

Pulse Oximetry in the Newborn Infant

Contents

1. Introduction and who guideline applies to:	2
Key Points.....	2
Related UHL documents	2
Background.....	2
Aims.....	2
2. Process of performing pulse-oximetry:.....	2
2.1 Screening consent	2
2.2 Which babies are eligible for this screening test?	2
2.3 Where the check should be performed?	2
2.4 Who will be responsible for doing the test?	3
2.5 When should the check be performed?	3
2.6 Exclusions.....	3
2.7 Special circumstances:.....	3
2.8 How is the check performed?	4
2.9 Where to check saturations:.....	4
2.10 Interpreting the saturations results	5
2.11 Documentation of the pulse-oximetry result.....	6
3. Education and training	6
4. References.....	6
5. Audit Standards.....	6
6. Keywords:	7
Appendix 1: Newborn Pulse Oximetry Flowchart (inpatient births)	8
Appendix 2: Newborn Pulse Oximetry Screening Flowchart for Community / SMBC.....	9
Appendix 3: NIPESmart pulse-ox data input	10

1. Introduction and who guideline applies to:

This guideline is aimed at all Health care professionals involved in the care of newborn infants at Leicester Royal Infirmary, Leicester General Hospital, St Mary's Birth Centre (SMBC) and in the community.

Key Points

- Eligible infants for screening are 34⁺⁰ weeks gestation and above who are not on the neonatal unit continuously monitored.
- Pre and post ductal saturation should be obtained within 2-4 hours using the suitable monitor
- The flow charts in [appendix 1 & 2](#) should be used to determine which babies have a negative screen, need a repeat screen and which babies have a positive screen.
- Those babies with positive screens should have a medical assessment by the neonatal team (tier 2 doctor or senior ANNP) to determine further management.
- Babies will be admitted to NNU if after clinical assessment it is felt they require interventions due to low saturations.

Related UHL documents

[Neonatal examination of the newborn on the postnatal ward](#)
[Postnatal Ward Handbook UHL Neonatal Guideline.pdf](#)

Background

Hypoxaemia is a common presentation of congenital heart disease. Pulse oximetry screening can improve detection rate of CCHD before discharge. In addition, other non-cardiac conditions can also be detected. This has been demonstrated in randomized controlled trials (grade A).

Many hospitals and some countries have already introduced routine screening. At the moment this is not part of the newborn screening programme in the UK. At present precise screening pathways vary but all show benefit.

Aims

This guideline is written to provide clear guidance on eligibility criteria for this screening tool, how to perform oximetry and interpret results.

The guideline also clarifies the documentation and logistics surrounding this screening test.

2. Process of performing pulse-oximetry:

Please refer to the flow chart in [Appendix 1](#) in conjunction with the following section:

2.1 Screening consent

Verbal consent needs to be obtained when the test is performed.

2.2 Which babies are eligible for this screening test?

All babies that are born at 34+0 weeks gestation and above (unless baby admitted to NNU and requiring continuous monitoring e.g. congenital anomaly)

2.3 Where the check should be performed?

The default for performing the check should be the delivery suite or birthing centre for hospital births. Checks can also be performed on the postnatal wards, neonatal unit or in the home following planned homebirth.

2.4 Who will be responsible for doing the test?

In most circumstances midwives and nursery nurses will perform the test.

For home-births and the St Mary's Birth Centre midwives will perform the test.

However other trained health-care professionals e.g. doctors, advanced neonatal nurse practitioners, neonatal nurses may perform the test if required.

2.5 When should the check be performed?

The check should be performed within the first 8 hours of life prior to discharge from delivery suite or the birthing centre. It is ideal to perform this between 2-4 hours of age to allow for normal adaptation and reduce the incidence of false positive test result due to slow adaptation.

Pulse oximetry should be carried out on all babies transferring into SMBC ward who are < 72 hours of age and have not had a NIPE or pulse ox at birth that were born within UHL only, including Home births.

All babies should have a pulse-oximetry screening check done before discharge from delivery suite.

2.6 Exclusions

The presence of the following risk factors will exclude the baby from newborn pulse oximetry screening:

- Presence of a suspected cardiac lesion from the fetal anomaly scans
- Suspected or confirmed congenital infection
- Dysmorphism in the newborn suggestive of chromosomal or genetic aberrations particularly the trisomies
- Abnormal cardiovascular screen as part of the newborn physical examination (note we routinely perform the newborn examination after 24 hours in UHL at present).
- Symptomatic newborn with a history of tachypnea, cyanosis and or poor feeding at the time of doing the initial pulse-oximetry screen (this does **not** apply to repeat screening).

2.7 Special circumstances:

NNU

Most admissions to the neonatal unit will not be eligible for pulse-oximetry screening because:

- Prematurity <34⁺⁰ weeks gestation
- Medical need for continuous saturation monitoring (see exclusion criteria)

As a failsafe when the newborn check is done and entered onto the baby notes/ S4N system the clinician should check that the pulse-oximetry screening status is correct.

Community and St Mary's Birth Centre (refer to Appendix 2)

Due to logistics of attending the home birth the pulse-oximetry screen should be done by the midwife attending the delivery just prior to departing. Pulse oximetry screens should be carried out at St Mary's Birth centre between 2 and 4 hours of age.

If a repeat is needed or if the pulse-oximetry check is abnormal then arrangements will need to be made to transfer the mother and infant to delivery suite at Leicester Royal Infirmary or another hospital that offers level 3 neonatal care by ambulance.

If the pulse-oximetry check is abnormal the midwife on delivery suite will contact the neonatal unit to make them aware, unless the baby is symptomatic in which case the transferring midwife should pre-warn the neonatal and delivery suite teams of the baby's condition in preparation for arrival at the hospital.

This should be the course of action regardless of whether the mother is booked outside of UHL as the pulse-oximetry screen cannot differentiate between cardiac and respiratory disease and immediate assessment is more important.

The midwife will need to record the pulse-oximetry results in relevant section found on the paediatric page of the maternity booklet and also on to the S4N-system.

2.8 How is the check performed?

Equipment:

The test must be performed using the suitable monitor available. The monitors are located in the following areas:

Leicester Royal Infirmary:	Leicester General Hospital	Community
Neonatal Unit Delivery Suite Birth Centre Ward 5 Ward 6	Neonatal unit Ward 30 Delivery suite	Melton Birth Centre Community teams Homebirth team

The cable is **NOT SINGLE PATIENT USE** and so must not be disposed of but cleaned with an alcohol/Distel wipe before and after use.

There are spare cables on NNU, Melton Birth Centre and the community office.

2.9 Where to check saturations:

Saturations should be checked pre and post ductally in all babies. The result of both tests should be recorded on the S4N system and in the maternity notes and in the post natal diary SBAR handover page.

Preductal Saturations: check on the right hand or wrist	Post ductal saturations: on either foot/lower limb
	

Whilst conducting the pulse-ox test the midwife or nursery nurses should report any worrying features that may indicate cardiovascular or respiratory disease to the on-call Neonatal practitioner. Examples of these are:

- Cyanosis or dusky appearance
- Tachypnoea (rapid breathing)
- Shallow breathing
- Grunting
- Recession
- Pallor
- Sweaty
- Floppy

If there are any concerns then a full clinical review the infant must be performed so that appropriate and timely medical assessment and intervention can take place.

2.10 Interpreting the saturations results

Negative Screen	Asymptomatic infant Both readings more than or equal to 95% and difference less than OR equal to 2%	No action needed routine newborn care
Requires a repeat screen	Asymptomatic infant Either reading 90-94% inclusive or difference >2% (i.e. 3% and above)	Repeat screen in two hours' time Make sure baby is adequately warm and feet not cold.
Positive Screen	Symptomatic infant At any time saturations <90% (either reading) Repeat screen: Either reading 90-94% inclusive or difference >2% (i.e. 3% and above)	Urgent medical assessment by a tier 2 doctor, senior ANNP or consultant. Admission to the neonatal unit for further assessment and management guided by clinical condition and differential diagnosis. If in the community or SMBC, transfer via ambulance to a unit that offers level 3 care

2.11 Documentation of the pulse-oximetry result

Results should be written on the baby check page of the maternity booklet.

All pulse oximetry results must be recorded in the S4N system ([NIPE - NIPE - nhsbaby \(thirdparty.nhs.uk\)](#)). Appendix 3 shows screen-shots from this system. Training on the use of this will be provided.

If for any reason a baby is not eligible for pulse-oximetry screening or consent is not given then this needs to be documented on S4N.

Please ensure the pulse oximetry is completed and entered onto S4N system or handed over to the receiving ward staff if this is still needing to be completed, before the baby is transferred to the ward (2- 4 hrs of age). If the baby requires a repeat test this MUST be handed over to the midwife in charge and documented clearly in the notes.

3. Education and training

None

4. References

Ewer et al: Pulse oximetry screening for congenital heart defects in newborn infants Pulse-Ox: a test accuracy study. Lancet 2011; 378:785-94

Mahle et al: role of pulse-oximetry in Examining Newborns for Congenital Heart Disease: A scientific statement from the American Heart Association and American Academy of Pediatrics. Circulation 2009; 120: 447-58

Thangaratinam S et al. Pulse-oximetry screening for critical congenital heart defects in asymptomatic newborn babies: a systematic review and metanalysis. Lancet 2012; 379: 2459-64.

Claire Evans, Jill Walker. Public Health England NIPE: Newborn Pulse Oximetry Screening Pilot Implementation feasibility study. Information for Trusts. December 2015.

Evidence Criteria

Evidence according to RCPCH

Grade A	At least 1 randomised controlled trial addressing specific recommendation
Grade B	Well conducted clinical trials but no randomised trial on specific topic
Grade C	Expert committee report or opinions

5. Audit Standards

All eligible babies should have a pulse-oximetry screen done in the first 8 hours of life and the result recorded on NIPE smart.

Any baby with a positive screen (red) should be reviewed within 1 hour by one of the neonatal team.

6. Keywords:

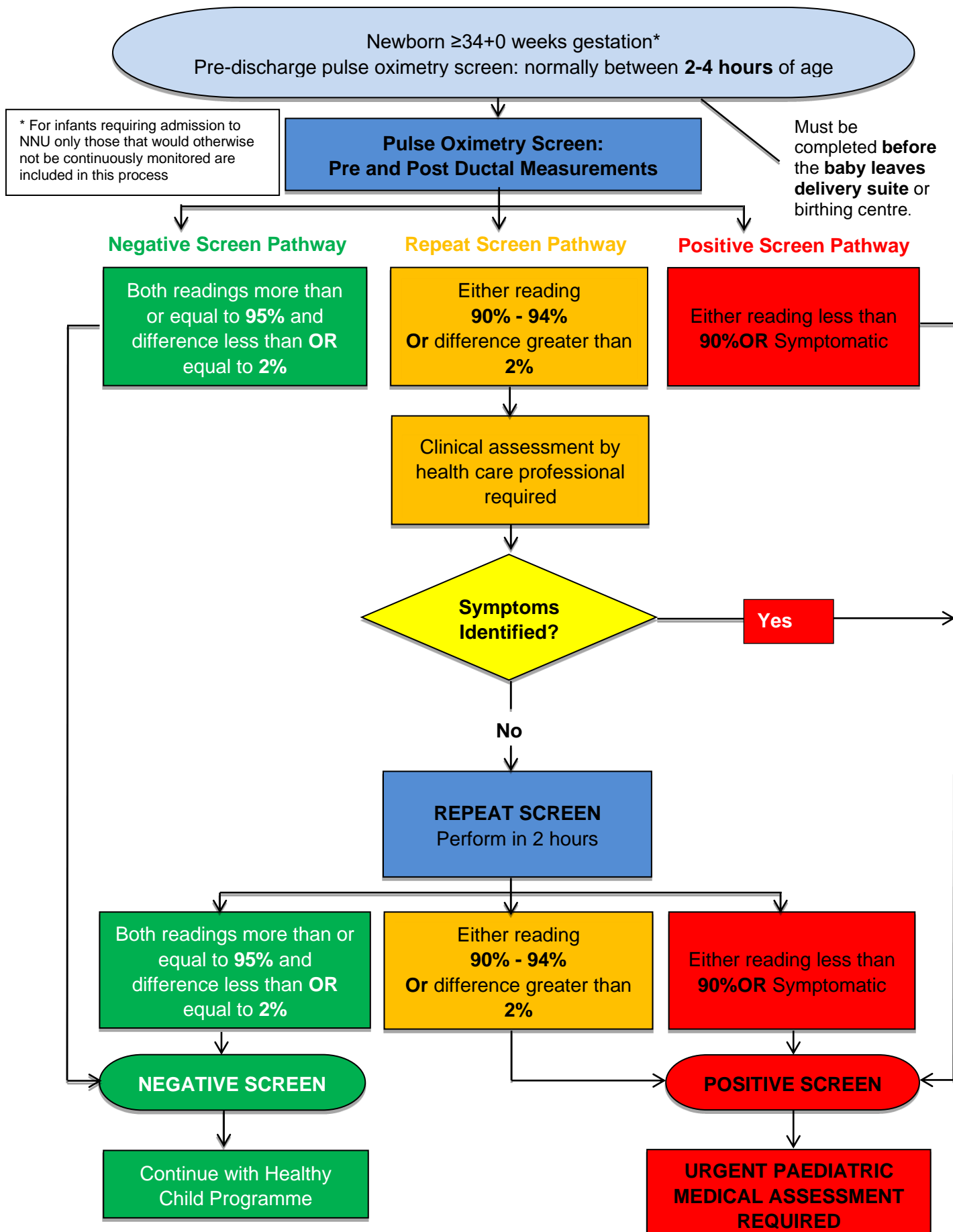
Hypoxaemia, NIPE, Oxygen Saturation, Pre ductal saturation, Post ductal saturation, Screen

The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs.

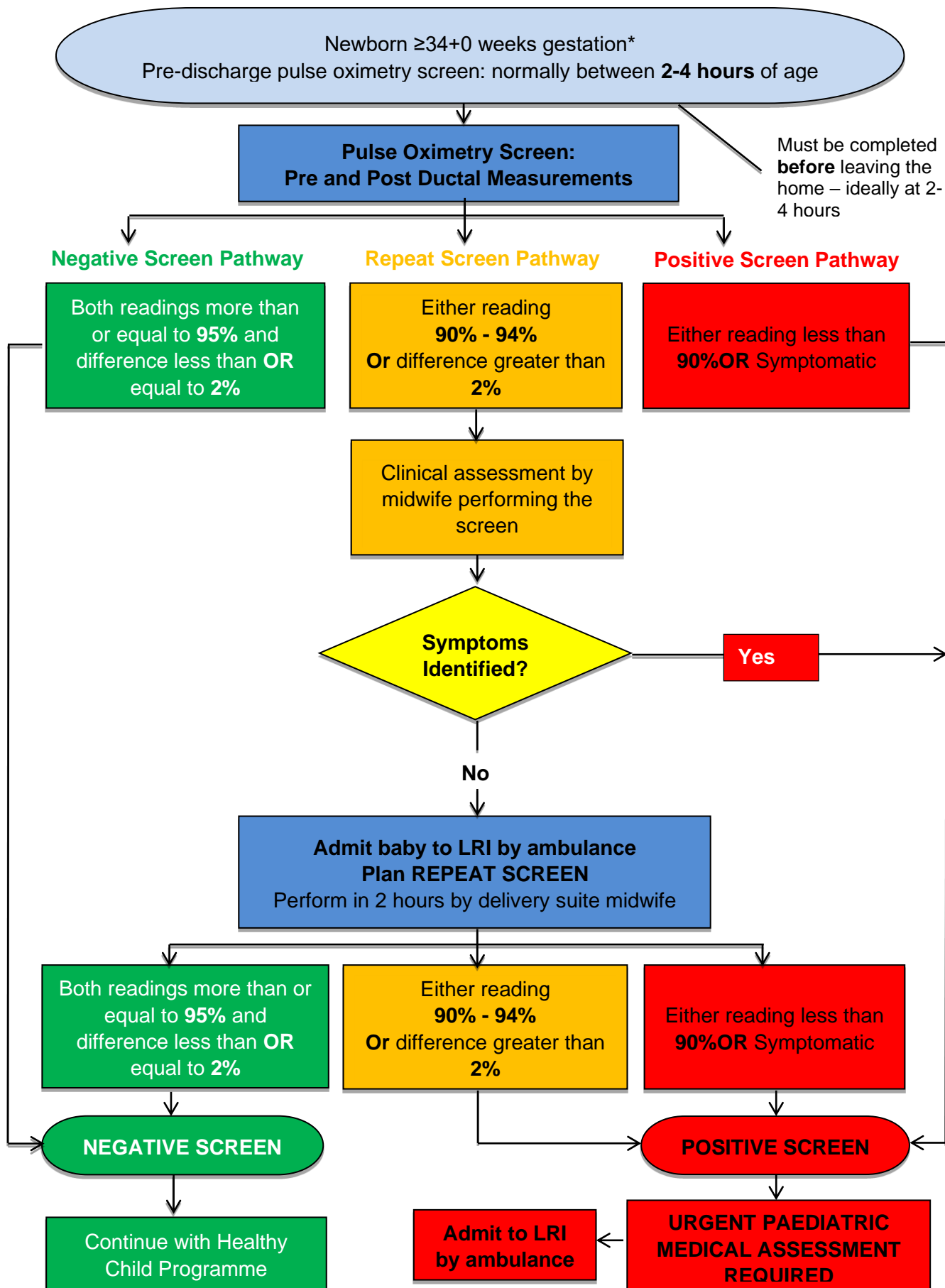
As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

DEVELOPMENT AND APPROVAL RECORD FOR THIS DOCUMENT			
Author / Lead Officer:	J Behrsin: Consultant Neonatologist S Mittal: Neonatal Consultant Guidelines Lead	Executive lead: Chief Nurse	
REVIEW RECORD			
Date	Issue Number	Reviewed By	Description Of Changes (If Any)
May 2105	V 1	Neonatal and Maternity Governance	New guideline
Feb 2018	V2	J Behrsin Neonatal Guidelines Meeting Neonatal and Maternity Governance	No longer a pilot so references to that taken out Timing of check changed to allow for earlier testing
January 2021 – March 2021	V2	Neonatal Guidelines Meeting Neonatal Governance	
July 2022	V2.1	E Broughton J Behrsin	Amendment made to location of pulse oximetry probe when assessing post ductal saturations. Previously stated use any other limb, now specifies it needs to be either foot/lower limb. Replaced reference to the NIPE Smart system with S4N
May 2023	V3	J Behrsin L Taylor (quality standards midwife)	Amended terminology from refer to middle grade doctor to refer to tier 2 doctor. Added keywords to document
July 2024	V4	J Behrsin L Taylor (quality standards midwife)	Standardised time of assessment for all areas, now 2-4 hours of age. Added hyperlink to S4N system Clarified actions to be taken if positive result or if any other concerns Removed reference to sticker and replaced with relevant section in maternity notes.

Appendix 1: Newborn Pulse Oximetry Flowchart (inpatient births)



Appendix 2: Newborn Pulse Oximetry Screening Flowchart for Community / SMBC



Appendix 3: NIPESmart pulse-ox data input

Current Search > Current Search Results > Current Patient

Born Gender NHS No.

Demographics | Screening | Outcomes | **Pulse Oximetry** | Letters

Pulse Oximetry Screening Results

Please note that newborn pulse oximetry screening is not part of the national NIFE screening programme and use of this tab and data fields is for local use only (provider trust responsibility)

Parent Consent:* Accepted Declined Not Yet Asked

Type	Date/Time	Pre ductal	Post ductal	Differential	Outcome	Practitioner
First Screen	<input type="text"/>	100%	100%	0%	First Screen Negative	Hospital notes, See

10 items per page 1 - 1 of 1 items

[\(NIFE - NIFE - nhsbaby \(thirdparty.nhs.uk\)\)](#)