
Newborn Bloodspot Screening

This guideline is for use by ASPH NICU ONLY.

For the purpose of this guideline, day of birth regardless of time of birth is classed as Day 1.

See also: Competency - To correctly take a newborn blood spot test.

Purpose

Universal screening of all infants at 5 days of age for

1. phenylketonuria (PKU)
2. congenital hypothyroidism (CHT)
3. sickle cell disease (SCD)
4. cystic fibrosis (CF)
5. medium-chain acyl-CoA dehydrogenase deficiency (MCADD).
6. maple syrup urine disease
7. isovaleric acidaemia (IVA)
8. glutaric aciduria type 1 (GA1)
9. homocystinuria (pyridoxine unresponsive) (HCU)

Treatment for PKU and CHT should commence by the time the baby is 21 days old. Guidance from the UK Newborn Screening Programme Centre means that a baby may require more than one blood spot test. It is not necessary for a baby to be on feeds before a sample can be taken.

Key Points

- **Day 1 is the date of birth regardless of the time of birth. The aim is that all newborn babies should have a blood spot test taken from 120 hours to 192 hours.**
- **Babies transfused before 120 hours are tested before and >72 hours after transfusion.**
- **Tests must be performed by 192 hours at the latest, even if multiple transfusions are ongoing, to ensure timely detection and treatment of PKU**
- **Babies born <32/40 will require a repeat 2-spot blood spot at 28 days**
- **To minimise discomfort, tests should be coordinated with other investigations that the baby requires for his/her clinical management (e.g. blood sugars etc.)**

- **Printed blood spot labels are preferred identification of blood sample method. If not blood spot printed label available fill the cards in completely including the NHS number as baby's name may change.**

- **Northgate failsafe (The National Database for checking of blood spots) will be checked daily by the ward receptionist. In the absence of the ward receptionist the nurse in charge will check failsafe.**

- **Verbal consent is taken from parents for blood spot taking following the parents reading the blood spot leaflet available on the neonatal intensive care unit.**

When to perform Blood Spot Testing

Action	Reasoning
<p>Babies admitted to neonatal units are likely to have multiple blood samples taken. Blood spot screening should be coordinated with other tests when possible. Venepuncture or venous / arterial sampling from an existing line is an alternative. This is providing the sample is not contaminated with EDTA and the line is cleared of infusate.</p>	<p>To minimise the number of invasive procedures</p>
<p>Babies less than 120 hours of age should have a single circle blood spot sample taken on admission/prior to blood transfusion to screen for SCD. The blood spot card should be marked 'Pre-transfusion'. Complete the details on the blood spot card.</p>	<p>The screening test for SCD cannot be done on samples from babies who have received a blood transfusion.</p>
<p>The 'Pre-transfusion' blood spot card should be stored in the baby's medical records and despatched to the newborn screening laboratory at St Helier's together with the routine 120 hour sample if the baby has received a blood transfusion in the interim.</p> <p>If the baby is transferred to another unit before the 120 hour sample has been taken, ensure pre-transfusion blood spot card accompanies the infant. Details of newborn sampling should be documented and included in transfer information and Badgernet.</p>	<p>The single circle blood spot sample taken and marked as 'Pretransfusion' can be discarded if the baby does not receive a blood transfusion.</p> <p>To ensure new unit is aware that pre-transfusion sample has been taken.</p>
<p>The routine blood spot sample (four spots) should be taken from 120 hours of age and in exceptional circumstances between 120 and 192 hours for all babies regardless of medical condition, milk feeding and prematurity. For the purpose of screening, date of birth is day 1. Complete the details on blood spot card.</p>	<p>To enable timely detection of abnormal results and initiation of appropriate treatment.</p>
<p>When a baby has had a blood transfusion, either intrauterine or in the newborn period, before the 120 hour spot, another sample (four spots) is needed 72 hours (3 days) after the last blood transfusion.</p> <p>In the event of multiple blood transfusions an initial screening sample should be sent by 192 hours at the latest. (For intrauterine transfusion count date of birth as date of transfusion).</p> <p>The date of the last blood transfusion before the blood spot must be recorded on the card and on any transfer notifications/Badgernet</p>	<p>To enable metabolite concentrations to return to pretransfusion levels.</p> <p>To ensure all babies are screened by 192 hours regardless of blood transfusion status. To reduce the chance of the baby missing newborn blood spot screening. To permit appropriate interpretation of results.</p>

<p>For SCD, a pre-transfusion sample is the preferred option for sickle cell screening.</p> <p>When a preterm baby has not had a pre-transfusion sample taken, the laboratory may forward the routine 120 to 192 hour sample to the DNA laboratory for analysis as a failsafe. Further information is available at www.sct.screening.nhs.uk/cms.php?folder=251</p>	<p>To ensure all babies are screened for SCD</p>
<p>Inform parents of any outstanding screening tests, and record this in the PCHR. Advise parents which healthcare professional will be responsible for completing the blood spot screening for their baby and approximately when it will occur.</p> <p>Ensure notification of screening status when the care of babies is transferred. This includes babies who are transferred in the immediate neonatal period. The screening status of the baby is to be recorded on Badgernet.</p>	<p>To ensure that all babies are screened.</p>
<p>CHT screening for preterm infants Babies born at less than 32 weeks (equal to or less than 31 weeks + 6 days) require a second blood spot sample to be taken in addition to the 120 hour sample (counting day of birth as day 1).</p> <p>These babies are to be tested when they reach 28 days of age (counting day of birth as day 1) or day of discharge home, whichever is the sooner.</p> <p>Complete the details on the blood spot card. Write the gestational age on the card.</p> <p>Two spots on the card should be filled with blood.</p> <p>The responsibility for taking both samples lies with the healthcare professional who is responsible for clinical care at the time the blood spot sample is due.</p> <p>In babies who are transferred before they reach 28 days of age, the responsibility for completing screening is transferred to healthcare professionals in the receiving unit. Record all blood spot samples taken in baby's hospital records, on transfer documentation, PCHR and on Badgernet.</p>	<p>To ensure a valid sample for congenital hypothyroidism screening as immaturity can mask this condition.</p> <p>To ensure laboratory is aware of reason for second sample.</p> <p>To ensure babies who are transferred at less than 28 days of age have all newborn blood spot tests completed.</p> <p>To ensure screening will be completed by receiving unit.</p> <p>To ensure all babies born at less than 32 weeks (equal to or less than 31 weeks + 6 days) are screened</p>

Flow Chart for Blood Spot Screening at St. Peter's Hospital

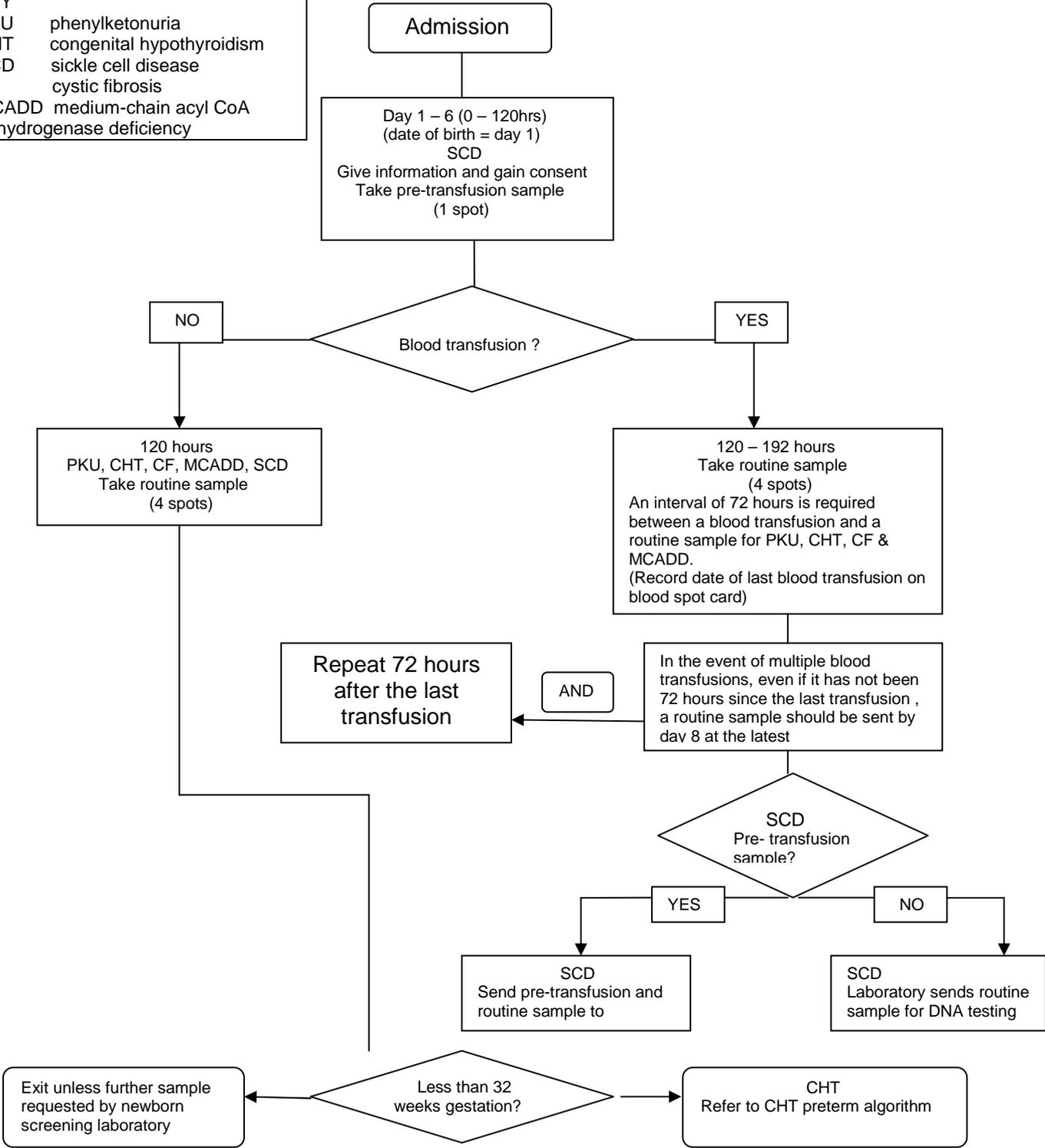


Newborn Blood Spot Screening
For all babies cared for in hospital specialist units



Screening Programmes

KEY	
PKU	phenylketonuria
CHT	congenital hypothyroidism
SCD	sickle cell disease
CF	cystic fibrosis
MCADD	medium-chain acyl CoA dehydrogenase deficiency



Unavoidable Repeats

<p>Unavoidable repeat samples may be required from a few babies due to prematurity, borderline thyroid stimulating hormone (TSH) results, inconclusive CF screening or having received a blood transfusion. These samples should be taken as soon as possible or at the age directed by the screening laboratory.</p> <p>A one week interval between samples is recommended for borderline TSH results. Take a four blood spot sample and mark the card 'CHT borderline'.</p> <p>Ensure that the 'repeat sample' box is ticked on the blood spot card. Laboratories may also request a repeat sample due to any of the following:</p> <ul style="list-style-type: none"> • Incomplete data on the card, e.g. no date of sample recorded • No NHS number (or equivalent) on the card • Bar-coded label not complete due to misalignment of label printer • Insufficient blood on the card, e.g. has not soaked through to back of card • Layering of blood • Compression of the blood spot • Delay in laboratory receiving the sample • Taken before 120 hours of age • Second samples (for CHT preterm or post transfusion) taken at wrong time • Contamination of the sample card, e.g. faeces, adult blood, etc. <p>When a repeat sample is requested for any of the above reasons, the sample should be taken within 72 hours of the receipt of the request (unless ongoing transfusions).</p>	<p>To ensure screened babies receive a valid result.</p> <p>An interval of one week is required to detect any meaningful change in TSH levels.</p> <p>Unable to confirm baby's age at sample.</p> <p>Unique identification number for each baby.</p> <p>Unable to confirm identity of baby.</p> <p>Not enough blood to analyse to ensure accurate result.</p> <p>May lead to an invalid result.</p> <p>May lead to false-negative results as the blood is spread too thinly.</p> <p>May lead to an invalid result.</p> <p>May give rise to a false-positive result for CHT.</p> <p>May delay treatment.</p> <p>May lead to an incorrect result.</p>
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How to take Blood Spot Screening at St. Peter's Hospital

Equipment

Parent information leaflet (should be given to parents)
 Non-sterile protective gloves
 Lancet
 Cotton wool ball
 Plaster
 Blood spot card and glassine envelope
 Nursing and medical records
 Bar coded pre-printed patient label

Procedure	Rationale
Can the sample be done at the same time as other blood tests?	To minimise discomfort and handling
Explain to parents why the newborn blood spot screening test is performed and how it is taken. Give information leaflet if parents don't already have it.	To obtain parental understanding and verbal consent. Record decision to screen in notes.
Use the pre-printed blood spot barcoded labels on all layers of the newborn blood spot card, or fill in all the boxes, confirm baby's name, date of birth and parent's contact details	To identify patient with results.
Recommend comfort measures for the baby. Ensure the baby is cuddled and in a secure position for taking the sample – swaddling the baby may reduce pain/discomfort. Engaging the baby through face-to-face contact, voice and touch may be beneficial. Suggest the baby is breast feeding during the heel prick if clinically well enough. An alternative to breast feeding is to give sucrose according to the policy +/- non-nutritive sucking (e.g. a pacifier)	To make it easier for the baby to regain his or her calm and cope with the procedure. To reduce the pain/discomfort of the procedure. Painful procedures are a medical indication for use of pacifiers or sucrose solutions. <u>This does not undermine the WHO / UNICEF's <i>Baby Friendly Initiative's Ten Successful Steps to Breastfeeding</i></u>
Wash hands and put on non-sterile protective gloves.	To prevent cross infection
The heel should be washed with tepid plain tap water. Do not use alcohol or alcohol wipes. Ensure the baby's heel is clean and dry. Ensure the heel is warm- additional warming of the heel is not necessary.	Washing is important for test reliability. To prevent contamination of the sample or infection of the puncture site.
Using the lancet on the inner or outer plantar aspects of the heel, gently pierce the skin. For full term and pre-term babies, the external and internal limits of the calcaneus are preferred. Puncture should be no deeper than 2.0 mm Allow heel to hang to aid blood flow.	To minimise skin trauma and maximise potential to obtain blood. Topical pain relief cannot be given as this may contaminate the sample.
Wait up to 15 seconds to allow blood to flow. Do not squeeze the foot in an attempt to increase blood flow. Apply the blood drop to one side of the card.. The aim is to fill each circle on the newborn bloodspot card with a single drop. Allow the blood to fill the circle by natural flow, and seep through to the back.of card. Do not compress	Less than four circles is inadequate, leads to inaccurate results and greater likelihood of a repeat procedure. The exception to this is the pre-transfusion sample, for which a single blood spot is sufficient. The term repeat sample should be a four circle sample.

<p>the card to ensure the blood has soaked through.</p> <p>Fill all the circles completely and avoid layering blood.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>FULL CIRCLE</p>  </div> <div style="text-align: center;"> <p>LAYERING</p>  </div> <div style="text-align: center;"> <p>SPOTTED</p>  </div> </div>	
<p>If the blood flow ceases- The congealed blood should be wiped away firmly with cotton wool or gauze. Gently 'massage' the foot, avoid squeezing, and drop the blood onto the card. A second puncture may be necessary. This should be performed on a different part of the same foot, or, if necessary, the other foot.</p>	<p>To disturb the clot and encourage blood flow.</p> <p>The original site is avoided to prevent the sample from containing excessive fluid and to reduce pain.</p>
<p>Apply cotton wool to the wound, then apply a hypoallergenic spot plaster to the heel if appropriate / required.</p>	<p>To stop bleeding.</p>
<p>Dispose of the sharp in a sharps container.</p>	<p>To prevent injury and cross infection to others</p>
<p>Allow blood spots to air-dry and put the card blood spot end first into the envelope.</p>	<p>To prevent sample contamination/damage</p>
<p>On NICU, put the completed card into the blood spot box in the Dr's office for collection. Blood spots taken on TCU must be brought up to the reception on NICU and placed in basket.</p>	<p>Sample card will be collected by clerk.</p>
<p>Postnatal ward / Community / Paediatric Wards send / bring the completed blood spot card to the blood spot coordinator Community Midwives Office, Joan Booker Ward.</p>	<p>To ensure test is sent to appropriate place for analysis.</p>
<p>Record when blood spot was performed on the PCHR, nursing charts, and the nursing and medical records, especially the care plan.</p>	<p>To keep accurate records.</p>
<p>If the baby has had a blood transfusion <u>and</u> no pre-transfusion card was taken, make a note in the care plan that the test needs to be repeated at or after 72 hours for PKU, CHT, (CF) and again at 3 months for SCD.</p>	<p>To ensure test for Phenylketonuria is not missed and to ensure that haemoglobinopathy screening is performed correctly. A risk management form should be filled in.</p>
<p>When the repeat test is taken, record it as above.</p>	<p>To keep accurate records.</p>
<p>Record any subsequent tests as above</p>	<p>To keep accurate records.</p>

Process before sending off to St Helier Laboratory for analysis

All blood spots should be taken as per St Helier laboratory guideline by clinical staff.

- Completed blood spot cards should be put in relevant basket in Drs office on NICU. Blood spot cards should never be sent direct to community office.
- Ward receptionist will check all blood spots for accuracy before sending to lab to minimise repeat blood spot requests from St Helier of the following.

Correct identifying label for correct baby, cross referenced with clinical notes, right name, NHS no, DoB, sex.

Date of specimen.

72 hours from blood transfusion.

Quality of blood samples.

- Ward receptionists will complete red blood spot folder with babies details for x3 different spots required. For all fields required as stated on blood spot record sheet.
- Identify in admission book when blood spot taken and sent.
- Ward receptionist to inform nurse in charge if sample is not suitable for sending and processing.
- Unsuitable blood sample card to be returned and placed at back of red blood spot folder for blood taker to be spoken to and re-training given if appropriate.

Miscellaneous

- All staff (nursing and ward reception) to receive year updates on NICU Mandatory Training day.
- Spreadsheet to be maintained by maternity screening coordinator for all repeat requests required on NICU.
- Ward receptionist to send out reminder to nursing staff for day 28 bloodspot.
- Ward receptionist to contact referring / booking hospital ward clerk to follow up transfers on failsafe if not received within 48 hours of admission.

References and Further Information

UK Newborn Screening Programme Centre, *Standards and Guidelines for Newborn Blood Spot Screening*, 2012: London.

www.sct.screening.nhs.uk/

Guideline

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