**A Clinical Guideline recommended for use**

<table>
<thead>
<tr>
<th>For Use in:</th>
<th>Blakeney Ward, Delivery Suite, Neonatal Unit</th>
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<tbody>
<tr>
<td>By:</td>
<td>Neonatal Senior House Officers (SHOs), Advanced Neonatal Nurse Practitioners (ANNPs), Midwifery Neonatal Examiners (MNEs)</td>
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<tr>
<td>For:</td>
<td>Healthy Neonates not in Intensive Care</td>
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<td>Division responsible for document:</td>
<td>Division 3</td>
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<td>Clinical Standards Group and Effectiveness Sub-board</td>
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<tr>
<td>Compliance links: (is there any NICE related to guidance)</td>
<td>None</td>
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<tr>
<td>If Yes – does the strategy/policy deviate from the recommendations of NICE? If so, why?</td>
<td>N/A</td>
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This guideline has been approved by the Trust's Clinical Guidelines Assessment Panel as an aid to the diagnosis and management of relevant patients and clinical circumstances. Not every patient or situation fits neatly into a standard guideline scenario and the guideline must be interpreted and applied in practice in the light of prevailing clinical circumstances, the diagnostic and treatment options available and the professional judgement, knowledge and expertise of relevant clinicians. It is advised that the rationale for any departure from relevant guidance should be documented in the patient’s case notes.

The Trust's guidelines are made publicly available as part of the collective endeavour to continuously improve the quality of healthcare through sharing medical experience and knowledge. The Trust accepts no responsibility for any misunderstanding or misapplication of this document.
HEART MURMUR PRESENT and/or any of the following:
1. Cyanosis
2. Lower limb SaO₂ of <95% (see guideline CA5175)
3. Femoral pulses difficult to palpate
4. Dysmorphic features & associated structural anomalies
5. Abnormal Heart rhythm (see guideline CA6034v1)

SUSPECT CONGENITAL HEART DISEASE
Tier 1 doctor/ANNP cardiovascular examination. Including pre & post ductal SaO₂

Any of the following:
- Signs of heart failure/shock
- Positive newborn pulse oximetry screen (POS)
- Absent/weak femoral pulses

Any of the following:
- Loud murmur (≥3/6)
- Pansystolic/diastolic/continuous
- Location other than LSE
- Abnormal ECG
- Murmur + dysmorphic features

ALL of the following:
- Well baby
- No signs of heart failure
- Normal pulses
- Soft systolic murmur (<2/6)
- Negative newborn POS

FINDINGS

Significant congenital heart disease
Congenital heart Disease (acyanotic)
Innocent Heart murmur

URGENT
Contact Tier 2 SpR/Sn ANNP
- Admit NICU
- NICU Consultant review
- Echo by PEC or Cardiac Technician
- Contact GOSH
- Consider Prostin

SOON
Contact Tier 2
- Inform NICU Consultant within 24hrs
- Echo before discharge or PEC / Cardiac Physiologist scan within 2 weeks via consultant referral
- GP letter
- Information leaflet
- CAU open access and NICU outreach support only if consultant deems necessary

ROUTINE
If murmur still present at 24 hrs, contact Tier 2 for review:
- Routine 6-8 week neonatal FU
- GP letter
- Information leaflet
- CAU Open access

Clinical Guideline for: Heart murmur: Trust Guideline for the Management of Newborn Babies
Author/s: Katie Cullum; Robert Daniels; Rahul Roy; Paul Clarke Author/s title: ANNP; Senior ANNP; Consultant Neonatologist & Paediatrician with expertise in Cardiology; Consultant Neonatologist
Approved by: CGAP Date approved: 09/12/2016 Review date: 09/12/2019
Available via Trust Docs Version: 4 Trust Docs ID: 1223
Trust Guideline for the Management of Newborn Babies with Heart Murmur.

Objective of Guideline

a) To provide guidance on early diagnosis and appropriate referral of congenital heart disease
b) Avoid unnecessary investigations
c) Minimise anxiety in parents of new-borns with heart murmurs

Rationale for the recommendations

Congenital heart disease (CHD) is present in 8 to 12 per 1000 live births. Heart murmurs are detected in 0.6-1.6% of routine new-born examinations. Structural heart disease is found in 50% of the babies noted to have a heart murmur and 9% require early cardiac surgery. 57% of infants dying from CHD post discharge had a murmur pre-discharge. 15% of new-borns with CHD have a critical life threatening heart defect. Newborns have some unique features i.e. right ventricular dominance and elevated pulmonary vascular resistance in the early newborn period.

However, not all neonates with CHD will be found to have a murmur at postnatal check. This guideline offers a pathway that aims for an early diagnosis of significant congenital heart disease whilst avoiding unnecessary investigations and limiting parental anxiety in well babies.

Clinical examination by an experienced paediatrician is a useful means of assessing the presence of CHD but lesion-specific diagnosis is not satisfactory. Pulse oximetry screening (POS) is a useful tool to detect critical cyanotic congenital heart disease (refer to POS guideline CA5175 (id 10566) [click here]).

All babies with heart murmurs which are considered to be innocent but persist for >24 hours should be reviewed by a Tier 2 SpR or Senior ANNP before discharge. Even in the absence of a heart murmur, a newborn infant may have a serious heart defect that requires immediate attention.

History

Take a history for risk factors of congenital heart disease (See Table 2) and symptoms suggestive of heart failure (See Table 1). Review the antenatal ultrasound scan reports with special reference to the 4-chamber view.
Table 1

<table>
<thead>
<tr>
<th>Symptoms &amp; signs of heart failure</th>
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<tr>
<td>• Poor feeding, tired and breathless whilst feeding, takes a long time to complete feeds, vomiting</td>
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<td>• Tachypnea worse with feeding, recession and grunting</td>
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<tr>
<td>• Clammy skin, cold sweat on forehead, poor perfusion, pallor, cyanosis</td>
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<td>• Tachycardia, hyperactive precordium, gallop rhythm</td>
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<tr>
<td>• Presence of central cyanosis (as measured by lower limb saturations (post ductal) – A reading $\text{SaO}_2$ of $&lt;95%$ should prompt further investigation</td>
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<td>• Puffy eyelids, oedema, hepatomegaly</td>
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Table 2

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<thead>
<tr>
<th>Risk factors for CHD</th>
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<tr>
<td>• Sibling with a CHD</td>
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<td>• Parent with a CHD (recurrence risk is higher if the mother is affected)</td>
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<td>• Maternal diabetes mellitus</td>
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<td>• Cardiac abnormality suspected on fetal anomaly scans</td>
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<tr>
<td>• Dysmorphic syndromes and structural malformations</td>
</tr>
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<td>• Excessive maternal alcohol intake during pregnancy</td>
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<tr>
<td>• Suspected or confirmed congenital infection</td>
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<td>• Medications taken during pregnancy e.g. amphetamines, anticonvulsants, lithium, valproic acid, angiotensin-converting enzyme inhibitors, retinoic acid etc.</td>
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Clinical examination

• Dysmorphic features
• Signs of heart failure (tachypnea, increased respiratory effort, hepatomegaly, shock)
• Palpation of brachial and femoral pulses
• Presence of central cyanosis (as measured by lower limb saturations (post ductal) – A reading $\text{SaO}_2$ of $<95\%$ should prompt further investigation
• Presence of a subcostal heave +/- active precordium
• Heart sounds
• Murmur – intensity, character, location and radiation

Note that evanescent acrocyanosis, perioral & periorbital dusksiness in the presence of a pink tongue/normal $\text{SaO}_2$ reading are normal findings in neonates
INVESTIGATIONS

Investigations will vary depending upon availability of local resources and expertise.

Electrocardiogram (ECG)
Please refer to the trust guideline ‘Management of newborn babies with abnormal heart rhythm (see guideline CA6034v1) for details of when an ECG should be considered. ECG is considered mandatory in Down’s syndrome (with or without murmur).

Chest X Ray and Four Limb Blood Pressure
There is no evidence to support doing a routine chest x ray or four limb blood pressure measurements in the assessment of neonates with heart murmurs.

Echocardiography
This is the gold standard investigation for differentiating between innocent and pathological murmurs. Please refer to the flow chart and information below to see when an echocardiogram should be performed after thorough clinical assessment.

‘Traffic lighting’ infants with a heart murmur

**RED:** Likely significant congenital heart disease; - Infants with or without a heart murmur and **any** of the following warning signs:

- lower limb oxygen saturation ≤ 90%
- lower limb oxygen saturation 91-94% which on repeat 1-2 hours later remains <95% or the difference between the lower limb oxygen saturations is greater than 2%
- absent/weak femoral pulses
- signs of heart failure or shock

Admit to NNU, stabilise. Discuss with consultant on call and/or PEC if available. Discuss with GOSH cardiology registrar in the interim should an echocardiogram not be possible within a timely manner and consider starting prostaglandin infusion.

**AMBER:** Asymptomatic but clinically pathological murmur — Infants **without any** of the above warning signs but with **any** of the following abnormal clinical findings:

- Dysmorphism & associated structural anomalies
- Loud systolic murmur (≥ 3/6); diastolic, continuous murmur; murmur location other than left sternal edge /radiation
- Abnormal ECG findings

Organise echocardiogram prior to discharge, if that is not possible then arrange PEC or cardiac physiologist echocardiogram within the first two weeks of life.
Trust Guideline for the Management of Newborn Babies with Heart Murmur.

Approach to organising an echo:

- Discuss with PEC when available
- When PEC unavailable or available but unable to perform an echocardiogram – discuss with the Cardiac Physiologists via phone and/or email and make an ICE request mentioning the reasons and timescale within which the scan needs to be done
- All referral to the PEC for an outpatient appointment should be through a formal referral letter mentioning the reasons and timescale within which the scan needs to be done.
- All request for echocardiogram has to discussed with the consultant responsible for the baby

If a baby with a clinically pathological murmur is discharged before a definitive diagnosis is reached, the parents should be given verbal and written information leaflet describing warning signs i.e. signs & symptoms of heart failure and advising them what to do in the event that their baby becomes unwell or they have concerns. Arrange CAU Open access and neonatal outreach support only if consultant deems necessary (i.e. home visit within 72 hours).

**GREEN:** Likely non-pathological murmur - Well infants with

- No signs of heart failure, normal pulses, lower limb saturations >95%, soft (1-2/6) systolic murmur at the left sternal edge with no radiation.

Arrange follow up in 4-6 weeks with the neonatal consultant that was covering Special Care/Blakeney ward on the day the baby was born. Send GP letter to advise him/her of findings. Advise family of signs and symptoms of heart failure and give parent information leaflet Heart murmurs in healthy newborn babies [click here](#).

Clinical Audit Standards derived from guideline

- All echocardiogram reports and plans for out-patient clinic review of heart murmurs must be communicated to the general practitioner and must be documented in the baby’s case notes.
Trust Guideline for the Management of Newborn Babies with Heart Murmur.

- All parents of babies with murmurs who are advised to return for out-patient clinic review must be given verbal and written advice regarding signs and symptoms of cardiac compromise and this must be documented in the baby’s case notes.

Summary of development and consultation process undertaken before registration and dissemination

The author on behalf of the Paediatric Department which has agreed the final content drafted the guideline. It has been discussed at the Departmental Guidelines Meeting and circulated to the Neonatal Consultants and Specialist Registrars, Neonatal SHOs, and ANNPs; suggestions for improvement have been incorporated.
Trust Guideline for the Management of Newborn Babies with Heart Murmur.

**Distribution list/ dissemination method**

Hospital intranet, Neonatal Unit, Delivery Suite and Blakeney ward.

**References**


Trust Guideline for the Management of Newborn Babies with Heart Murmur.


Glossary

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>PEC</td>
<td>Paediatrician with Expertise in cardiology</td>
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<td>CHD</td>
<td>Congenital Heart disease</td>
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<td>LSE</td>
<td>Left Sternal edge</td>
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<tr>
<td>ECG</td>
<td>Electrocardiogram</td>
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<tr>
<td>POS</td>
<td>Pulse Oximetry Screen</td>
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<tr>
<td>CAU</td>
<td>Children Assessment Unit</td>
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<tr>
<td>GOSH</td>
<td>Great Ormond Street Hospital</td>
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<tr>
<td>GP</td>
<td>General Practitioner</td>
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<tr>
<td>SPR</td>
<td>Specialist Registrar</td>
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<tr>
<td>Sn ANNP</td>
<td>Senior Advanced Neonatal Nurse Practitioner</td>
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<tr>
<td>FU</td>
<td>Follow up</td>
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