MANAGEMENT OF INFANTS BORN TO MOTHERS WITH THYROID PROBLEMS - NEONATAL CLINICAL GUIDELINE

If any of:
- Family history of activating TSH receptor mutations
- Clinical thyrotoxicosis in mother in 3rd trimester
- Signs of fetal thyrotoxicosis
- If TSH-Receptor Antibody (TRAb) status known
- Raised Thyroid Stimulating Immunoglobulin (TSI)

Inform neonatologist preferably ante-natally as baby at high risk of thyrotoxicosis

Type of Mother’s thyroid disease

Hyperthyroidism = overactive thyroid = thyrotoxicosis = Graves Disease

Is currently on or ever been treated with Carbimazole/Propylthiouracil (PTU) or had Thyroid surgery or Radio- iodine treatment

Advise hospital delivery and 24 hr check

Advise hospital delivery and daily check

Low risk of HYPOTHYROIDISM

Low Risk
- Postnatal referral to neonatal staff not required
- Will be picked up by Neonatal Screening

Risk of HYPERTHYROIDISM

Medium Risk:
- Postnatal referral to Neonatal Clinic
- At postnatal discharge arrange:
  - Day 10-14 TFTs and examination

High risk of HYPERTHYROIDISM

High Risk (Rare)
- Neonatal team to review daily for first 24-48hrs
- At discharge arrange:
  - Day 5-7 TFTs & exam.
  - PLUS
  - Day 10-14 TFTs & exam

Where high level of suspicion of thyrotoxicosis advise parents to watch for poor feeding, panting for breath, excessive wakefulness, sweating, loose stools, weight loss

If baby is symptomatic they will need to be checked by a Paediatric doctor via NNU clinic or more urgently via Paediatric Registrar on-call.
1. **Aim/Purpose of this Guideline**

   1.1. This guideline applies to Neonatal/Paediatric and Midwifery/Obstetric Staff involved in the care of neonates in acute and community settings whose mothers are or have been affected by thyroid disorders. The guideline is adapted from accepted current practice in Bristol Children’s Hospital.

2. **The Guidance**

   2.1 **Background.**

   It is common for Thyroid Stimulating Hormone (TSH) and free T4 to be raised in the first days of life as a normal acute phase response. Thyrotoxicosis features **suppressed** TSH levels.

   2.2 **Antenatal History**

   - **Maternal Hypothyroidism** with no history of hyperthyroidism, treated with Thyroxine only, carries a low risk to the newborn and requires routine neonatal blood spot screening only.
   
   If secondary to Hashimoto’s thyroiditis there may be thyroid inhibiting antibodies or rarely Thyroid Stimulating Immunoglobulin (TSI). Babies of these mothers will need TSH and T4 check at 10 days old.

   - **Maternal Hyperthyroidism** carries medium to high risks for their baby. Hospital delivery is advised. See section 2.6 Management flow chart for guidance for monitoring required.

   Hyperthyroidism treated or untreated during pregnancy increases the risk of fetal and maternal complications. Antithyroid (thyrostatic) drugs Propylthiouracil (PTU) and Carbimazole (CBZ) inhibit the synthesis of T3 and T4. Both drugs cross the placenta and could cause fetal hypothyroidism and goitre. Carbimazole has been associated with aplasia cutis, oesophageal and choanal atresia in case reports, so PTU is preferred.

   2.3 **Features of neonatal thyrotoxicosis**

   These may be present at birth or delayed for several days. Affected infants will usually be symptomatic by 10 days old. Features include goitre, tachycardia, periorbital oedema, weight loss, diarrhea, sweating, hepatosplenomegaly, bruising and petechiae.

   **Breast feeding**

   PTU less than 750mg and Carbimazole less than 15mg/day are considered safe and do not interfere with the neonatal thyroid function. **PTU is excreted in much lower quantities into milk and is preferable.** Thyroxine taken by the mother is not a contraindication to breast feed and should not interfere with the Guthrie test.
2.5. Normal thyroid function test ranges

Note: Normal TFTs ranges for neonates differ from older children. Premature infants have physiological hypothyroxinaemia for T4, free T4 and low normal TSH.

<table>
<thead>
<tr>
<th>Normal ranges in infants</th>
<th>TSH (mU/L)</th>
<th>Free T4 (pmol/L)</th>
<th>Free T3 (pmol/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cord Blood – 48 hours</td>
<td>3-120</td>
<td>16.7-48.3</td>
<td>2.5-9.3</td>
</tr>
<tr>
<td>4-7 days post-natally</td>
<td>0.3-6</td>
<td>13.7-28</td>
<td>2.8-5.7</td>
</tr>
<tr>
<td>Preterm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28-36 weeks cord blood – 48 hours</td>
<td>0.7-27</td>
<td>11.3-24</td>
<td>1.2-7.3</td>
</tr>
<tr>
<td>28-36 weeks 4-10 days Post-natally</td>
<td>0.7-27</td>
<td>10-30</td>
<td>1.2-4.9</td>
</tr>
</tbody>
</table>

2.6 Treatment of Neonates with Thyrotoxicosis

There are risks of significant morbidity and mortality for affected infants. Treatment decisions are complex and should be discussed with a Paediatric Endocrinologist or a Paediatric Consultant with an interest in endocrinology (Dr Kumar at RCHT)

1. Infants with raised fT4 and suppressed TSH: significant biochemical abnormalities indicate thyrotoxicosis but depending on whether clinical signs are present, treatment may be required (carbimazole alone) Discuss with Consultant
2. Infants with abnormal biochemistry and adrenergic clinical signs: tachycardia, wakefulness, tachypnoea should be treated with Carbimazole and Propranolol. Discuss with Bristol
3. Infants with evidence of actual or incipient cardiac failure: Discuss with Bristol/possible transfer for review. As well as Carbimazole and Propranolol consideration should be given to Lugol’s Iodine and rarely, Prednisolone

2.7 Drug Therapy options for above

**Carbimazole**: 250 micrograms/kg 3 times daily (Severe thyrotoxic crisis may require higher dose) Blocks thyroid hormone synthesis but doesn’t inhibit the release of preformed thyroid hormones

**Propranolol**: 250-500 micrograms/kg 3 times daily. Helps control symptoms due to adrenergic stimulation and inhibits T4 to T3 deiodination

**Lugol’s Iodine**: (Rare) 1 drop 3 times daily. Usual duration 3 days, maximum 7 days. Promptly blocks preformed thyroid hormone release and reduces thyroid hormone synthesis

**Prednisolone**: 2mg/kg/day (rare) Inhibits thyroid hormone release and inhibits peripheral conversion of T4 to T3

2.8 Progress and monitoring

Aim is to abolish hyperthyroidism without causing hypothyroidism.
- Titrate treatment against clinical response. Stop Propranolol once clinically euthyroid
- Measure TFTs every 2 weeks. If fT4 in normal range reduce Carbimazole dose by 25% (TSH suppression often shows a 2-3 week lag so don't wait for that in order to reduce dose)
- Continue this consideration of dose reduction according to TFTs every 2 weeks
- Maternal antibodies have approx. 6 week half life. Treatment may be needed for 8-12 weeks
- FBC should be performed if clinical evidence of infection, not routinely (Carbimazole may cause agranulocytosis in 0.03% of patients)

2.9 Prognosis
Excessively high dose of prolonged use of antithyroid treatment can lead to subsequent period of thyroid suppression ie. hypothyroidism. Ensure 2 normal TFTs after withdrawal of treatment.
Rarely (if severe/prolonged duration of many months) there is a risk of craniosynostosis and developmental delay so monitor head circumference growth and development in those cases.
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 neonatal clinical audit programme. Findings reported to the Child Health Directorate Audit / 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 / Clinical Guidelines meeting</td>
</tr>
<tr>
<td>Acting on recommendations and Lead(s)</td>
<td>Dr 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 of audit. 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 2.
### Appendix 1. Governance Information

<table>
<thead>
<tr>
<th>Document Title</th>
<th>Management of infants born to mothers with thyroid problems – neonatal clinical guideline</th>
</tr>
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<tbody>
<tr>
<td>Date Issued/Approved:</td>
<td>November 2016</td>
</tr>
<tr>
<td>Date Valid From:</td>
<td>November 2016</td>
</tr>
<tr>
<td>Date Valid To:</td>
<td>November 2019</td>
</tr>
<tr>
<td>Contact details:</td>
<td>(01872) 252667</td>
</tr>
<tr>
<td>Brief summary of contents</td>
<td>This guideline is designed to ensure the implementation of a standardised approach to the management of infants born to mothers with thyroid disease.</td>
</tr>
<tr>
<td>Suggested Keywords:</td>
<td>Neonatal. Infants. Thyroid disease</td>
</tr>
<tr>
<td>Target Audience</td>
<td>RCHT ✓ PCH CFT KCCG</td>
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<tr>
<td>Executive Director responsible for Policy:</td>
<td>Executive Director</td>
</tr>
<tr>
<td>Date revised:</td>
<td>October 2016</td>
</tr>
<tr>
<td>This document replaces (exact title of previous version):</td>
<td>Clinical guideline for neonatal management of infants born to mothers with thyroid disease</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>David Smith</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, Child Health, Midwifery</td>
</tr>
<tr>
<td>Links to key external standards</td>
<td>No</td>
</tr>
</tbody>
</table>
Related Documents:

1. Management of infants of mother with thyroid disease
   Clinical guideline Dr.C.Burren, Consultant
   Endocrinologist 2016 Bristol Children’s Hospital
2. Haddow,JE et al Maternal Thyroid deficiency during
   pregnancy and subsequent neurophysiological
   development of the child. New England Journal
   Medicine 1999;341:549-55
3. Pearce, EN Diagnosis and management of
   Thyrotoxicosis. BMJ 2006;332:1369-73
4. Drugs during pregnancy and lactation(2007) 2nd
   ed.Schaefer,C,Peters,P.,Miller,R
5. Laurberg,P et al Guidelines for TSH receptor antibody
   measurements in pregnancy; results of an evidence
   based symposium organised by the European
   Thyroid Association
6. AL Ogilvy-Stuart, Midgley. Practical Neonatal
7. BNF-C 2013 British National Formulary for Children
   BMJ Publications

Training Need Identified? No

Version Control Table

<table>
<thead>
<tr>
<th>Date</th>
<th>Version</th>
<th>Summary of Changes</th>
<th>Changes Made by</th>
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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
This document has been created following the Royal Cornwall Hospitals NHS Trust Policy on Document Production. It should not be altered in any way without the express permission of the author or their Line Manager.
### Appendix 2. Initial Equality Impact Assessment Form

Name of the strategy / policy / proposal / service function to be assessed (hereafter referred to as policy):
Management of infants born to mothers with thyroid problems – Neonatal clinical guideline

<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Name of individual completing assessment:</td>
<td>Judith Clegg</td>
</tr>
<tr>
<td>Telephone:</td>
<td>01872 252667</td>
</tr>
</tbody>
</table>

1. **Policy Aim***
   Who is the strategy / policy / proposal / service function aimed at?
   To provide guidance on the management of infants born to mothers with thyroid disease.

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 medical staff.
   Neonatal patients

6a) **Is consultation required with the workforce, equality groups, local interest groups etc. around this policy?**
   No. Neonatal Guidelines Group consultant approved guideline

b) **If yes, have these *groups been consulted?**

C) **Please list any groups who have been consulted about this procedure.**

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><strong>Age</strong></td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 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

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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.  

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
</tr>
</tbody>
</table>

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

No area indicated

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Signature of policy developer / lead manager / director  
Paul Munyard  
Date of completion and submission  
November 2014

Names and signatures of members carrying out the Screening Assessment

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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_______

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Management of infants born to mothers with thyroid problems - neonatal clinical guideline  
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Appendix 3

Parent Information Sheet for infants born to Mothers with Thyroid Problems

**QUESTION**
If I have only ever had hypothyroidism (an under active thyroid) and only ever treated with thyroxine, will my baby require any extra observation or tests?

**ANSWER**
No. Your baby will have the routine day 5 newborn blood spot check and will not require further tests or investigation.

**QUESTION**
If I have had hyperthyroidism or being treated for hyperthyroidism or had surgery, will my baby need extra observations or blood tests?

**ANSWER**
Yes, we would suggest a hospital delivery and your baby may need to be observed for 24 to 48 hours. Depending on individual situations your baby may need further examinations and blood tests at 5 to 7 days and at 10 to 14 days. A member of the paediatric team will talk to you after delivery to advise you about this. Arrangements will be made for these appointments prior to your discharge from hospital.

If you are concerned about your baby and issues related to Thyroxine, then you can telephone Dr Kumar’s secretary on x 2681.