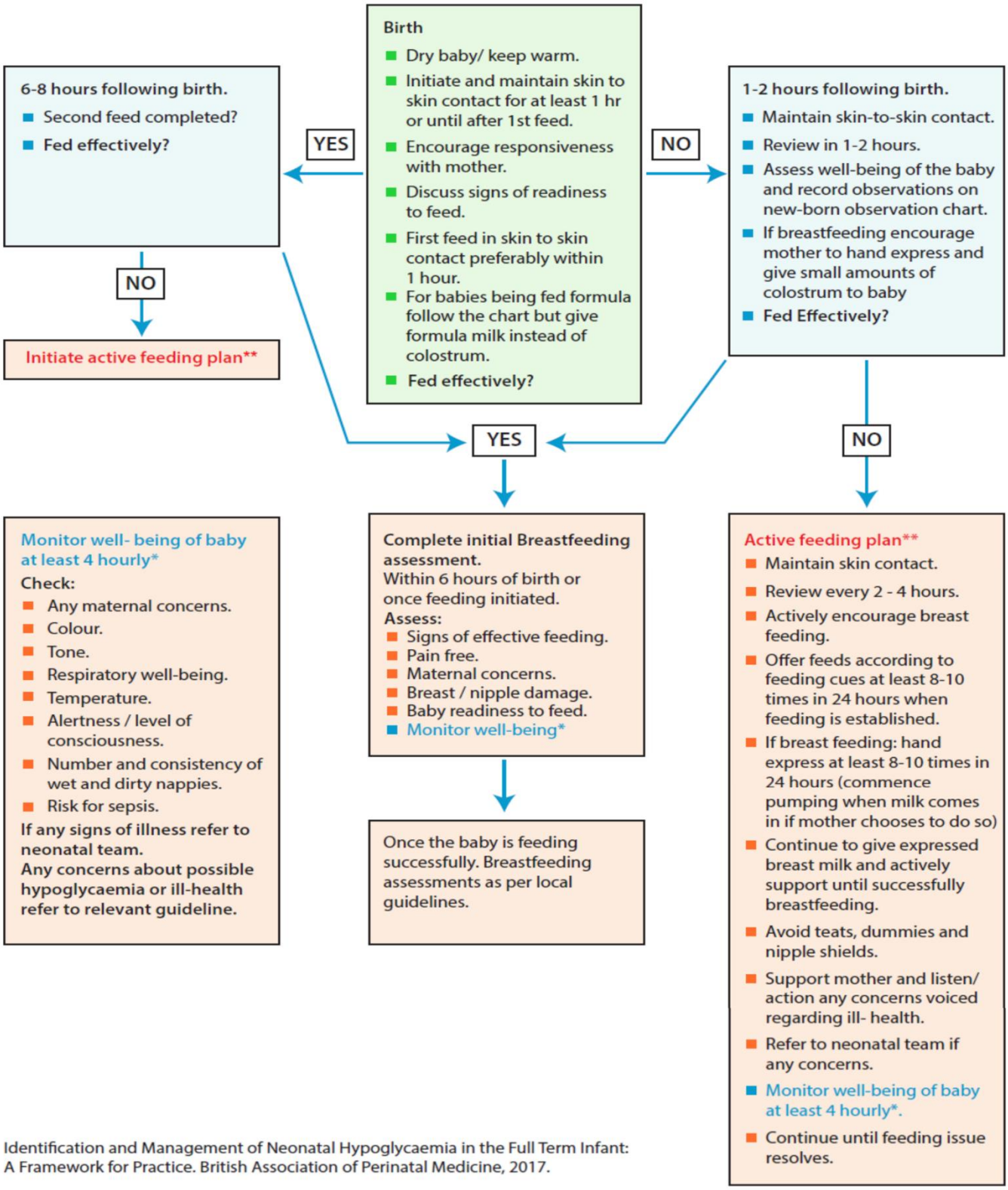
Appendix 5

Flowchart D. Management of reluctant feeding in healthy term infants ≥ 37 weeks



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