1. **Aim/Purpose of this Guideline**
   1.1 To provide clinical guidance on the assessment, investigation and management of neonatal hypoglycaemia. All clinical staff involved will benefit from the improvement in service and timing.

2. **The Guidance.**
   2.1 **Background**
   Healthy term babies may feed infrequently during the first 24-48 hours of life. These babies have the ability to cope with low glucose supply through a process of counter-regulation for the first few hours of life, which prevents them from becoming unwell. **Well babies, without risk factors, do not require routine blood glucose monitoring.**

   2.2 **At risk infants**
   In some babies, these counter-regulation mechanisms will not function as well, so they are in danger of becoming dangerously short of energy supplies. The gold standard for glucose monitoring is a laboratory sample, however blood gas machine analysis is acceptable, and as a screening test a bedside Glucometer is used, but should be confirmed with a laboratory sample if severe (<1.1mmol/L) or prolonged.

   The following table lists those babies at high risk of problems.

   **At Risk Babies**
   - Preterm (<37 weeks gestation)
   - Low birth weight (<2.5kg)
   - Large for dates > 4.5Kg
   - Maternal diabetes mellitus (all types)
   - Jitteriness *
   - Hypothermia (<36.5°C)
   - Infection or other illness
   - Poor condition at birth – includes any of:
     - Cord / scalp pH <7.05 or BE below -12
     - Resuscitation >5 minutes
     - Apgar <7 at 5 minutes
     - Maternal use of β blockers (e.g. Labetolol)

   * **Jitteriness may be defined as excessive, symmetrical repetitive movements of limbs, which are unprovoked and usually relatively fast. It is important to be sure this movement is not simply a response to stimuli.**

   Prolonged severe hypoglycaemia in these babies can cause long-term neurological damage, so it is important to try to prevent it, and to detect and treat it when it does happen.
2.3. Evidence Base

2.4. Process
All newborn babies should be assessed against the above criteria, and at risk babies should be managed as per the pathways below. Blood glucose results should be recorded and any action taken should be documented, timed and signed. Parents should be regularly updated and this should be documented.

2.5. Auditable Standards
In order to monitor compliance with this guideline it will be included in the neonatal clinical audit programme with findings presented at the directorate audit meeting. Any deficiencies / action plan will be presented at the Clinical Governance meeting. Any clinical incident reports relating to this guideline will be monitored against it. Potential auditable standards could include the correct identification of ‘at Risk’ babies, the number of admissions to the neonatal unit with hypoglycaemia, and the rate of exclusive breastfeeding in the “at risk” population.
2.6 Management of Babies at risk of Hypoglycaemia – Breastfed

- Dry baby, keep warm and encourage early skin-to-skin contact
- Feed as soon as possible, within the first hour
- Observe for signs of hypoglycaemia*

Has the baby had an effective feed?

Yes

- Review regularly
- Feed at least 3 hourly
- Encourage mothers to respond to early feeding cues
- Encourage further skin-to-skin contact
- Keep baby warm
- Check blood glucose before second feed (not before 2 hours old)

No

- Observe for signs of hypoglycaemia
- Hand express and give baby EBM by NG tube or cup
- If no EBM available, continue to express hourly
- Offer 10mls/kg formula with verbal consent
- Continue skin to skin contact
- Ensure baby is kept warm
- Check blood glucose when 2-3 hours old

Inform neonatal team.
Ensure effective breast feed.
If blood sugar 1 hour later <2.6mmol/L then:
Give 10mls/Kg of EBM by NG tube or cup with consent. If EBM not available give 10mls/Kg of formula by NG tube or cup with verbal consent.
Repeat blood glucose after 1 hour

Pre feed Blood Sugar ≥ 2.6 mmol/L ?

Yes

- Continue to monitor blood glucose for 48 hours, or until ≥ 2.6mmol/L for 3 consecutive measurements

No

Glucose ≥ 2.6 mmol/L

Yes

- Discuss with Neonatal Team

No

Urgently discuss with Neonatal Team

- Baby appears unwell OR
- Blood sugar is <1.1 mmol/L

At Risk Babies
- Preterm (< 37 weeks gestation)
- Low birth weight (<2.5kg)
- Large for dates > 4.5kg
- Maternal diabetes mellitus (any type)
- Hypothermia (< 36.5°C)
- Infection or other illness
- Poor condition at birth
- Cord / scalp pH < 7.05 or Base Excess below -12
- Resuscitation > 5 minutes
- Apgar < 7 at 5 minutes
- Maternal use of β blockers (e.g. Labetolol)

*Signs of Hypoglycaemia
Apnoea
Cyanosis
Poorly responsive/sleepy
Convulsions
Jittery

Inform neonatal team.
Ensure effective breast feed.
If blood sugar 1 hour later <2.6mmol/L then:
Give 10mls/Kg of EBM by NG tube or cup with consent. If EBM not available give 10mls/Kg of formula by NG tube or cup with verbal consent.
Repeat blood glucose after 1 hour

Yes

No
2.7 Management of Babies at risk of Hypoglycaemia – Formula Fed

Has the baby had an effective feed?

- Yes
  - Review regularly
  - Feed at least 3 hourly
  - Encourage mothers to respond to early feeding cues
  - Encourage further skin-to-skin contact
  - Keep baby warm
  - Check blood glucose before second feed (not before 2 hours old)

- No
  - Has the baby had an effective feed?

Pre feed Blood Sugar ≥ 2.6 mmol/L?

- Yes
  - Continue to monitor blood glucose for 48 hours, or until ≥ 2.6mmol/L for 3 consecutive measurements

- No
  - Inform neonatal team
  - Give 10mls/kg of formula by NG tube or cup
  - Repeat blood glucose after 1 hour

If at any point

- Baby appears unwell OR
- Blood sugar is <1.1 mmol/L

Urgently discuss with Neonatal Team

At Risk Babies

- Preterm (<37 weeks gestation)
- Low birth weight (<2.5kg)
- Large for dates > 4.5Kg
- Maternal diabetes mellitus (any type)
- Hypothermia (<36.5°C)
- Infection or other illness
- Poor condition at birth
- Cord / scalp pH < 7.05 or BE below -12
- Resuscitation > 5 minutes
- Apgar < 7 at 5 minutes
- Maternal use of β blockers (e.g. Labetolol)

*Signs of Hypoglycaemia
- Apnoea
- Cyanosis
- Poorly responsive/sleepy
- Convulsions
- Jittery

Discuss with Neonatal Team
2.8 **Management of Babies with Hypoglycaemia - Blood sugar < 2.6 mmol/L**

- Baby should be reviewed by Neonatal SHO / ANNP.
  - Check for symptoms.
  - Check lab blood glucose (Fluoride Oxalate – yellow top)
  - Act on blood gas machine glucose (if not available Glucometer) whilst awaiting lab glucose.

- **Baby asymptomatic and well**
  - Try for an effective breast feed
    - If not - Give further feed / top up of 10mls/kg
    - Check blood sugar 1 hour afterwards
    - Continue to monitor pre feed blood glucose

- If blood sugar remains consistently < 2.6 mmol/L
  - Offer 10mls/kg EBM
  - Start a 10% Dextrose infusion at normal daily rate
  - **Consider hypoglycaemia screen**

- **Blood sugar < 1.1 mmol/L Or Baby appears unwell**
  - **URGENT correction required – Admit to NICU**

- **IV Access**
  - If unable to gain IV access
    - Administer 0.5mls/kg of glucose gel onto buccal mucosa
    - Consider IM Glucagon 200microg/kg
    - Get senior help for IV access

- **Give 2.5mls/kg IV bolus of 10% Dextrose.**
  - Start a 10% Dextrose IV infusion at normal daily rate.
  - Recheck blood glucose 30 mins after bolus

- **Signs of Hypoglycaemia**
  - Apnoea
  - Cyanosis
  - Poorly responsive/sleepy
  - Convulsions
  - Jittery

- **Dextrose concentrations > 12.5% needs to be administered centrally (long line/UVC)**

- **If blood glucose remains consistently < 2.6 mmol/l ↑ infusion rate +/- Dextrose concentration**
  - Be cautious of inducing hyponatraemia due to excess fluid - ↑ dextrose concentration rather than rate if this is a risk
3. Monitoring compliance and effectiveness

<table>
<thead>
<tr>
<th>Element to be monitored</th>
<th>Key changes in practice recommended by guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>Dr Paul Munyard. Consultant Paediatrician and Neonatologist.</td>
</tr>
<tr>
<td>Tool</td>
<td>Audit. To be included in the Neonatal Clinical Audit Programme. Findings reported to the Directorate Audit Meeting / Governance meeting.</td>
</tr>
<tr>
<td>Frequency</td>
<td>As dictated by audit findings</td>
</tr>
<tr>
<td>Reporting arrangements</td>
<td>Child Health Directorate Audit and Clinical Guidelines meeting.</td>
</tr>
<tr>
<td>Acting on recommendations and Lead(s)</td>
<td>Paul Munyard. Consultant Paediatrician and Neonatologist</td>
</tr>
<tr>
<td>Change in practice and lessons to be shared</td>
<td>Required changes to practice will be identified and actioned within 3 months. A lead member of the team will be identified to take each change forward where appropriate. Lessons will be shared with all the relevant stakeholders</td>
</tr>
</tbody>
</table>

4. Equality and Diversity

4.1. This document complies with the Royal Cornwall Hospitals NHS Trust service Equality and Diversity statement which can be found in the 'Equality, Diversity & Human Rights Policy or the Equality and Diversity website.

4.2. Equality Impact Assessment
The Initial Equality Impact Assessment Screening Form is at Appendix
## Appendix 1. Governance Information

<table>
<thead>
<tr>
<th>Document Title</th>
<th>Neonatal Hypoglycaemia – Clinical Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Issued/Approved:</td>
<td>November 2014</td>
</tr>
<tr>
<td>Date Valid From:</td>
<td>November 2014</td>
</tr>
<tr>
<td>Date Valid To:</td>
<td>November 2017</td>
</tr>
<tr>
<td>Contact details:</td>
<td>(01872) 252681</td>
</tr>
<tr>
<td>Brief summary of contents</td>
<td>This guideline is designed to ensure the implementation of a standardised approach to the investigation and management of neonatal hypoglycaemia.</td>
</tr>
<tr>
<td>Suggested Keywords:</td>
<td>Neonatal. Hypoglycaemia. Investigation. Management. Unstable blood sugar</td>
</tr>
<tr>
<td>Target Audience</td>
<td>RCHT PCH CFT KCCG (✓)</td>
</tr>
<tr>
<td>Executive Director responsible for Policy:</td>
<td>Executive Director</td>
</tr>
<tr>
<td>Date revised:</td>
<td>12 November 2014</td>
</tr>
<tr>
<td>This document replaces (exact title of previous version):</td>
<td>Clinical Guideline for the Investigation and Management of Neonatal Hypoglycaemia</td>
</tr>
<tr>
<td>Approval route (names of committees)/consultation:</td>
<td>Paediatric Consultants Child Health Audit and Guidelines meetings</td>
</tr>
<tr>
<td>Divisional Manager confirming approval processes</td>
<td>Sheena Wallace</td>
</tr>
<tr>
<td>Name and Post Title of additional signatories</td>
<td>Not Required</td>
</tr>
<tr>
<td>Signature of Executive Director giving approval</td>
<td>{Original Copy Signed}</td>
</tr>
<tr>
<td>Publication Location (refer to Policy on Policies – Approvals and Ratification):</td>
<td>Internet &amp; Intranet (✓) Intranet Only</td>
</tr>
<tr>
<td>Document Library Folder/Sub Folder</td>
<td>Neonatal</td>
</tr>
<tr>
<td>Links to key external standards</td>
<td>None</td>
</tr>
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</table>
Related Documents:


Training Need Identified? No

Version Control Table

<table>
<thead>
<tr>
<th>Date</th>
<th>Version No</th>
<th>Summary of Changes</th>
<th>Changes Made by</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 2014</td>
<td>V2.0</td>
<td>Review and amended in accordance with Baby Friendly Initiative recommendations</td>
<td>Paul Munyard. Consultant Paediatrician and Neonatologist.</td>
</tr>
</tbody>
</table>

[Please complete all boxes and delete help notes in blue italics including this note]

All or part of this document can be released under the Freedom of Information Act 2000

This document is to be retained for 10 years from the date of expiry.

This document is only valid on the day of printing

Controlled Document

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# Appendix 2. Initial Equality Impact Assessment Form

| Name of the strategy : Neonatal Hypoglycaemia - Clinical Guideline |
|-------------------------|----------------------------------|----------------------------------|
| Directorate and service area: | Is this a new or existing Policy |
| Name of individual completing assessment: Dr Paul Munyard | Telephone: |
| | (01872) 24 2681 |

<table>
<thead>
<tr>
<th>1. Policy Aim*</th>
<th>Who is the strategy / policy / proposal / service function aimed at?</th>
</tr>
</thead>
<tbody>
<tr>
<td>This guideline is aimed at hospital based staff responsible for neonatal care</td>
<td></td>
</tr>
</tbody>
</table>

| 2. Policy Objectives* | |
|-----------------------||
| As above |

| 3. Policy – intended Outcomes* | |
|-------------------------------||
| Evidence based and standardised practice |

| 4. *How will you measure the outcome? | |
|--------------------------------------||
| Audit |

| 5. Who is intended to benefit from the policy? | |
|-----------------------------------------------||
| Neonatal, Midwifery and Paediatric staff. | |
| Neonatal patients | |

| 6a) Is consultation required with the workforce, equality groups, local interest groups etc. around this policy? | |
|------------------------------------------------------------------------------------------------------------------||

<table>
<thead>
<tr>
<th>6b) If yes, have these *groups been consulted?</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>6c). Please list any groups who have been consulted about this procedure.</th>
</tr>
</thead>
</table>

7. The Impact

Please complete the following table.

<table>
<thead>
<tr>
<th>Equality Strands:</th>
<th>Yes</th>
<th>No</th>
<th>Rationale for Assessment / Existing Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

Neonatal Hypoglycaemia – Clinical Guideline
Sex (male, female, trans-gender / gender reassignment) x
Race / Ethnic communities /groups x
Disability - learning disability, physical disability, sensory impairment and mental health problems x
Religion / other beliefs x
Marriage and civil partnership x
Pregnancy and maternity x
Sexual Orientation, Bisexual, Gay, heterosexual, Lesbian x

You will need to continue to a full Equality Impact Assessment if the following have been highlighted:
- You have ticked “Yes” in any column above and
- No consultation or evidence of there being consultation- this excludes any policies which have been identified as not requiring consultation. or
- Major service redesign or development

8. Please indicate if a full equality analysis is recommended. No

9. If you are not recommending a Full Impact assessment please explain why.

No area indicated

Signature of policy developer / lead manager / director. Paul Munyard
Date of completion and submission 12:11:2014

Names and signatures of members carrying out the Screening Assessment

Keep one copy and send a copy to the Human Rights, Equality and Inclusion Lead, c/o Royal Cornwall Hospitals NHS Trust, Human Resources Department, Knowledge Spa, Truro, Cornwall, TR1 3HD

A summary of the results will be published on the Trust’s web site.

Signed _______Kim Smith_________
Date _________12:11:2014_________