HEART MURMUR – NEONATAL CLINICAL GUIDELINE

Assessment of neonate with cardiac murmur

Heart murmur at >24 hours of age
Or Cyanosis
Or Lower limb sats <98%
Or >3% pre and post ductal difference Or Absent/weak femorals

Suspect congenital heart disease

Neonatal service Consultant review
Cardiovascular examination
Pre and post ductal saturations
ECG
Delay discharge until >24 hours old

ANY of the following:
Signs of heart failure/shock
Lower limb saturations <96%
>3% pre and post ductal difference
Absent/weak femoral pulses

Significant congenital heart disease

ANY of the following:
Loud murmur (>2/6)
Heave
Pansystolic/diastolic/continuous
Location other than LSE
Abnormal ECG
Murmur + dysmorphic

Congenital heart disease

ALL of the following:
Well baby
No signs of heart failure
Normal pulses
Lower limb saturations >95%
Soft systolic murmur (≤2/6)

Low risk of congenital heart disease

URGENT
Admit NNU
Same day review and ECHO by cardiologist/PEC/telemedicine
Consider prostaglandins

ECHO pre discharge or within 1 week of age
Cardiac referral by neonatal Consultant
Use NEOCARD clinic slot for urgent review within 1 week of age in Cardiac clinic

ROUTINE
Outpatient review by 2 weeks of age by neonatal service consultant

If murmur still present

Cardiac referral form handed over to secretary
To be seen within 4 weeks of age in Cardiac clinic
1. **Aim/Purpose of this Guideline**
   1.1. This guideline is designed to support clinical staff, both medical and nursing, involved in the care of an infant with a heart murmur.

2. **The Guidance**
   2.1 Background.

   A heart murmur heard in the neonatal period may be associated with congenital heart disease. However, it must be remembered that not all infants with congenital heart disease have a heart murmur in the neonatal period.

   **A neonate with any of the following findings needs urgent assessment including echocardiogram even if a murmur is not present:** signs of heart failure (see below) or shock, lower limb saturations <96% in the absence of respiratory disease, >3% difference in pre and post ductal saturations, absent/weak femoral pulses. These infants require urgent admission to NNU and assessment.

   Investigation will vary depending upon local resources and expertise. The following recommendations represent the minimum requirements to ensure the safe management of neonates with heart murmurs and the timely identification of congenital heart disease.

   2.2 Guideline
   - All infants with a heart murmur on neonatal examination should have a detailed assessment according the green/amber/red chart, and reviewed by a senior paediatrician (middle grade or consultant) – if not in the green category, or unsure, this should be a prompt assessment.
   - All infants with a heart murmur should remain in hospital until >24 hours old (unless definitive diagnosis is reached before this)
   - All infants with a heart murmur should have a detailed cardiovascular clinical examination that must include measurement of pre and post ductal saturations.
   - If a baby with a heart murmur is discharged before a definitive diagnosis is reached, the parents should be given a written information leaflet describing warning signs and advising them of what to do in the event that their baby became unwell - see appendix

2.3 **Clinical examination:**
   - Dysmorphic features
   - Signs of heart failure (tachypnoea, increased respiratory effort, hepatomegaly, shock)
   - Palpation of brachial and femoral pulses
   - Presence of cyanosis (as measured by lower limb saturations – a reading < 96% should prompt further investigation
   - Presence of a subcostal heave +/- active precordium
   - Heart sounds
   - Murmur – intensity, character, location and radiation

2.4 **Investigations**
   **Electrocardiogram (ECG)**
   Considered mandatory in all newborns with a murmur or Down syndrome (with or without a murmur). In Down syndrome ECG is sensitive and specific in the diagnosis
of atrioventricular septal defect but has not been shown to aid the diagnosis of other structural congenital heart disease
A normal neonatal ECG shows right axis deviation because of the right ventricular dominance of the newborn heart. Left axis deviation in a newborn is a significant abnormal finding and should prompt further investigation.
Whilst an abnormal ECG should prompt further investigation, a normal ECG should not be considered reassuring if there are abnormal clinical findings or lower limb saturations <96%

**CXR and 4 limb blood pressure**
There is no evidence to support the use of CXR or 4 limb blood pressure measurements in the assessment of neonates with heart murmurs

**Echocardiography - ECHO**
This is the gold standard investigation for differentiating between innocent and pathological murmurs. Some units will undertake an echocardiogram in all neonates with heart murmurs.

- **Likely significant congenital heart disease (RED)** - Infants with a heart murmur and any of the following warning signs: lower limb saturations < 96%; absent/weak femoral pulses; signs of heart failure or shock – **admit to NNU**, stabilise, consider for prostaglandin infusion, arrange **urgent ECHO** and review (same day). ECHO by Paediatric cardiologist, or Paediatrician with Expertise in Cardiology (PEC) or by telemedicine link to Bristol.
- **Asymptomatic but clinically pathological murmur - (AMBER) – ECHO soon** (pre-discharge or by 1 week of age). Infants without any of the above warning signs but with any of the following abnormal clinical findings: dysmorphism; heave; abnormal heart sounds; loud murmur (>2/6); pansystolic, diastolic, continuous murmur; murmur location other than left sternal edge /radiation; abnormal ECG
- **Likely non-pathological murmur - (GREEN) outpatient review by 2** weeks of age by neonatal service consultant. Well infants with no signs of heart failure, normal pulses, lower limb saturations >96%, soft (1-2/6) systolic murmur at the left sternal edge with no radiation. Infant’s consultant will refer for outpatient review on Gwithian in 2- 4 weeks with Paediatrician with expertise in Cardiology.

**Getting an Urgent ECHO:**
1. Inform neonatal service consultant so that they can contact Paediatrician with Cardiology expertise to discuss case.
2. If out of hours it is the service consultant’s decision whether to contact Paediatrician with Cardiology expertise
3. In the event of being unavailable Paediatrician with Cardiology expertise to perform an urgent ECHO the duty consultant will need to liaise with the Bristol Children’s Hospital paediatric cardiology service/on call consultant for advice. The Truro service consultant may also wish to consider liaising with Derriford NNU service/on call consultant to discuss the feasibility of arranging an urgent ECHO.
3. Monitoring compliance and effectiveness

This part must provide information on the processes and methodology for monitoring compliance with, and effectiveness of, the policy using the table below.

<table>
<thead>
<tr>
<th>Element to be monitored</th>
<th>Key Changes to practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>Dr. Sam Padmanabhan</td>
</tr>
<tr>
<td>Tool</td>
<td>Audit</td>
</tr>
<tr>
<td>Frequency</td>
<td>As dictated by audit findings</td>
</tr>
<tr>
<td>Reporting arrangements</td>
<td>Include in neonatal clinical audit programme, findings reported to the directorate audit meeting / Governance meeting</td>
</tr>
<tr>
<td>Acting on recommendations and Lead(s)</td>
<td>Dr. Sam Padmanabhan. Consultant Paediatrician with expertise in Cardiology</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 2.
## Appendix 1. Governance Information

<table>
<thead>
<tr>
<th>Document Title</th>
<th>Neonatal Murmur Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Issued/Approved:</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; May 2016</td>
</tr>
<tr>
<td>Date Valid From:</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; May 2016</td>
</tr>
<tr>
<td>Date Valid To:</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; May 2019</td>
</tr>
<tr>
<td>Directorate / Department responsible (author/owner):</td>
<td>Dr Andrew Collinson. Consultant Paediatrician and Neonatologist</td>
</tr>
<tr>
<td>Contact details:</td>
<td>(01872) 252667</td>
</tr>
<tr>
<td>Brief summary of contents</td>
<td>This guideline outlines the clinical responsibilities of staff involved in the management of neonate with murmur</td>
</tr>
<tr>
<td>Suggested Keywords:</td>
<td>Neonatal. Neonate. Newborn. Cardiac. Heart Murmur</td>
</tr>
<tr>
<td>Target Audience</td>
<td>RCHT</td>
</tr>
<tr>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Executive Director responsible for Policy:</td>
<td>Medical Director</td>
</tr>
<tr>
<td>Date revised:</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; May 2016</td>
</tr>
<tr>
<td>This document replaces (exact title of previous version):</td>
<td>CLINICAL GUIDELINE FOR THE MANAGEMENT OF THE NEONATE WITH A HEART MURMUR</td>
</tr>
<tr>
<td>Approval route (names of committees)/consultation:</td>
<td>Consultant approval. Child Health Directorate Audit. Neonatal Clinical Guidelines Group</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>Links to key external standards</td>
<td>None</td>
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### 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 (Name and Job Title)</th>
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<tr>
<td>December 2016</td>
<td>V1.0</td>
<td>Initial issue.</td>
<td>Andrew Collinson. Consultant Paediatrician and Neonatologist</td>
</tr>
<tr>
<td>January 2016</td>
<td>V.2</td>
<td>Inclusion of algorithm Consultant Approved</td>
<td>Author: Sam Padmanabhan Consultant Paediatrician with cardiac Interest. Dr Lianne Doherty</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Formatter: Kim Smith. Staff Nurse.</td>
</tr>
</tbody>
</table>

**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**

This document has been created following the Royal Cornwall Hospitals NHS Trust
Appendix 2. Initial Equality Impact Assessment Form

Name of the strategy / policy / proposal / service function to be assessed (hereafter referred to as policy) (Provide brief description):
Heart Murmur – Neonatal Clinical Guideline

| Directorate and service area: Child and Women’s Health. Neonatal | Is this a new or existing Policy? New |
| Name of individual completing assessment: Dr. Paul Munyard. | Telephone: (01872) 252667 |

1. Policy Aim*
Who is the strategy / policy / proposal / service function aimed at?
This guideline is aimed at clinical staff responsible for the immunisation of infants and children

2. Policy Objectives*
As above

3. Policy – intended Outcomes*
Audit

4. *How will you measure the outcome?
Audit

5. Who is intended to benefit from the policy?
Patients.
Medical and nursing staff.

6a) Is consultation required with the workforce, equality groups, local interest groups etc. around this policy?
No. Consultant approved.

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

C). Please list any groups who have been consulted about this procedure.
N/A

7. The Impact
Please complete the following table.

Are there concerns that the policy **could** have differential impact on:

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

Heart Murmur – Neonatal Clinical Guideline

Page 7 of 10
<table>
<thead>
<tr>
<th>Age</th>
<th>x</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (male, female, transgender / gender reassignment)</td>
<td>x</td>
</tr>
<tr>
<td>Race / Ethnic communities /groups</td>
<td>x</td>
</tr>
<tr>
<td>Disability - learning disability, physical disability, sensory impairment and mental health problems</td>
<td>x</td>
</tr>
<tr>
<td>Religion / other beliefs</td>
<td>x</td>
</tr>
<tr>
<td>Marriage and civil partnership</td>
<td>x</td>
</tr>
<tr>
<td>Pregnancy and maternity</td>
<td>x</td>
</tr>
<tr>
<td>Sexual Orientation, Bisexual, Gay, heterosexual, Lesbian</td>
<td>x</td>
</tr>
</tbody>
</table>

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
Dr Sam Padmanabhan

Date of completion and submission
1 June 2016

Names and signatures of members carrying out the Screening Assessment
1. 2.

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 ___________ 1 JUNE 2016 __________
Appendix 3 Information sheet for Parents / Carers

HEART MURMURS IN THE NEWBORN
INFORMATION FOR PARENTS

What is a heart murmur?
A heart murmur is an extra noise which is heard when the heart is listened to with a stethoscope.

Does a heart murmur mean there is heart problem?
Not necessarily. A heart murmur can sometimes be a sign that there is a problem with the heart like a small hole or a narrowing. However many babies with heart murmurs have completely normal hearts. (These babies have what are known as “innocent” or “normal” heart murmurs.)

How will I know if my baby has a heart problem?
If a heart murmur is heard within the initial 2 weeks, your baby will be seen in clinic by a Consultant within 2 weeks. If the murmur can still be heard and then your baby will be referred to a paediatrician with expertise in heart problems who may do further tests within first 4 weeks of age. If there are concerns at any stage in the medical assessment based on severity further investigations will be carried out if needed.

What should I look out for?
Most babies with heart murmurs remain well but if your baby becomes unwell they should be seen urgently by a doctor. Things to look out for include: breathing difficulties; becoming breathless or sweaty when feeding; poor feeding; blue colour of skin and lips or mottled skin.

What should I do if my baby becomes unwell?
You should seek urgent medical advice. If acutely unwell phone your GP or out of hours service or 999. For non urgent advice in working hours phone the neonatal secretaries on 01872 252681. Explain that your baby has a heart murmur and has become unwell.

Points to remember
- A heart murmur is an extra noise heard when listening with a stethoscope.
- Many babies with heart murmurs have completely normal hearts.
- A heart murmur can sometimes be a sign of an underlying heart problem.
- IF YOUR BABY BECOMES UNWELL SEEK URGENT MEDICAL ADVICE.
Heart Murmur – Neonatal Clinical Guideline

Appendix 4 Neonatal Murmur – Cardiac Referral form

<table>
<thead>
<tr>
<th>Name</th>
<th>Today’s date</th>
<th>Consultant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CR Number</td>
<td>Gestational age at birth</td>
<td>Current age</td>
</tr>
<tr>
<td>DOB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Anteatal abnormality**
- Current health: Any shortness of breath, Sweating, Poor colour, Feeding or weight gain issues

**Examination findings now:**
- **Murmur**
  - Yes / No
  - Character: Pan systolic / Ejection/ Continuous /Diastolic
  - Intensity: Loud/Soft
  - Position and Radiation: Upper left sternal edge, Lower left sternal edge, All over precordium, Radiation to back
- **Pulse**
  - Rate
  - Volume: Normal / Low /Bounding
  - Femoral: Easy / Difficult
- **Hepatomegaly**
  - Pre ductal SaO2
  - Post ductal SaO2
- **Respiratory rate**
- **CXR (if done)**
- **Dysmorphisms: yes/no**

**ECG findings (mandatory)**
- **Rhythm**
- **Axis**
- **LVH yes/no**
- **QTc interval**
- **Pre-excitation**
- **Any other findings**

**Any other relevant details**
- Other anomalies with potential cardiac associations
  - Turner’s/Trisomy/Noonan/Martin’s/ Connective tissue disorder
  - Family History of cardiac problems (Not ischemic heart disease)
  - Cardiomyopathies

**Cardiac review request**
- **RED to see Urgently**
  - Neonatal / On call consultant will phone paediatric consultant with expertise in Cardiology

**Cardiac review request**
- **AMBER to see within 7 days of age**
  - Form counter signed by neonatal service/on call consultant
  - Book NEOCARD urgent appointment slot (2 slots/week) cardiac clinic and inform paediatric consultant with expertise in Cardiology and Hand over the referral form to neonatal secretary to book clinic who will upload on maxim

**Cardiac review request**
- **GREEN to see between 2-4 weeks of age**
  - Form counter signed by neonatal service/on call consultant
  - Hand over the referral form to neonatal secretary to book clinic

**Name and signature**
**Designation**
**Contact details**

Management of the neonate with a heart murmur.
Review Authors: L Doherty, S Padmanabhan March 2016.