



# **Guidance on the development of policies and guidelines for the prevention and management of Hypoglycaemia of the Newborn**

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## Introduction

Hospitals working towards the implementation of the WHO/UNICEF Baby Friendly Initiative best practice standards often consider the development of guidelines for the prevention and management of hypoglycaemia in the “at risk” infant. This is in order that breastfeeding may be protected by the avoidance of unnecessary supplementation with artificial milk, whilst ensuring the safety of all babies, irrespective of feeding method. If guidelines exist, it is important that they are effective and enable achievement of this goal. This document is intended to help hospitals to develop such guidelines. It may be used to support the development of new guidelines or to decide whether the current guidelines will help the staff to practise in a way which will meet the standards for Baby Friendly accreditation.

This document deals with key issues to be considered when devising guidelines for the prevention and management of hypoglycaemia of the newborn. These include the identification of babies who should be considered “at risk”, basic principles which should underpin all guidelines for their management, and the creation of an effective flow chart to guide day-to-day practice. The document includes a checklist which can be used as a way of evaluating the likely accuracy and effectiveness of existing or planned guidelines.

**Given that hospitals are at varied stages of implementing Baby Friendly best practice standards and have differing policies for deciding which babies are cared for in postnatal wards, development of one standard set of guidelines for all units would be unachievable. Therefore, when adapting this guidance to your own area of work, it is vital that all safety measures be incorporated and that the completed policy be piloted for understanding among staff, ease of use, safety for all babies and protection of breastfeeding.**

## Which babies are “at risk”?

Healthy term babies often feed infrequently in the first 24-48 hours after birth. Because they are able to mobilise energy stores through a process known as counter-regulation, they are not likely to suffer any ill effects. Some babies, however, are less able to mount this response, for example those born preterm, small for gestational age, compromised at birth or who have neonatal infection. In addition, babies born to diabetic mothers may initially produce too much insulin, rendering them prone to lower blood glucose levels. A prolonged period of hypoglycaemia, particularly if associated with clinical signs (“symptomatic hypoglycaemia”) may lead to neurological impairment. It should not be assumed that only breastfed babies are at risk. Babies fed with infant formula and who fall into the “at risk” category should also be monitored closely, and their mothers supported with effective feeding.

## Writing the guidelines

Well written guidelines provide a strong foundation for the implementation and maintenance of best practice standards for breastfeeding. Therefore, it is essential that these documents are presented in a way which provides clear instruction to the staff members who have the task of implementing them. When making decisions about the management of the “at risk” baby, staff often face a dilemma between protecting breastfeeding and ensuring the baby’s nutrient intake is adequate. Risks are that as a result, breastfed babies who require infant formula may not receive it or, alternatively, infant formula may be given unnecessarily. Similarly, without clear guidance, staff may underestimate the risk of hypoglycaemia faced by vulnerable formula fed babies and hypoglycaemia may be ineffectively prevented or managed.

When developing guidelines for the prevention and management of hypoglycaemia, it is vital to involve all disciplines and staff groups affected, as this will enhance acceptance and adherence. Education of staff in how to implement the guidelines is also essential. Audit of the effectiveness of the guidelines, including admission rates to NNU and the use of supplementary feeds for breastfed babies will enable assessment of the effectiveness of the guidelines.

Although the exact scope and wording of the guidelines will vary from hospital to hospital, certain key principles should underpin them:

### Hypoglycaemia guidelines - Underpinning principles

- Babies who are “at risk” need to be correctly identified and managed appropriately.
- For all breastfed babies, the aim should be to ensure that needs are met as far as possible by breastfeeding, or by the use of expressed colostrum/breastmilk (EBM). **Exclusive breastfeeding optimises health outcomes.** Also, it appears that **breastmilk enhances the baby’s ability to counter-regulate whereas large volumes of infant formula suppress this ability.**
- If the baby is unable to breastfeed effectively, the mother should be encouraged to **express her milk in order to maximise her future lactation.**
- For formula-fed babies, the aim should be to ensure frequent, effective feeding.
- Effective, ongoing observation of the baby’s condition is vital – ineffective feeding may be a sign of illness. Ensuring that the baby exhibits a normal level of arousal is fundamental to this aim. The baby should be woken and lifted from the cot to enable effective assessment of level of consciousness.
- Blood glucose measurements taken prior to 2 hours of age are not informative – readings made immediately after birth are merely indicative of the mother’s blood glucose concentration. Levels may then drop sharply until counter-regulation is initiated.
- If blood glucose levels remain lower than the agreed acceptable minimum despite breastfeeding/EBM, the baby should be reviewed by a paediatrician with a view to further investigation and appropriate management.

**Guidelines such as these refer to the “at risk” baby who is deemed well enough to be cared for in the postnatal ward. Should any baby develop clinical signs of hypoglycaemia, such as altered level of consciousness, abnormal tone or seizures, this can indicate underlying illness. In these babies the acceptable threshold level for blood glucose concentration needs to be higher; they should be reviewed by the paediatrician urgently and should not remain in the postnatal ward.**

## Creating an effective flow chart

Information presented in a simple flow chart which takes the reader from one action to the next offers the optimum way of ensuring that effective care is given consistently.

When devising a flow chart, consider the following:

- Recognition and management of the at-risk baby.
- Are the language and requirements easily understood by staff? – Test the flow chart on junior staff.
- Is the layout logical? – Do actions start at the beginning and move through the stages required?
- Are all possible actions covered? – Test the flow chart on a variety of “real” baby scenarios.
- Is it easy to read? – Consider tired night staff.
- Does the flow chart consider the continued safety of the baby once the “at risk” period has elapsed?

A flow chart can be found at the end of this document.

## Self-evaluation checklist

The checklist below is provided for comparison against existing or planned guidelines, to help ensure that all essential points are covered and that best practice is reflected wherever possible. Guidance notes are included in the right-hand column.

The checklist is in five sections:

- Essential points for all “at risk” babies
- Recommended practices at birth
- Recommended practices to support breastfeeding
- Care for formula-fed babies
- Ensuring accurate and effective blood glucose monitoring

Compare your guidelines with the checklist and decide whether, in your guidelines, each point is *covered clearly*, partially or ambiguously (*unclear*) or *not covered* at all and put a tick in the appropriate column.

## Essential points for all “at risk” babies

Point no.	Essential point	Point is (tick one):			Guidance notes
		Covered clearly	Unclear	Not covered	
1	The guidelines are written in the expected Trust format and include a review date.				To ensure compliance with Trust policy and CNST requirements.
2	Guidelines apply to all staff.				As with all guidelines, all staff – irrespective of role – are expected to follow the suggested plan of care and document the reason for any deviation from the guideline.
3	Documentation: Guidelines make clear what documentation is required e.g. time, clinical signs noted, blood glucose concentration, treatment, response to treatment.				Neonatal hypoglycaemia may be an early sign of other significant disease processes requiring further investigation and treatment (e.g. infection). Therefore accurate documentation is essential.
4	Monitoring: the guidelines include a clear explanation of the monitoring process, for example audit of admissions to NNU, supplements for breastfed babies. This should include the need for action planning, implementation and evaluations should audit identify any deficit in care.				Ongoing evaluation of the effectiveness of the guidelines on the standard of care provided is essential, with action taken should care be found to be deficient.
5	The guidelines include a flow chart which takes the reader through a logical and effective series of actions.				The flow chart should include suggestions for care related to points 8-29 of the checklist. Following the action lines will enable effective care to be provided which does not put the baby at risk, whilst minimising the potential use of supplements of artificial milk.

6	The guideline includes an accurate list of those babies who are at increased risk of hypoglycaemia.			<p>The following groups should be considered “at risk”:</p> <ul style="list-style-type: none"> <li>■ Preterm (&lt;37 weeks gestation)</li> <li>■ SGA (definition to be agreed according to local standards eg &lt;2<sup>nd</sup> centile)</li> <li>■ Low birth weight (&lt;2.5kg)</li> <li>■ Maternal diabetes</li> <li>■ Hypothermia</li> <li>■ Infection/other illness in the baby*</li> <li>■ Severe intrapartum asphyxia*</li> <li>■ Maternal use of beta-blockers, such as Labetolol</li> </ul> <p>*These babies may not initially be on a postnatal ward but may require monitoring on the ward during recovery.</p>
7	The guidelines do not define as “at risk” any babies for which there is no evidence to support this definition.			There is no evidence to label large babies as “at risk” in the absence of maternal diabetes. It is important however, to watch out for the baby of macrosomic appearance who has neonatal hyperinsulinism.
8	<p>The guidelines describe effective measures to monitor the wellbeing of the baby, e.g.</p> <p><i>Prior to feeds check:-</i></p> <ul style="list-style-type: none"> <li>■ <i>Level of consciousness</i></li> <li>■ <i>Tone</i></li> <li>■ <i>Temperature</i></li> <li>■ <i>Respiration</i></li> <li>■ <i>Colour/perfusion</i></li> </ul>			Frequent documented monitoring of the baby’s wellbeing is required.

9	<p>The guidelines include an effective description of the clinical signs of hypoglycaemia, e.g.</p> <p><i>If a newborn is unwell or shows signs of hypoglycaemia such as altered level of consciousness, apnoea, cyanosis, hypothermia, or convulsions he/she should be referred to a paediatrician urgently</i></p>				<p>Clinical signs (or “symptoms”) indicate that the baby is vulnerable to harm from hypoglycaemia; they should be acted upon straight away. Staff should be made aware of the signs of hypoglycaemia in order that they are able to recognise such situations.</p>
10	<p>The guidelines include a clear definition of “jitteriness”</p>				<p>“Jitteriness” is not a definitive sign of hypoglycaemia. Many babies will appear jittery on handling, therefore a definition such as the following is suggested:</p> <p><i>“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.”</i></p>

Recommended practice at birth					
Point no.	Recommended practice	Point is (tick one):			Guidance notes
		Covered clearly	Unclear	Not covered	
11	Skin-to-skin contact at birth and help with an early breastfeed (unless baby requires immediate transfer to NNU) should be offered to all mothers.				The guideline should recognise the important role of early skin-to-skin contact in maintaining the temperature – and therefore the stability of blood glucose levels – in the neonate, and in promoting an early breastfeed.
<b>Recommended practices to support breastfeeding</b>					
12	Use of ongoing skin-to-skin contact to support thermal control, emotional wellbeing and breastfeeding.				Ongoing skin-to-skin contact will continue to aid thermo-regulation and encourage frequent breastfeeds. Normal body temperature should be maintained, as hypoglycaemia is more likely to occur when newborns become cold.
13	Teaching mothers to recognise early feeding cues.				Mothers of “at risk” babies should be encouraged to respond to early feeding cues should their baby exhibit these. However, these babies should not be relied upon to exhibit cues and therefore a proactive approach to feed frequency is needed.
14	Frequent feeds, <u>at least</u> 3-hourly.				<p>In order to enhance early metabolic adaptation, frequent, effective, feeds are needed. The guideline should make clear that:</p> <ul style="list-style-type: none"> <li>There should not be more than 3 hours between feeds; more frequent feeds are often needed to ensure sufficient intake.</li> <li>The baby should be offered the breast whenever he/she shows signs of hunger, even where this</li> </ul>



					occurs less than 3 hours since the previous feed.
15	Mothers will be supported to breastfeed at each feed.				“At risk” newborns who are able to suckle adequately should continue to breastfeed <sup>1</sup> .
16	Where feeding at the breast is not achievable, the mother is encouraged to hand express frequently and expressed breastmilk (EBM) is offered.				If blood glucose concentration is low despite frequent breastfeeding, supplementary EBM should be provided by nasogastric tube or cup. Frequent small volumes of colostrum will be easily digested and absorbed by the baby.
17	Supplementation with infant formula is only recommended when blood glucose estimation (BG) is below accepted threshold and breastfeeding/expressing EBM is not successful, or has been insufficient to increase BG to acceptable level.				If the blood glucose level falls to below the acceptable threshold despite frequent breastfeeding together with the use of EBM, an alternative source of energy is needed. This may be achieved by giving infant formula.
18	Should infant formula be required in response to documented hypoglycaemia, an appropriate volume (e.g. 8-10 ml/kg) is offered by cup.				If supplementary feeding is required in response to a low blood glucose level, sufficient infant formula or EBM to achieve an acceptable rise should be offered, increasing daily with the baby’s age.
18	Care is discussed with parents and explanations documented.				The indications for the prescription of the infant formula should be discussed with the parents and documented.
<b>Care for formula-fed babies</b>					
19	Ensure that the baby remains warm, including the use of skin-to-skin contact.				Ongoing skin-to-skin contact will continue to aid thermo-regulation. Normal body temperature should be maintained, as hypoglycaemia is more likely to occur when newborns become cold.

20	Teaching mothers to recognise early feeding cues.				Mothers of “at risk” babies should be encouraged to respond to early feeding cues should their baby exhibit these. However, these babies should not be relied upon to exhibit cues and therefore a proactive approach to feed frequency is needed.
21	Frequent feeds, <u>at least</u> 3-hourly, offering sufficient infant formula to enable blood glucose level maintenance. Volume to be calculated using local agreed criteria.				<p>It is possible that the baby’s ability to utilise ketone bodies may be limited by use of infant formula therefore frequent feeds of sufficient volume are needed to ensure that blood glucose levels remain acceptable. The guideline should make clear that:</p> <ul style="list-style-type: none"> <li>■ There should not be more than 3 hours between feeds.</li> <li>■ The baby can be offered a feed whenever he/she shows signs of hunger, even where this occurs less than 3 hours since the previous feed.</li> </ul>
22	Mothers will be supported with bottle feeding technique until they are confident.				To ensure adequate intake as a result of effective feeding technique.

## Ensuring accurate and effective blood glucose monitoring

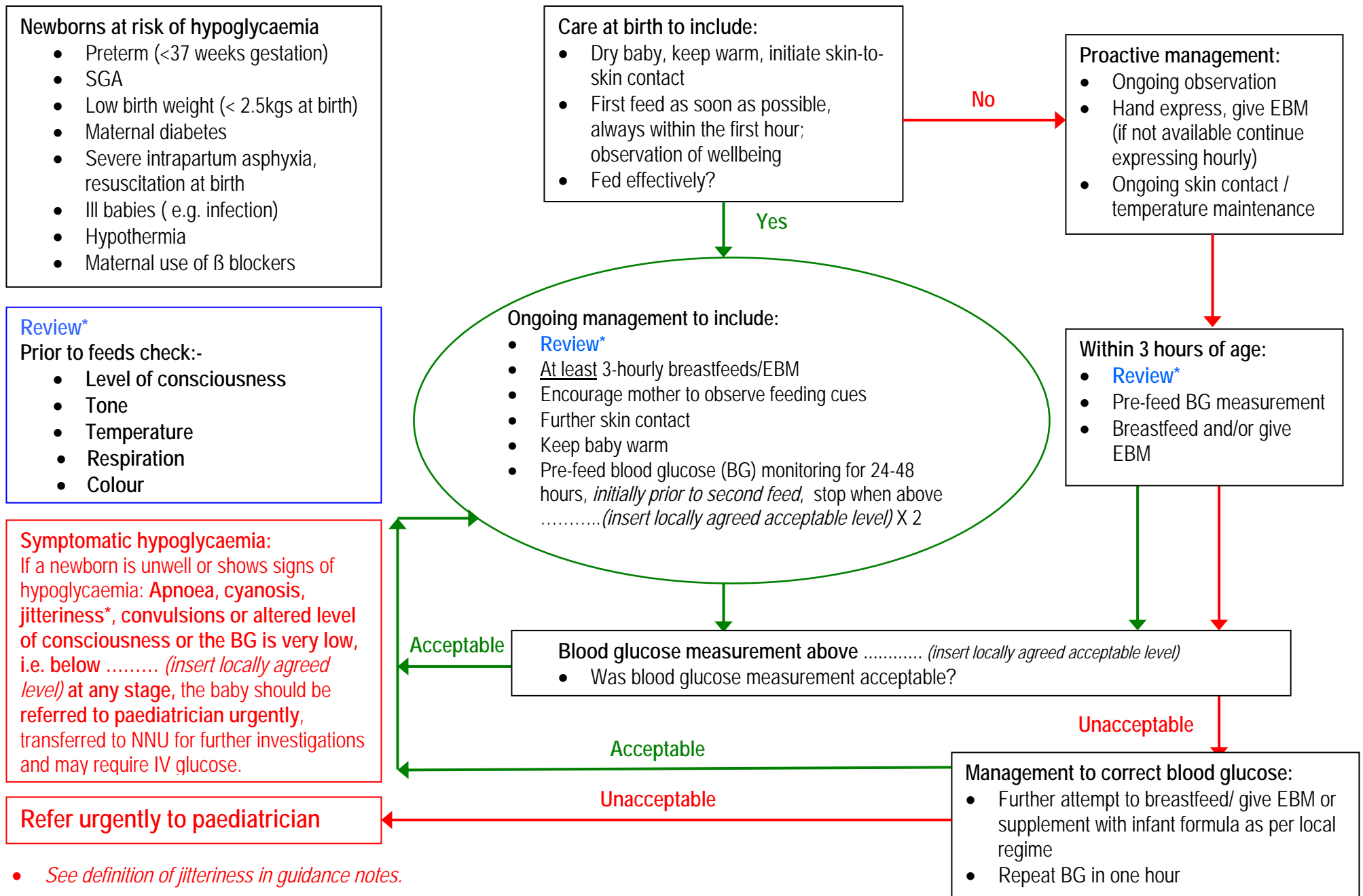
Point no.	Recommendation	Point is (tick one):			Guidance notes
		Covered clearly	Unclear	Not covered	
23	Definition of blood glucose (BG) level at which hypoglycaemia is diagnosed conforms with WHO guidelines (<2.6 mmol/l), NICE (<2.0mmols) or other evidence-based, locally-agreed protocol.				The threshold at which hypoglycaemia is diagnosed should conform with the WHO <sup>1</sup> NICE <sup>2</sup> guidelines.or other quality evidence (e.g. <sup>4,5</sup> ).
24	First BG to be measured prior to second feed unless baby is symptomatic prior to this. Routine measurement should not be carried out any earlier than 2 hours of age.				Blood glucose should never be recorded routinely in asymptomatic babies under 2 hours of age. Prior to this age babies naturally experience a fall in blood glucose concentration which resolves even in the absence of nutritional intake <sup>2</sup> . Recording the blood glucose this early is likely to lead to unnecessary intervention.
25	Ongoing pre-feed monitoring until baby is stable.				Hypoglycaemia is most likely to occur in the first 24-48 hours of life. Pre-feed monitoring allows the lowest possible level to be identified.
26	Use of an accurate ward-based machine (not reagent strips).				Reagent strip tests are unsuitable for diagnosing neonatal hypoglycaemia and should not be used.
27	Supported with a laboratory measurement if ward machine is not recognised to be accurate below 2.6 mmol/l.				Any low value recorded using a bedside test should be confirmed using a quality-assured method or in a laboratory.

28	Consider repeating 1 hour post-feed if BG below normal level pre-feed.				If a low pre-feed blood glucose level has been discovered this may be repeated post-feed. Allowing one hour to elapse after the feed will enable optimum digestion/absorption. Alternatively, if the baby is well it may be appropriate to observe level of consciousness and the repeat measurement prior to the next feed rather than do a post-feed measurement.
29	Severe (BG <1.1mmol/l), persistent or recurrent hypoglycaemia requires urgent paediatric assessment and treatment.				Hypoglycaemia of unusual severity e.g. <1.1mmol, or which does not resolve despite adequate feeding, indicates underlying illness and should be treated urgently. The baby will require urgent transfer to NNU for further investigations and is likely to require IV glucose.

## References

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4. Deshpande S, Ward Platt M. (2005) The investigation and management of neonatal hypoglycaemia. Seminars in Fetal and Neonatal Medicine; 10, 351-361.
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6. The Confidential Enquiry into Maternal and Child Health (CEMACH). (2007) Diabetes and Pregnancy: caring for the baby after birth. Findings of a National Enquiry: England, Wales and Northern Ireland. CEMACH, London.
7. Williams A, Modder J. (2010) Management of pregnancy complicated by diabetes - maternal glycaemic control during pregnancy and neonatal management. Early Human Development; 86: 269-273

## Sample flow chart for the management of BREASTFED babies at risk of hypoglycaemia on postnatal wards



NB: These are guidelines; individual circumstances may require alternative management

## Sample flow chart for the management of bottle-fed babies at risk of hypoglycaemia on postnatal wards

