Frimley Health NHS Foundation Trust

Pulse Oximetry Screening Guideline

Key Points

- Routine newborn pulse oximetry screening can identify babies with critical congenital heart defects that may otherwise have been missed by antenatal ultrasound and postnatal examination
- Pulse oximetry screening reduces mortality from critical congenital heart defects and identifies babies with other important conditions, such as respiratory disorders and sepsis
- Pulse oximetry screening is a simple, safe and non-invasive test

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Abbreviations

CCHD	Critical congenital heart disease
CHD	Congenital heart disease
FHFT	Frimley Health NHS Foundation Trust

Contents

1. Introduction

All newborn babies born under the care of FHFT, whether this is in the hospital, birth centre or at home will undergo Pulse Oximetry Screening to identify babies with congenital heart disease; as well as identify babies with non-cardiac causes of low oxygen saturations. Undetected illness including potential infection, breathing difficulties, congenital heart disease and slow adaptation to ex-utero life are among the causes of low saturations.

This guideline provides guidance on the routine use of pre-discharge pulse oximetry screening in the delivery suite, the postnatal ward and the community to improve the early detection of critical congenital heart disease (CCHD) in asymptomatic newborn babies; and identify babies with non-cardiac respiratory conditions.

Cardiovascular malformations are the leading group of congenital malformations with an incidence of 4 to 10 per 1000 live births. They account for 6-10% of all infant mortality. Cardiovascular malformations also account for 20-40% of deaths attributable to all congenital malformations and most of these deaths occur in the first year of life. The term congenital heart disease (CHD) encompasses a variety of lesions with a wide range of clinical importance, ranging from those with no functional or clinical significance, to potentially life-threatening lesions. If critical defects are not detected early, they can result in cardiovascular compromise resulting in death or significant long-term effects on neurodevelopment. Critical CHD refers to heart defects that require intervention or lead to death in the first 28 days after birth. Timely recognition of these conditions allows the possibility of early intervention that may influence the natural history of the condition and subsequent outcome. Undetected illness including potential infection, breathing difficulties, congenital heart disease and slow adaptation to ex-utero life are among the causes of low saturations. All these conditions merit neonatal review to diagnose, and if needed, to treat the underlying condition.

2. Pulse Oximetry Screening for babies born in hospital/birth centres

(See Appendix 1 - Pathway for Babies Born in Hospital/Birth Centres)

- All babies born in hospital and birth centres should be screened, preferably between 4-24 hours of life before discharge home. Ideally the screening will be conducted at the newborn examination and will be performed by a trained professional, i.e., NIPE Midwife, Midwife, Resident doctor or ANNP who have received the appropriate training.
- Dedicated hand-held saturation monitors with reusable probes should be made available on the postnatal wards, delivery units, and midwife-led birth unit. Each community team should have a monitor available for home births (see separate section for home births).
- Two saturation readings should be taken, a pre-ductal saturation (right arm) and a post- ductal saturation (either foot) – **Test One**.
- The highest consistent reading attainable in both should be recorded in the neonatal notes and should be available for the newborn examination.

The following outcomes apply:

- A **Pass** (test negative) – both readings 95% or higher and difference less than 3%.
- A **Fail** (test positive) – either reading 89% or less, or clinical concerns.
- A **Borderline** – either reading 90-94% or difference of 3% or greater.
- For a pass, no further action is required, other than recording the saturations in the NIPE Smart Portal under the Pulse oximetry section.
- Babies who **fail** screening (test positive) will be referred to the senior neonatal/paediatric team for urgent assessment.
- If the result is borderline, and the baby is clinically well, the test should be repeated in 1 to 2 hours by the NIPE midwife – **Test Two**.
- If the result is again borderline, a trained senior neonatal clinician should examine the baby.

- If this examination is normal, the test should be repeated in 1-2 hours by the NIPE midwife/senior paediatrician – **Test Three**.
- Anything but a clear pass in **Test three** requires urgent senior paediatric assessment and investigation.
- Passing the screening does not rule out a congenital heart defect, and an abnormal cardiac examination should always be investigated.
- Oxygen saturations should be checked in any baby where there is a clinical concern regardless of whether they have previously passed the test.

3. Pulse oximetry Screening for babies born at home

(See Appendix 2 - Pathway for Babies Born at Home)

- All babies born at home should undergo pulse oximetry screening. This is to be performed by the NIPE Midwife.
- All babies born in the community should ideally be screened within **24 hours** of life by the NIPE midwife. If there is clinical concern the baby should be transferred to NNU via ambulance.
- Each team should have its own portable pulse-oximeter with reusable probes.
- Two saturation readings should be taken, a pre-ductal saturation (right arm) and a post- ductal saturation (either foot) – **Test One**
- The highest, consistent reading attainable in both will be recorded in the neonatal notes and on NIPE Smart.
- The following outcomes apply:
- A **Pass** (test negative) – both readings 95% or higher and difference of less than 3%
- A **Fail** (test positive) – either reading 89% or less, or baby symptomatic
- A **Borderline** – either reading 90-94% or difference 3% or greater
- Babies who fail screening (Test positive) should be referred to the neonatal/paediatric team for urgent assessment.
- A **borderline** result should also be discussed with the on-call neonatal/paediatric registrar, and if both midwife and registrar have no clinical concerns, the test can be repeated in 1 to 2 hours – **Test Two**
- If the baby does not pass **Test Two**, or the examination is borderline, or there are other clinical concerns, the baby should be referred to the neonatal registrar for immediate assessment in hospital.
- Oxygen saturations should be checked in any baby where there is a clinical concern regardless of whether they have previously passed the test.
- Passing the screening does not rule out a congenital heart defect, and an abnormal cardiac examination should always be investigated.

4. Acknowledgements

Some of the information in this guideline, for use at Frimley Health, has been adapted from the Pulse Oximetry Screening guideline produced by the Thames Valley & Wessex Operational Delivery Network. We are grateful for their permission to do this.

5. References

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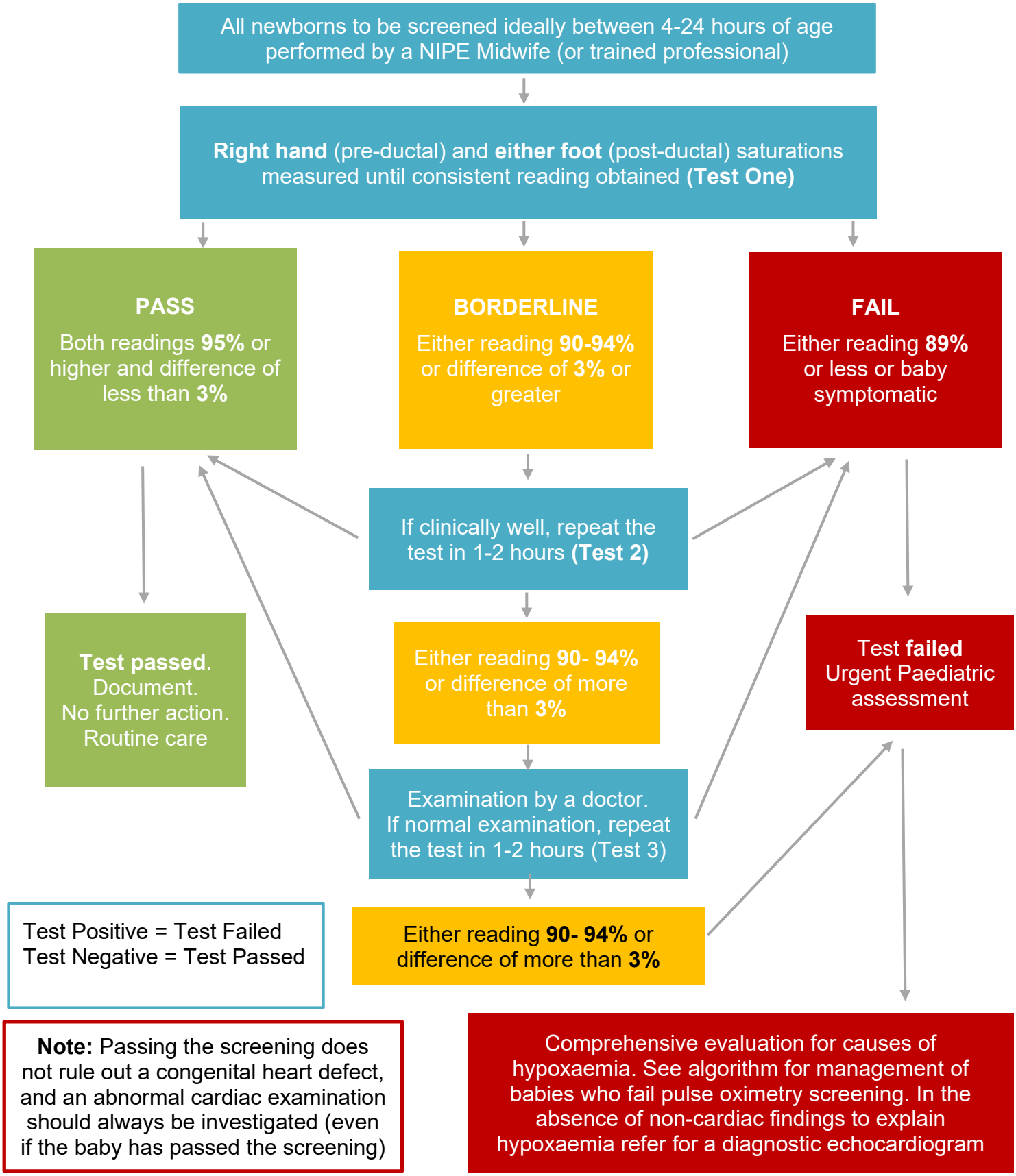
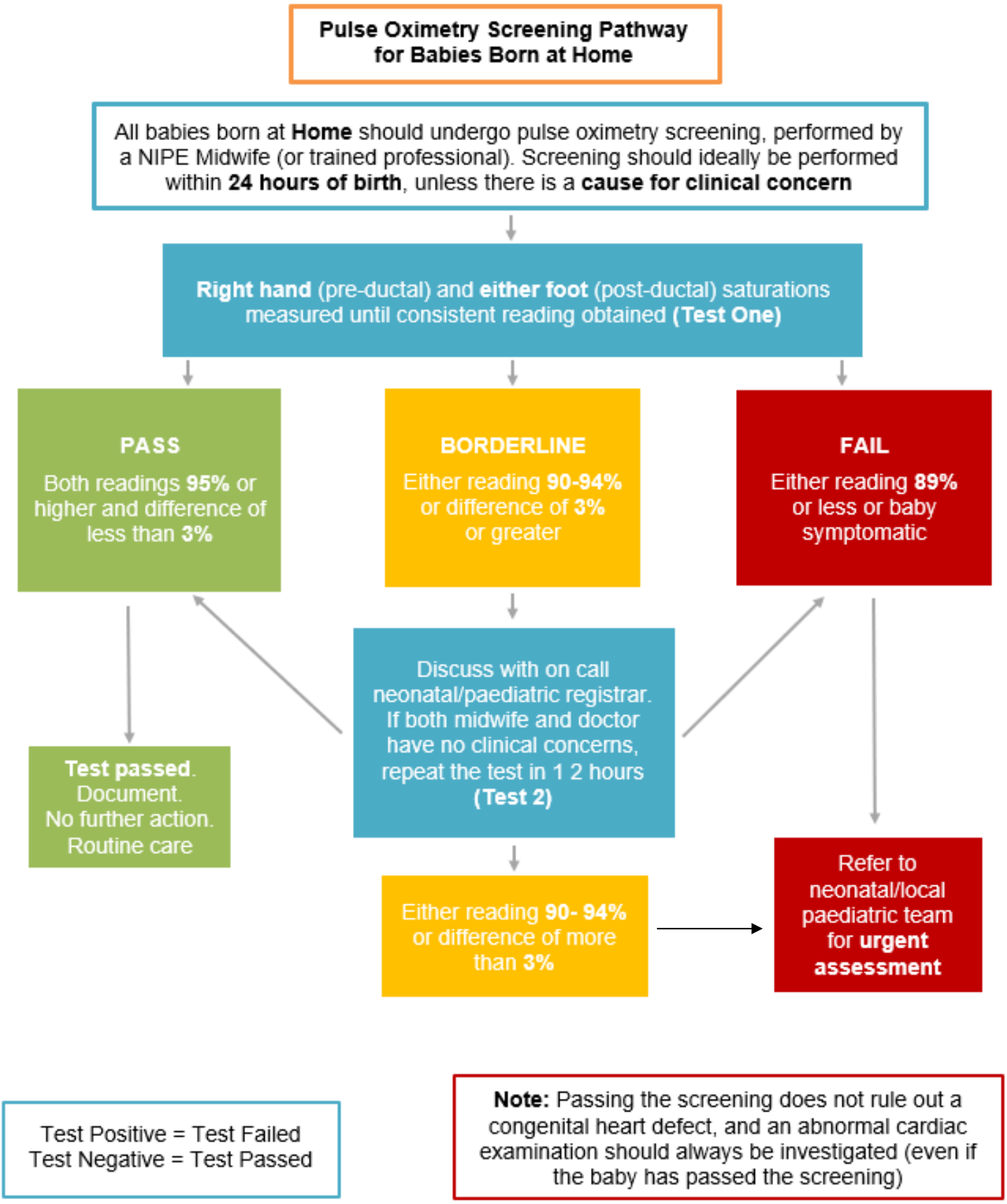
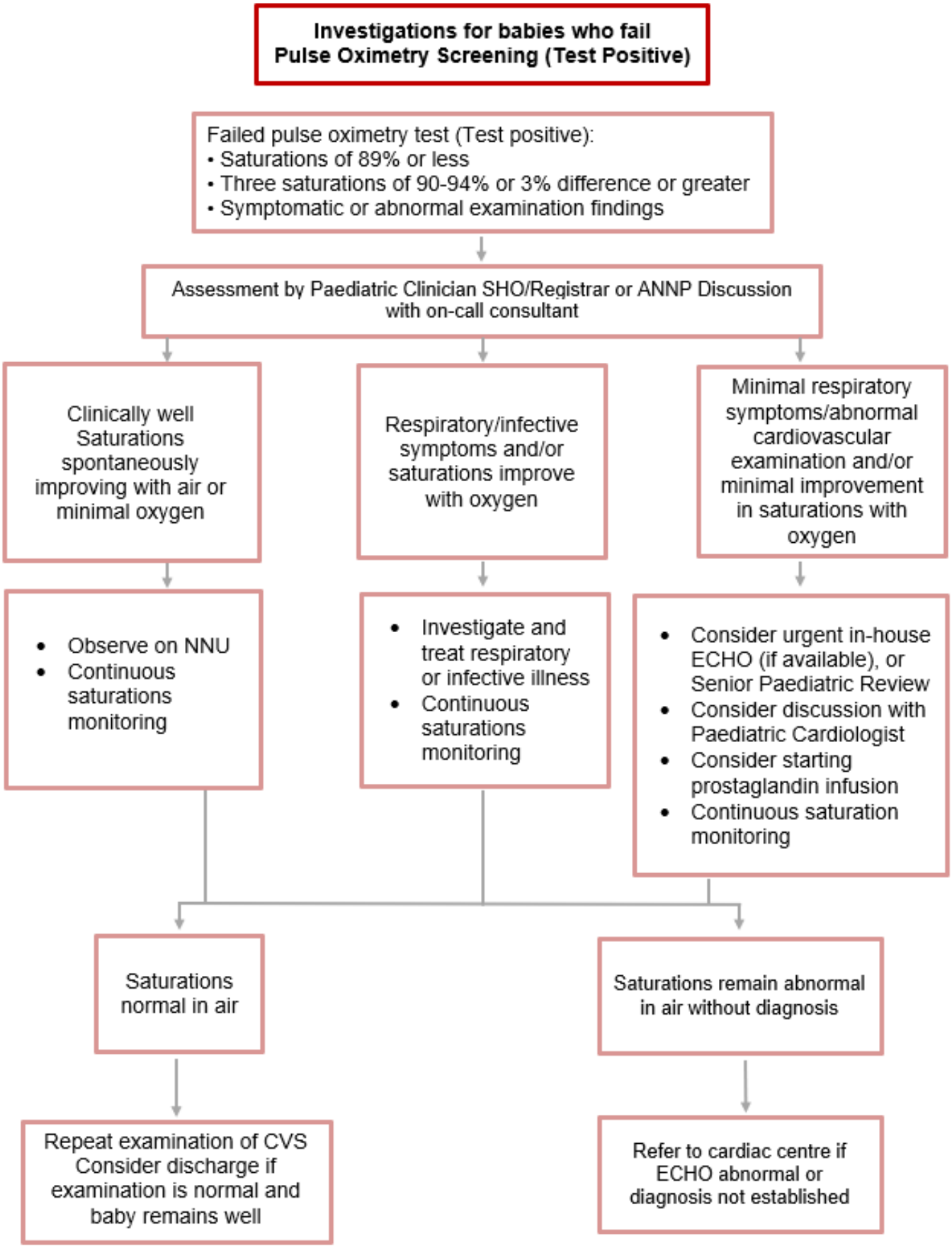
Appendix 1: Pulse Oximetry Screening for Babies Born in Hospital/Birth Centres



Appendix 2. Pathway for Babies Born at Home



Appendix 3. Pathway for Babies that Test Positive



Appendix 4. Patient Information Leaflet

Maternity Services

NHS
Frimley Health
NHS Foundation Trust

Newborn Pulse Oximetry Screening

Information for patients, relatives and carers

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What is pulse oximetry?

Pulse oximetry is a quick and harmless test that measures how much oxygen is in the blood. It is helpful in determining if an infant's heart and lungs are healthy.

Why is it being done?

Measuring oxygen levels in newborn babies helps to identify the small number of babies who have an unidentified serious heart defect. We know that these babies usually appear healthy at birth but often have lower oxygen levels. The test identifies babies with lower oxygen levels so we can check these babies very carefully to identify a possible heart defect before the baby becomes unwell. Babies with other conditions such as breathing problems, infections and circulation problems can have lower oxygen levels too and the test may also identify these babies.

What is congenital heart disease?

Congenital heart disease (CHD) is a problem in the structure of the heart or the blood fow through the heart. The word *congenital* means the condition is present at birth. Some forms of CHD need to be detected and repaired early in life; these are called 'critical' CHD.

What does the test involve?

Your baby will undergo a routine pulse oximetry test, usually within the first 12 hours after birth. A small sensor which is attached to a blood oxygen monitoring machine (pulse oximeter or 'sats' machine) is placed around your baby's right wrist. The sensor shines a red light through your baby's skin and can calculate your baby's blood oxygen level within a few minutes. This test is then repeated on one of your baby's feet.

What are the possible results?

Low oxygen levels can occur in healthy newborn babies as they are adapting after birth, especially in the first few hours after birth. If the test results are not normal, a repeat test will be performed within a couple of hours. If this second test is normal and your baby is well, then no further action is needed.

If a repeat test continues to show low oxygen levels a paediatric/neonatal doctor will check over your baby. It may be necessary for your baby to be admitted to the Neonatal Unit for observation and further tests. Your baby may need further investigations and it may be necessary to rule out serious heart defects by performing an echocardiogram (ultrasound scan of the heart). If further tests are necessary, your doctor will discuss these with you.

Will this pick up all serious heart conditions?

Pulse oximetry screening is designed to detect heart conditions that are associated with a low oxygen level in the baby's blood. Not all serious heart conditions will do this; therefore it is important that if you have any concerns either before you take your baby home or afterwards, you discuss them with a healthcare professional. Signs that may be of concern include blue/grey skin colour, fast breathing rate, excessive sweating, little or no energy, drowsy or sluggish, or sleeping longer than usual and poor feeding.

Further Information

No decisions about treatment will be made without you giving consent first. If you would like more information please speak to your midwife or paediatric/neonatal doctor.

For a translation of this leaflet or for accessing this information in another format:

Please contact (PALS) the Patient Advice and Liaison Service on:

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Telephone: 0300 613 6530
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Wexham Park & Heatherwood Hospitals
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This guideline has been registered with the trust. However, clinical guidelines are guidelines only. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician. If in doubt contact a senior colleague or expert. Caution is advised when using guidelines after the review date. This guideline is for use in Frimley Health Trust hospitals only. Any use outside this location will not be supported by the Trust and will be at the risk of the individual using it.

Version History

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1.0	December 2021	Catherine Quelcutti - Neonatal Critical Care Transformation Clinical Specialist	Final	First version
1.1	August 2022	Dr Angela Yannoulias, Consultant Paediatrician	Interim	Change to local process
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