Hinchingbrooke Pathology User Guide

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1. Scope

This User Guide has been produced to assist both hospital and community users of the pathology service at Hinchingbrooke Hospital. It deals with access to the various pathology disciplines, specimen requirements, information and labelling requirements and reference ranges of the investigations available. If this User Guide fails to provide information required, users are encouraged to contact relevant key personnel listed.

2. Purpose -Service background

The Pathology Laboratory at Hinchingbrooke hospital is integral part of the Family and Integrated Support Services Division. It houses some of the most up to date testing equipment within the United Kingdom, receiving around 230k samples per year. Since August 1st 2017 the service is provided by North West Anglia NHS Trust with the laboratory at Hinchingbrooke a satellite of the hub laboratory at the Peterborough City Hospital (PCH).

Local haematology and biochemistry services at Hinchingbrooke have been integrated to form a single service now entitled "Blood Sciences", which utilises multidisciplinary skills. The Hinchingbrooke laboratory also provides an on-site transfusion service to Hinchingbrooke hospital. This service is delivered from the Hinchingbrooke laboratory located on the ground floor at the rear of the hospital. Service is provided 24/7 for normal hours and out of hour's provision please see details in Section 7.1 Service Information – Service Availability.

Hinchingbrooke Hospital also provides a body store and bereavement service.

The POCT service at Hinchingbrooke Hospital is managed by the NWANGLIAFT POCT team based at PCH.

The repertoire of testing offered at the Hinchingbrooke Blood Sciences laboratory is limited and additional testing is referred to Peterborough City Hospital for processing. The pathology department at PCH is divided into a number of specialist departments:

- Biochemistry and Immunology
- Haematology/Transfusion
- Cellular Pathology (Non-gynae Cytology, Histopathology, Mortuary and Bereavement Services)
- Microbiology
- Point of Care (POCT)

For details of tests referred please see sections below.

<u>GP Service Provision.</u>

With the exception of occasional urgent tests and some anti-coagulant monitoring, all work from GP surgeries is currently processed at the Cambridge University Hospital NHS Foundation Trust (CHUFT) laboratory on the Cambridge Biomedical Campus. Sample collection runs call at Hinchingbrooke Pathology to deliver community blood transfusion antenatal work and collect work referred to CUHFT.

3. Terms and Definitions

Term	Definition
HH	Hinchingbrooke Hospital
FISS	Family & Integrated Support Services
CUHFT	Cambridge University Hospitals Foundation Trust
PCH	Peterborough City Hospital
NWAngliaFT	North West Anglia Foundation Trust

4. Responsibility

The Policy applies to all clinical staff obtaining pathology samples for onward despatch to the laboratory for processing. Clinical staff are defined as medical, nursing, laboratory or associated groups.

5. Related Documents

Item	Document Location
Blood Transfusion Policy / Procedures	See Intranet document library
Business Continuity Plan	
Quality Manual	
Major Incident	
Venepuncture on Adult Patients Guideline and Assessment for Clinicians	

6. Safety and Environmental Considerations *(if applicable)*

Not applicable.

7. Procedure

7.1 Service information

Key Personnel

The Pathology service is part of the Family and Integrated Support Services Division (FISS). The key contacts are:

Position	Contact details
General Manager	See intranet for details
Pathology Services Manager NWANGLIAFT	PCH 8440 PSM OFFICE HH x7477
Consultant Haematologist	Bleep via switchboard
Clinical Lead	See intranet for details
Consultant Chemical Pathologist	Bleep via switchboard
Consultant Medical Microbiologist	Bleep via switchboard
Blood Sciences Manager	currently vacant

	HH x6522 / PCH X8441
Deputy Blood Sciences Manager	01480 416522 / x6522
Transfusion Manager	01480 416265 / X6265 PCHnumber to 01733 678463 / x8463
Transfusion Practitioners	PCH – ext 8422 / 8480
Pathology Quality Manager	01480 416265 / 01733 678441 HH x 6265 / PCH x 8441

Raising a concern

A concern can be made by anyone who is affected by the actions of North West Anglia Pathology Services. It can also be made by someone acting on behalf of another person, with their consent.

It is important that you raise your concern as soon as possible after the event and usually within 12 months. This time limit can be extended if there are good reasons why the complaint could not be made sooner.

If you are in any way unhappy about the pathology service that you have received, the first step in many cases is to talk to the Pathology Quality Manager (01733) 678431.

Link to pathology contact form

To make a formal complaint

Please click the link below which will take you to the North West Anglia NHS Foundation Trust website and the complaints contact information.

Link to Formal Complaint Contact information

Pathology Information Technology

The department is fully computerised, using the WinPath system provided by CliniSys Ltd. Remote enquiry facilities for pathology results are available via clinical viewer at ward nursing stations and other key points throughout the Hinchingbrooke trust.

All results from samples processed at either PCH or CUHFT are viewable via clinical viewer.

Information Governance

The laboratory operates in accordance with NWANGLIAFT's procedures for data security, storage, archive and retrieval of records, electronic passage to remote users and disposal of records.

Specimen Handling

Specimen handling and storage requirements are dependent upon specimen types and the tests required. For more information on particular storage requirements please contact the laboratory on 01480 416151.

Blood specimens that require electrolyte measurement (sodium, potassium, chloride) must never be refrigerated before centrifugation. All such specimens should be stored and transported to the laboratory at room temperature. Failure to do so will result in the invalidation of the above tests.

Histology specimens will only be accepted during routine working hours 9am -5pm as they must be checked and signed for.

Specimens intended for other Hospital Laboratories

If patient samples are intended for other labs e.g. antenatal samples for the Rosie or pre op transfusion samples taken for patients having surgery at PCH these should be clearly marked and in a separate bag so that they are easily identifiable from the bulk of routine samples.

Specimen transport within Hinchingbrooke

Specimens can be transported via the pneumatic pod system from within Hinchingbrooke. Samples should be placed in one of the plastic specimen bags provided, which can then be sealed and sent **inside of one of the pods** along with the corresponding request form to the pod station that is designated for that particular area of the hospital, which will be one of the following pod station numbers; 001 from main hospital chute system, Designation 1 from within the treatment centre. Some specimens should **not** be transported via the pod system, these include:

- CSF samples
- Samples preserved on ice
- Samples that do not fit safely in the pod
- Urine samples and any microbiology or histology samples
- Covid swabs

For further information on or problems with the pneumatic pod system please contact the facilities department on extension 6566. In the event of the pod system being down, please contact the portering service on ext. 1197 to arrange specimen transport.

Samples from within Hinchingbrooke not transported via the pod system should be taken to the laboratory via the hospital porters, and should be carried in the boxes provided, in accordance with local model rules.

Specimen transportation from outside the Hinchingbrooke site

The department has contracts with GSG via Cambridge University Hospital NHS Foundation Trust (CUHFT) and GSG via Peterborough City Hospital to provide sample transport services. All GP samples, Cellular Pathology, Non-Gynae Cytology and Microbiology and Blood Sciences samples are transferred to CUHFT or PCH by these services. However users should note that, under the EU Carriage Requirements for Diagnostic Specimens (ADR Regulations), the '**consignor'** is considered responsible for complying with the Regulations.

The Regulations require samples to be packaged in accordance with Packing Instructions P650 which requires a triple layer of packaging to reduce the likelihood of sample leakage during transport. All samples for transportation must go via the Pathology Laboratory, so that it is sent in packaging compliant with P650 and UN3373 standards.

Transportation of transfusion samples for additional testing

Transfusion samples for further investigations are transported to NHS Blood and Transplant (NHSBT) reference laboratories in London or Bristol via their own transport, contracted couriers/taxi services or using SERV (volunteers) depending upon the level of urgency. All samples for transportation must go via the Pathology Laboratory.

Spillages of specimens during transportation

Specimens must be transported packaged as described above in order to reduce the risk of spillages. If a spillage is encountered during the specimen transportation procedure please contact the laboratory via telephone on 01480 416151 (or out-of-hours contact the hospital switchboard on 01480 416416 and ask to speak to the Pathology department) for advice on the handling of the spillage. When contacting the laboratory, if possible please provide information on the specimen types being transported, the extent of spillage and the transport medium if used. Please note any formalin spillage is of a serious nature and must be escalated and dealt with immediately. Specific spill kits are required – do not attempt to clean this up without laboratory involvement. Spills within theatres should be handled in accordance to theatre policy.

Results Enquiries

Telephone enquiries regarding reports **must** be made initially via the laboratory sample reception for tests performed on site on Extension 6151.

For enquiries about tests performed at PCH, contact:

Biochemistry	204 8455 / 8458
Immunology	204 8454
Haematology	204 8453
Histology	204 8180 / 8182
Microbiology	204 8424

For all enquiries about tests performed at CUHFT contact the CUH Helpdesk 0333 1032220 (option 1, then option2).

Hinchingbrooke Service Availability

The blood sciences department operates a 24/7 shift system. A routine service is provided from 08:30 to 20:30, Monday to Friday. At all other times access to the service is via the respective duty Biomedical Scientist (BMS) who may be contacted by bleep – Haematology/ Transfusion -1257; Biochemistry- 1239 if a phone call to the laboratory is unanswered.

7.2 Phlebotomy Services

An inpatient phlebotomy service is provided between 08:00 and 12:00 each weekday at Hinchingbrooke, and between 07:00 and 11:00 on Saturday, Sunday and Bank Holidays mornings. A corresponding outpatient service is provided from 09:00 – 17:00 on weekdays only. This service is provided from the Treatment Centre (extension 8471).

Inpatient requests **must** be left in the correct day pocket of the wards phlebotomy folder by 07:30 weekday and 06:30 weekends/ bank holidays to be collected when the phlebotomists call. Phlebotomists will visit each ward once daily. At weekends and Bank Holidays a limited service is provided (generally only two phlebotomists are on duty on these occasions) and it is expected that workloads will be restricted to essential investigations only.

Requests forms of patients that the Phlebotomists have been unable to bleed (e.g off ward, being seen by other staff, patient refusal) will be returned to the folder for the clinical teams to action later.

The Sarstedt Monovette blood collection system is in use throughout the Trust.

Please note:

Patients presenting with a request form for blood tests will be viewed as providing implied consent and the venepuncture procedure explained to ensure that patients fully understand and are comfortable with the process. Any patients requiring information regarding the tests requested, their function and clinical implications will be referred to the requesting clinician. The patient will be afforded the opportunity to defer venepuncture until the requisite information has been obtained. For referral samples implied consent is actioned that clinical information or family history may be shared with testing centre.

Sampling Supplies

Monovette and other pathology supplies are available from Pathology Reception; please return a Pathology Supplies Requisition List via the email address: hinch.pathologystores@nhs.net. All orders will be processed within 5 routine working days. A colour-coded guide to the Monovette system is included with this User Guide (See appendix E)

Phlebotomy training is provided to other NHS professionals. For further information please contact the Phlebotomy team.

For a list of blood sample requirements please see the relevant discipline sections.

7.3 Completion of Pathology Request Forms and Labelling of Samples

IMPORTANT Incorrect labelling of the sample will result in it being rejected and the patient having to be re-bled/ resampled

It is the responsibility of the requesting clinician and then the individual performing the venepuncture to ensure that request forms and samples are correctly and identically labelled. It is essential that the risk of misreporting pathology results is minimised to ensure patient safety and to this end accurate identification of the patient from whom the specimen/ sample was obtained is of paramount importance.

It is expected that the requesting clinician has obtained consent for the diagnostic test from the patient using Good Clinical Practice as detailed in NHS Choices, Advanced Nursing Practice toolkit or equivalent best practice (see references).

The actual labelling of samples must take place immediately after (not before) the sample has been placed in the sample container and whilst next to the patient. With regards to inpatients, the information on the wrist band must match the information on the sample and the request form and, if possible, be confirmed verbally with the patient. With regards to Out-patient and GP originated samples, the name and Date of birth information must be confirmed verbally with the patient.

IMPORTANT All samples **must** be labelled in the presence of the patient.

Almost all of our outsourced service providers require the NHS number as the unique identifier and this must be provided along with the unique hospital number for the patient. If it is not provided samples cannot be sent on for testing.

The laboratory will refuse to accept samples that do not comply with the labelling criteria outlined below.

Laboratory Criteria for the Acceptance of Pathology Requests/ Samples - General Information

All samples **must** arrive at the Pathology Department accompanied by a laboratory request form containing relevant information. Patient demographics on the sample and request form **must** be clearly annotated and identical. If samples have a discrepancy, in most cases a report will be issued with the error recorded. If the sample is urgent, the laboratory will attempt to contact the clinician directly by telephone.

Request Form	Patient Sample
Surname	Surname
Forename(s) (initials not sufficient)	Forename(s) (initials not sufficient)
Date of Birth	Date of Birth
Hospital / Unique patient identifier	Hospital/Unique patient identifier
NHS Number (must be included – unless an agreed exception)	NHS Number (should be included)
Date and time bled	Date and time bled
Ward/ Location/ Consultant	Ward / Location
Clinical Details	Signature of person taking the blood
Required tests	
Signature of requesting clinician	

For histology specimens the specimen type, including the part of the body obtained and any clinically relevant information, **must** also be included on the form.

Any microscope slides sent to the laboratory due to space restrictions will be deemed adequate if the frosted end is labelled with:

- Patients Surname
- Patients Forename
- Patients Date of Birth

The information must be recorded in pencil as ink is dissolved by the laboratory staining protocols in use.

Use of Addressograph Labels

Addressograph labels are not permitted for use on any samples – they must be hand written. Samples bearing addressograph labels will be rejected. The only exception to this is the labelling of histology samples.

Where addressograph labels are used to provide information on request forms, the requester **must** ensure that all four copies of the request form have a separate label. It is also important to record the location, consultant and the time and date of the sample are written on the form, as this information is not included on the addressograph labels.

Actions regarding inadequate or mismatched information

Incorrectly labelled samples **will not** be accepted. However, contact to the requesting source will be made on any samples that are deemed non-repeatable.

Health and Safety

- Leaking Samples - **will be** discarded (excluding histology samples). Urine samples **must** not be transported to the laboratory in the same bag as other samples, since leakage will result in contamination of the other samples and request forms.
- Specimen Containers - Samples will only be accepted in the approved specimen container. Syringes with needles attached **will not** be accepted.
- Contamination **-** Any request forms/ specimen containers/ transport bags contaminated with body fluids **will be** discarded.
- Marsupial bags are ideal to transport the request form separately to the sample (in the zip lock section) if a sample compartment is not attached to the request form.

Factors affecting laboratory tests

- It is necessary to mix samples containing anti-coagulant well after venesection as clots may be generated within the sample tube, leading to it not being able to be analysed on the haematology/ Transfusion equipment.
- It is essential that samples are sent to the laboratory as soon as possible after bleeding the patient. For example, samples left overnight on the ward before analysis will result in erroneous results for potassium, glucose and bilirubin levels, so these results **will not** be reported by the laboratory.
- CHAD and cryoglobulin samples must be kept at 37°C on bleeding, before receipt in the laboratory, as once the sample is outside of the body, drop in temperature will affect the quality of results. If samples are not kept at the correct temperature, they **will not** be accepted by the laboratory.

Additional Discipline Specific Information

Clinical advice

For Clinical advice see Pathology Website about our service.

Patient information

Additional patient information can be found at www.pch-pathlab.com

Biochemistry

For sample validity queries please contact the laboratory.

Requests for gentamicin or vancomycin analysis **must** give the

- date and time of the last dose,
- number of doses per day and
- date and time of the sample.

Requests will be rejected if information is missing, or if the sample is less than 22 hours post dose (or 10 hours if being dosed twice per day). If the sample is intended as a 1hr post-dose sample e.g. for Gentamicin in case of Infective Endocarditis, this must be clearly stated on the form.

Requests for sFlt-1/PlGF ratio (for the assessment of pre-eclampsia risk) must have the gestational age stated on the request form. Requests will normally only be accepted between 20 weeks and 34 weeks + 6 days.

Add on tests:

Samples for routine analysis are retained in the Clinical Biochemistry laboratory for approximately 4 days (with the exception of 'glucose' samples, with a fluoride-EDTA anticoagulant, which are retained for a minimum of 2 days).

Blood Transfusion

See section 7.7

Histology

Multiple specimen pots **must** be easily distinguishable from each other and **must** be numbered in the same order as they appear on the request card. Failure to do so will result in the specimen being rejected and returned to the sender.

All specimens **must** be sent in formalin fixative (at least ten times the volume of the specimen) unless prior arrangements have been made with the Laboratory. Fresh specimens received without prior arrangements **will be** challenged.

Specimens from known TB patients **must** always be sent in formalin fixative unless prior arrangements and notification are made with the laboratory

Specimens that have leaked into the specimen bag **will be** rejected and returned to requestor for remedial action. Always make sure the specimen container lid is firmly fixed before dispatch to the laboratory.

Non-Gynae Cytology

Delays in transportation of specimens to the laboratory **must** be avoided. An unlabelled smear in a labelled smear carrier is unacceptable.

Unlabelled cervical smears **will be** discarded (as per National recommendation), and the request form returned to the smear taker, with an attached request for a repeat smear.

Unlabelled non-gynae specimens **will be** returned with the request form to the clinician requesting the test, or the clinician **will be** given the opportunity to visit the laboratory and identify the specimen him/ herself.

Laboratory staff **will not** intervene in the labelling and identification process.

Microbiology

The site and nature of sample **must** be recorded on the request form to allow appropriate processing. Additional information **must** include: antibiotics (current, post, or intended) and clinical diagnosis.

Invasive/ unrepeatable and timed specimens may be processed regardless of the amount of information given, but results **will be** issued with a disclaimer to the effect that the laboratory will take no responsibility for the accuracy of the specimen details. In the event that the location of the sender is not provided, the report will remain on the laboratory computer system until it is identified.

Leaking samples **will be** risk assessed according to the amount of spillage, the infection risk, and the repeatability of the specimen. Senders will always be notified if a specimen has to be discarded.

In addition:

- Any incidents arising from non-compliance with these guidelines **will be** reported through the NWAngliaFT Critical Clinical Incident reporting system –DATIX.
- If users would like to give the laboratory feedback, please contact the Blood Sciences or Transfusion Managers or Pathology Quality Manager.

7.4 Blood Sciences

This service has been formed by the integration of the Biochemistry, Haematology and Blood Transfusion disciplines at Hinchingbrooke. A combined Haematology/ Biochemistry/ Immunology / Microbiology request form is available to users. Transfusion Forms remain separate.

Results are available remotely throughout the hospital using the clinical viewer. For training please contact the Trust IT Department. An Investigations Protocol for accident and emergency patients designated as 'Majors' and AAU is in operation at Hinchingbrooke – this is shown at Appendix B

The service is a clinical service and is not intended for medico-legal use. This applies particularly to measurements of ethanol and drugs of abuse.

The repertoires of the sub-disciplines are as follows.

7.5 Biochemistry

Laboratory Service

Clinical Biochemistry is part of the Blood Sciences service. It provides a routine and emergency service to Hinchingbrooke Hospital.

Enquiries

Biochemistry – ext. 6267 / 3024

Reporting

Results **will be** available for all General chemistry* tests within 4 hours of receipt in the laboratory, with the exception of non-urgent HbA1c samples which are batched and tested daily and some endocrine/tumour marker tests which are not run overnight.

Referred tests to PCH/ CUHFT	within 2-7 days
Referred tests to other laboratories	within 7-14 days

* For urgent requests please notify the laboratory on ext. 6267 (out of hours bleep 1239) and mark the request form 'URGENT'. An 'Urgent' sample turnaround of 1 hour is provided for general chemistry tests and Troponin to Accident and Emergency and other departments.

Special Requests

Special requests **must** be referred to the laboratory before collection.

Gut hormones	Cryoglobulins	
Calcitonin	Ammonia	Porphyrin

For CSF Xanthochromia the sample must be protected from light. The form must state the time between onset of headache and the time of sampling. If not already received within 24 hours of the CSF, a serum sample is required for matched serum total protein and bilirubin. This is a send away test and must be transported to the Hinchingbrooke laboratory before 11:00am for same day analysis. CSF spectrophotometry is only performed once daily, Monday to Friday, so samples must be at the referral laboratory by 14:00 hours.

Biochemistry Analyses, Reference Ranges and Specimen Types

See individual tests in the table, below. For most blood tests, serum (from clotted blood) is needed. Please send full sample tubes (4.7ml adult / 1.1ml paediatric) but if this is not possible, please discuss minimum sample requirements (ext. 6267). Glucose FE-Fluoride EDTA (Yellow top) 4.9ml / 1.1ml, Lithium Hep (Orange top 4.9ml / 1.1ml) where used should also be full volumes where possible

Specimens are routinely retained for one week but may be stored for longer if requested. Extra investigations may be requested in writing during this time if analyte stability allows.

Reference ranges given are adult ranges, unless otherwise specified. Different ranges may apply, depending on age, sex, nutritional state, time of day and season. Always consult the reference range provided with the report since methods are constantly updated.

7.5.1 Analytical Profiles, Reference Ranges and Specimen Types

These are for tests performed on site at the Hinchingbrooke Laboratory.

Test	Reference Range	Specimen Type
U + E profile		
Sodium	133 – 146 mmol/L	
Potassium *(Adult)*	- 146 mmol/L - 5.3 mmol/L	
(Neonate)	3.5 - 5.3 mmol/L	
(Infant)	3.4 – 6 mmol/L	
(1-6yr)	3.5 – 5.7 mmol/L	
Chloride	3.5 – 5.0 mmol/L	
Urea* *(Adult)*	95 – 108 mmol/L	
(Neonate)	2.5 – 7.8 mmol/L	
(Infant)	0.8 – 5.5 mmol/L	
(1-6yr)	1 – 5.5 mmol/L	
Creatinine *(Male)*	2.5 – 6.5 mmol/L	Serum gel tube (brown top)
(Female)	59 – 104 µmol/L	
	45 – 84 µmol/L	
*Urea is no longer part of the routine "U+E" profile. This test is available upon request	Changes in creatinine are used to assess acute kidney injury (AKI) risk. An AKI staging is reported based on national guidelines.	
eGFR (calculated by CKD-EPI equation) Requires gender, date of birth and a serum creatinine result for calculation.	Stage mL/min/1.73m^2 1 >90 2 60 – 89 3 30 – 59 4 15 – 29 5 <15	
Cardiac Markers		
Total Creatine Kinase (CK) *(male)*	40 – 320 iU/L	Serum gel tube (brown top)
(female)	25 - 200 iU/L	
Troponin T	See report for interpretation. Interpretative guidance of initial values can be found in the Trust Document Library under Pathology Guidelines.	

Bone profile			
Adjusted calcium	*(adult)*	2.20 - 2.60 mmol/L	Serum gel tube (brown top)
	(neonate)	2.00 – 2.70 mmol/L	
	(1 – 16yr)	2.20 – 2.70 mmol/L	
Phosphate *		0.80 - 1.50 mmol/L	
Albumin	*(adult)*	35 - 50 g/L	
	(neonate – infant)	30 – 45 g/L	
	(1 – 16yr)	30 – 50 g/L	
alkaline phosphatase*	*(adult)*	30 - 130 iU/L	
	(neonate)	70 – 380 iU/L	
	(1 – 16yr)	60 – 425 iU/L	
LFT profile			Serum gel tube (brown top)
Total protein*		60 - 80 g/L	
Albumin	*(Adult)*	35 - 50 g/L	
	(Neonate-infant)	30 – 45 g/L	
	(1-16yr)	30 – 50 g/L	
Total globulin*		24 – 35 g/L	
*Total protein and total globulin are no longer part of the routine "LFT" profile. These tests are available upon request			
Total Bilirubin	*(14d – Adult)*	0 - 21 µmol/L	
Direct Bilirubin		0 – 6.8 µmol/L	
ALT	*(male)*	5 – 41 U/L	
	(female)	5 – 33 U/L	
alkaline phosphatase~	*(Adult)*	30 - 130 IU/L	
	(Neonate)	70 - 380 IU/L	
	(infant- 16yr)	60 – 425 IU/L	
~Upper reference limit markedly increased in pregnancy and growth associated with infancy and puberty.			
Lipid profile (fasting) total cholesterol triglyceride HDL LDL		Please see NICE guidance on Lipid modification or Familial Hypercholesterolaemia	Serum gel tube (brown top)
Blood gases Co-oximetry, Lactate and Bicarbonate. These are only available on ward-based analysers. No blood gas analysis is conducted in Pathology.			Use Li Hep syringe, well mixed.

Iron profile serum iron^ transferrin transferrin satn. *(male)* *(female)* Ferritin^ *(adult male)* *(adult female)* CRP	 5.83 – 34.5 µmol/L 2.0 – 3.6g/L 20 – 50 % 15 – 50 % 30 – 400 µg/L 13 - 150 µg/L <5 mg/L	Serum gel tube (brown top) **Minimum retesting interval – 28 days**
^Ferritin is elevated and serum iron and transferrin depressed by acute inflammation, as indicated by a raised CRP. Under this circumstance, the determination of iron overload and especially iron deficiency by means of these measurements may be unreliable.		
Individual Blood Tests The list below covers tests done on the HH site, there are numerous additional assays available e.g. static and dynamic endocrine function tests, drug monitoring and toxicology. Please contact the laboratory to discuss referrals and protocols.		
Ammonia *(Infant - Adults)* *(neonates)* *(Sick or Prem.)*	0 - 50 µmol/L 0 - 100 µmol/L 0 – 150 µmol/L	EDTA blood in a small screw top tube(1.1ml)full, with air excluded. Sent on ice
Amylase	28 – 100 U/L	Serum gel tube (brown top)
Beta-HCG (serum)	Gestation related < 4.0 U/L non-pregnant	Serum gel tube (brown top)
Carboxyhaemoglobin (Available on ward-based blood gas analysers. No blood gas analysis is conducted in Pathology.)	unexposed, resting non-smokers 0.5 – 1.5 %	Use Li Hep Blood Gas syringe, well mixed, no air space.
C-reactive protein (CRP)	0 - 5 mg/L	Serum gel tube (brown top)
Direct bilirubin	0 – 6.8 µmol/L	
Digoxin	0.5 - 2.0 µg/L At least 6 hours from last dose	
Alcohol / Ethanol Not for legal use	No range quoted Results reported in mg/dL	Serum gel tube (brown top)
Gamma-glutamyl transferase (GGT) *(male)* *(female)*	 <60 U/L <40 U/L	Serum gel tube (brown top)
Glucose (fasting)	4.1 – 5.9 mmol/L	Fluoride EDTA (yellow top) or, if received within 2 hours, serum gel tube (brown top)

Glucose tolerance test -for the diagnosis of Diabetes	If being done as an outpatient, please arrange appointment - contact Phlebotomy, ext. 8471 The following table summarises the 2016 WHO recommendation for the diagnostic criteria for diabetes and intermediate hyperglycaemia **Diabetes** Fasting plasma glucose ≥7.0 mmol/L Random or 2-h plasma glucose* ≥11.1mmol/L **Impaired Glucose Tolerance (IGT)** Fasting plasma glucose <7.0mmol/L and 2-h plasma glucose* ≥7.8 and <11.1mmol/L **Impaired Fasting Glucose (IFG)** Fasting plasma glucose 6.1 to 6.9mmol/L and 2-h plasma glucose (if measured) <7.8mmol/L *Venous plasma glucose 2-h after ingestion of 75g oral glucose load. *If 2-h plasma glucose is not measured, status is uncertain as diabetes or IGT cannot be excluded	Fluoride EDTA (yellow top)
Please state on the request form whether the GTT is a "2 point" one, with sampling at 0 and 120 minutes only (for diagnosis of diabetes), or a "full" one with half hourly samples.		
HbA_1c	Non-diabetic reference range: 20 - 42 mmol/mol Also see NICE guidelines for advice on targets in patients with diabetes.	K EDTA (red top) or finger-prick capillary sample in haemolysate (grey top) **Minimum retesting interval - 7 days**
Magnesium *(Adults)* (*Neonate*)	0.7 - 1.0 mmol/L 0.6 – 1.0 mmol/L	
Osmolality (serum)	275 - 295 mmol/kg	

Paracetamol	Avoid taking blood < 4 hrs after Ingestion – limited value. See normogram in BNF	Serum gel tube (brown top)
Salicylate	See BNF for advice on poisoning	
Uric acid (*male*) (*female*)	200 - 430 µmol/L 140 - 360 µmol/L	
Thyroid Function Tests TSH *(7 – adult)* *(Neonate)* *(1 – 6yr)* *(Pregnant – 3rd trim)* Free T4 *(Pregnant - 2nd trim)* *(Pregnant – 3rd trim)* Free T3 *(adult)* *(Neonate)* *(1 – 20yr)* *(Pregnant – 3rd trim)*	 0.3 – 4.2 mU/L 0.7 – 11.0 mU/L 0.7 – 6.0 mU/L 0.2 – 3.2 mU/L 12 – 22 pmol/L 9.6 – 17 pmol/L 8.4 – 15.6 pmol/L 3.1 – 6.8 pmol/L 3.0 – 9.3 pmol/L 3.9 – 8.0 pmol/L 3.1 – 5.0 pmol/L	Serum gel tube (brown top) **Minimum retesting interval - 28 days**
B12 Folate	197 – 771 ng/L >3.0 ug/L	Serum gel tube (brown top) **Minimum retesting interval – Folate 28 days** **B12 – 60 days**
Vitamin D	Adequate >50 nmol/L Insufficient 30 – 50 nmol/L Deficient <30 nmol/L	Serum gel tube (brown top) **Minimum retesting interval – 90 days**
PTH	1.6 – 6.9 pmol/L	K EDTA (red top)
PSA *(0 - 49yr)* *(50 – 59yr)* *(60 – 69yr)* *(70 - 79yr)* *(80+ yr)*	0 – 2.5 ug/L 0 – 3.0 ug/L 0 – 3.0 ug/L 0 – 5.0 ug/L 0 – 10.0 ug/L	Serum gel tube (brown top)
CA125	0 – 35 KU/L	Serum gel tube (brown top)
CEA	0 – 5 ug/L	Serum gel tube (brown top)

Urine Analytical Profiles

Containers are supplied by laboratory. Telephone ext. 6267. Use of the correct preservative may be critical (see information below Check if unclear.

U + E profile Urine sodium Urine potassium Urine urea Urine creatinine (*male*) (*female*)	 40 – 220 mmol/24hr 25 – 125 mmol/24hr 428 – 714 mmol/24hr 9 – 19 mmol/24hr 6 - 13 mmol/24hr	 24hr (no preservative)
Calcium & phosphate profile Urine Calcium Urine Phosphate *(Adult)*	 2.5 - 7.5 mmol/24hr 15 - 50 mmol/24hr	 24hr collection in Hydrochloric acid
Creatinine clearance	Female ≤ 40yrs 90 – 130 ml/min 41 – 50yrs 84 – 124 ml/min 51 – 60yrs 77 – 117 ml/min ≥61 yrs 64 – 104 ml/min Male ≤ 40yrs 100 – 140 ml/min 41 – 50yrs 94 – 134 ml/min 51 – 60yrs 87 – 127 ml/min ≥61 yrs 74 – 114 ml/min	24hr in plain bottle + serum gel tube (brown top)
Calculated creatinine clearance (Cockroft Gault) Also see eGFR above	Female ≤ 30yrs 65 – 145 ml/min 31 - 40yrs 55 – 135 ml/min 41 – 50yrs 55 – 125 ml/min 51 – 60yrs 45 – 115 ml/min 61 - 70yrs 40 – 95 ml/min ≥71yrs 30 – 70 ml/min Male ≤ 30yrs 80 – 155 ml/min 31 - 40yrs 70 – 150 ml/min 41 – 50yrs 65 – 130 ml/min 51 – 60yrs 55 – 120 ml/min 61 - 70yrs 40 – 100 ml/min ≥71yrs 30 – 75 ml/min	Requires serum gel sample for creatinine plus patient's gender and body weight for calculation

Urine Drugs of abuse screen (This is a Qualitative Screening Test for the presence of Amphetamines, Barbiturates, Benzodiazepines, Cocaine, TetraHydroCananabinol, Methadone, MDMA, Morphine, Tricyclic Antidepressants and Metamphetamine).	Where the purpose of the test is related to employment, child-custody, medico-legal or forensic issues, this service is unsuitable. In particular there will be no 'chain of custody' as would be requires to use a result as evidence.	Random urine
Urine Osmolality	50 - 1200 mmol/kg related to intake & homeostasis	random, plain
Urine Urate	1200 – 5900 µmol/24 hours - 4.5 mmol/24hr	24hr collection, plain
Urine potassium	25 – 125 mmol/24h	Spot, plain universal
Urine sodium	40 – 220 mmol/24h	Spot , plain universal
Tests on CSF		
CSF glucose *(Adults)* *(Children)*	2.2 - 3.9 mmol/L 3.3 - 4.44 mmol/L - 5.5 mmol/L and >60% of simultaneous fluoride plasma glucose	Fluoride EDTA (yellow top)
CSF protein	0-2 weeks 0.15 – 0.90 g/L 2-4 weeks 0.15 – 0.70 g/L >4 weeks 0.15 - 0.40 g/L	Plain universal
Tests on "Fluids" e.g. peritoneal fluid, pleural fluid It may be useful to discuss the appropriate tests required with the lab, e.g. If your question is "is this urine?" the lab will be able to recommend the correct test to request		
Fluid Total protein	>35g/L exudate < 25g/L transudate	Plain
Fluid Glucose	Clinical team to interpret result dependant on fluid type and clinical presentation of patient.	Fluoride EDTA (yellow top)

Action limits, outside of which results **will be** telephoned to the appropriate clinician, is included at Appendix B

7.6 Haematology

Laboratory Service

Haematology is part of the Blood Sciences service. It provides a routine and urgent service to Hinchingbrooke Hospital.

For sample validity queries please contact the laboratory.

Enquiries

Contact ext 3545

Reporting

Results **will be** available on the clinical viewer for all specimens tested on-site within 4 hours, except for glandular fever, which may be batched and performed daily. * For urgent requests please notify the laboratory on ext. 3545 (out of hours bleep 1257) and mark the request form 'URGENT'. An 'Urgent' sample turnaround of 1 hour is provided for FBC and D-Dimer requests to Accident and Emergency and other departments.

Results will be telephoned if the results indicate immediate clinical intervention in line with RCPath guidelines – The communication of critical and unexpected pathology results (October 2017).

Analytical Profiles, Reference Ranges and Specimen Types

Please see individual tests in the table below (section 7.6.1)for sample requirements.

Specific Information regarding indications for Coagulation Screens

Coagulation tests are not a screening tool; use them only for:

1. Investigation of unexplained bleeding
2. Monitoring of anticoagulant therapy
3. Suspected disseminated intravascular coagulation (DIC)
4. Test of liver function where it is likely to be severely impaired (e.g. Paracetamol overdose or suspected liver failure)
5. Before major surgical procedures

Specific information regarding Indications for D-Dimers

D-dimer requests are accepted in the following circumstances:

1. Any patient with ?DIC
2. Patients with suspected DVT
3. Patients with suspected PE
4. Patients with suspected clot post VTE
5. Patients with chest pain with or without shortness of breath
6. Any patient with sepsis or ?sepsis
7. Any patient with known or suspected COVID-19 infection
8. Any patients with suspected VITT within 28 days of Astra Zeneca COVID-19 vaccination

Note: Any D-Dimer request for suspected PE/DVT should have a Wells score assessed, which should be provided as part of the clinical information sent to the laboratory.

Requests made directly to the consultant haematologist:

- Requests for bone marrow aspiration

- Specialist platelet and coagulation investigations

7.6.1 General Haematology – Reference ranges

Assay	Full Blood Count (FBC)
Key Words	Full Blood Count, FBC
Specimen Collection	2.6ml EDTA for adults, and where possible, for children >10 years old (Red lid); 1.2ml EDTA for paediatric patients <10 years old (Red lid), do not overfill. If a Kleihauer is also requested, an additional sample bottle is required. These two tests cannot be run from the same EDTA sample.
Turnaround Time	1hr for urgent requests, 4 hours for acute testing and next working day for all other requests
Test Indications	Investigations of red cells, white cells and platelets
Interferences	Lipaemia causes falsely elevated haemoglobin which also affects MCV and MCHC - If the lipaemia is identified during analysis due to these indices being significantly abnormal, then laboratory staff will perform a hyperlipidaemia correction to return the Hb, MCV and MCHC to their true values. Hyperbilirubinaemia does not affect the haemoglobin value but may affect other FBC values. Clots or fibrin strands in samples, platelet aggregates, and/or haemolysis can irreparably damage cellular content in the sample and render most FBC parameters invalid - Samples will be either processed with a disclaimer, processed with the most affected FBC values removed, or rejected entirely depending on the severity of the sample degradation. Samples identified by the laboratory as containing cryoglobulins will be warmed prior to analysis to minimise red cell clumping and the subsequent effect on the FBC results.
Reference Range	See table below
Minimum retesting interval	N/A

TEST	AGE/GENDER	RANGE	UNITS
Haemoglobin (Hb)	Up to 1 day	150 – 236	g/L
	1-14 days	128 – 218	
	14 days – 4 weeks	101 – 183	
	4-36 weeks	100 - 140	
	36weeks – 1year	113 – 141	
	1 – 12 years	110 – 151	
	Males over 12 years	130 - 180	
	Females over 12 years	115 - 165	
	Pregnant	100 - 150	
Red Blood Cell Count (RBC)	Up to 1 day	3.77 – 6.51	10^{12}/L
	1-14 days	3.0 – 5.2	
	14 days – 4 weeks	2.8 -5.2	
	4 weeks – 1 year	3.3-5.5	
	1 – 12 years	3.5-5.5	
	Males over 12 years	4.4-6.5	
	Females over 12 years	3.8-5.8	
	Pregnant	3.5-5.0	
Haematocrit (HCT)	Up to 1 day	0.45-0.67	Ratio
	1 day – 4 weeks	0.31-0.55	
	4 weeks – 1 year	0.33-0.39	
	1 – 12 years	0.33-0.43	
	Males over 12 years	0.4-0.53	
	Females over 12 years	0.36-0.46	
	Pregnant	0.32-0.46	
Mean Cell Volume (MCV)	Up to 1 day	101-137	fL
	1 day – 14 days	85-140	
	14 days – 4 weeks	90-120	
	4 weeks – 1 year	70-90	
	1 – 12 years	73-90	
	Over 12 years	80-100	
Mean Cell Haemoglobin concentration (MCHC)	ALL	318-364	g/L
	Up to 14 days	11 – 17	

Red Cell Distribution Width (RDW)	Over 14 days	11.5 – 15.0	%
Platelet Count (PLT)	ALL	150 - 400	10^9/L
Mean Platelet Volume (MPV)	ALL	9 – 12.1	fL
White Blood Cell Count (WBC)	Up to 1 day	9.4 – 34	10^9/L
	1 day – 4 weeks	5 – 19.5	
	4 weeks – 1 year	6-17.5	
	1 – 12 years	4.5-13.5	
	Over 12 years	4-11	
	Pregnant	4-15	
Neutrophil Count	Up to 1 day	1.7-19	10^9/L
	1 day – 4 weeks	1.5-10	
	4 weeks – 1 year	1-9	
	1 – 12 years	1.5-8.5	
	Over 12 years	1.8-7.7	
Lymphocyte Count	Up to 1 day	1.5-11.5	10^9/L
	1 day – 4 weeks	1.5-16	
	4 weeks – 1 year	2-11.5	
	1 – 12 years	1.5-5	
	Over 12 years	1.4-4.8	
Monocyte Count	Up to 1 day	0.1-3.7	10^9/L
	1 day – 4 weeks	0.1-2	
	4 weeks – 1 year	0.1-1	
	Over 1 year	0.1-0.8	
Eosinophil Count	Up to 1 day	0-2	10^9/L
	1 day – 4 weeks	0-1	
	Over 4 weeks	0.1-0.6	
Basophil Count	ALL	<0.1	10^9/L

Assay	Erythrocyte Sedimentation Rate (ESR)	
Key Words	Erythrocyte Sedimentation Rate (ESR)	
Specimen Collection	3.5ml sedivette monovette only (Purple lid) for all patients.	
Turnaround Time	2hr for ? Temporal Arteritis, Next working day for all other tests	
Test Indications	Polymyalgia Rheumatica, chronic inflammation, vasculitis, temporal arteritis, myeloma, acute phase reactions, acute infection.	
Interferences	Hyperalbuminaemia, haemolysis, clot in sample.	
Reference Range		
ESR (Westergren, mm in 1 h)	Men ≤50 years	1 – 10 mm
	Men >50years	2-14 mm
	Women ≤50 years	3-12 mm
	Women >50 years	5-20 mm
Minimum retesting interval	N/A	

Assay	Malaria including referral and RDT
Key Words	Malaria, Plasmodium, Falciparum, Vivax, Ovale, Malariae, Knowlesi, Trypanosomes, Babesia, Microfilaria
Specimen Collection	2.6.ml EDTA (Red lid). 1.2ml EDTA for paediatric (Red lid). Carried out on the Full Blood Count specimen.
Turnaround Time	4 hours, extended turnaround on species confirmation. If positive this test is referred to another centre for analysis: PHE Malaria Reference Laboratory Faculty of Infectious and Tropical Diseases London School of Hygiene and Tropical Medicine Keppel Street London WC1E 7HT
Test Indications	Suspected malarial infection based on travel history. Please ensure details on travel is placed on the request.
Interferences	Malaria RDT test can only detect live malarial parasites, and may not be able to detect certain subtypes of Plasmodium ovale or Plasmodium knowlesi; therefore a negative result does not conclusively rule out malarial infection. It can differentiate between Plasmodium falciparum/mixed infections and non-falciparum infections, but cannot speciate further. Please refer to the full malaria screen for confirmation.
Reference Range	N/A

Minimum retesting interval	N/A

Assay	Glandular Fever
Key Words	Paul Bunnell, Monospot, Glandular Fever, GF, Epstein Barr Virus, EBV, Heterophile antibody, infectious mononucleosis
Specimen Collection	2.6ml EDTA (Red lid). 1.2ml EDTA for paediatric (Red lid), do not overfill. Carried out on the Full Blood Count specimen.
Turnaround Time	Next working day
Test Indications	Lymphadenopathy, atypical lymphocytosis.
Interferences	A negative Glandular Fever screen does not conclusively rule out infectious mononucleosis.
Reference Range	N/A
Minimum retesting interval	N/A

Assay	Sickle Solubility Test
Key Words	Haemoglobinopathy, Sickle Cell Anaemia, Thalassaemia
Specimen Collection	2.6ml EDTA (Red lid). 1.2ml EDTA for paediatric (Red lid). Carried out on FBC specimen. Test can be added on to requests for the duration of storage of routine FBC samples (i.e. up to 3 days from receipt). See below for information on completion of request forms.
Turnaround Time	1 hour if going to theatre
Test Indications	This test is only performed if the patient is pre-op and going to theatre that day. If the patient has never been previously tested a full haemoglobinopathy screen would be sent to PCH.
Interferences	Haemolysis, clotted samples, anaemia, recent blood transfusion or history of bone marrow transplant.
Reference Range	N/A
Minimum retesting interval	N/A

Assay	Coagulation Screen
Key Words	Coagulation Screen, APTT, PT, Fibrinogen
Specimen Collection	3ml Citrate (Green lid). 1.4ml Citrate for paediatric (Green lid). Fill to mark.
Turnaround Time	4 hours
Test Indications	Investigation of bleeding tendency, Disseminated Intravascular Coagulation, Hereditary or acquired fibrinogen abnormality (qualitative and quantitative).
Interferences	Lipaemia, haemolysis, anticoagulants, antiphospholipid syndrome. Samples will be processed up to 24 hours from the time of collection. However, samples older than 8 hours at processing may begin showing interferences due to sample degradation and should be interpreted with caution. Ideal time of bleed to examination – 4hrs. The antibiotic oritavancin has been shown to react with certain coagulation reagents; it may artificially prolong the APTT for approximately 120 hours (5 days) post-dosage and the PT INR for approximately 12 hours post-dosage.
Reference Range	See table below. Please note that while ratios for INR and APTT will remain the same, the time in seconds for PT and APTT may change slightly when new reagent lots are started. If interpreting these results in seconds, please refer to the reference ranges printed on the report at the time of authorisation for the correct reference range.
Minimum retesting interval	N/A

Test	**Age / Sex**	**Range**	**Units**
Prothrombin Time (PT)	n/a	9-15	Seconds
INR	n/a	0.8-1.2	Ratio
Activated Partial Thromboplastin Time (APTT)	n/a	20-31.9	Seconds
APR	n/a	0.8-1.2	Ratio
Fibrinogen (FIB)	n/a	1.7-9	g/dL

Note: Neonatal reference ranges are not available please interpret results alongside clinical presentation.

Assay	D Dimer
Key Words	Deep Vein Thrombosis, DVT, Pulmonary Embolism, PE, Disseminated Intravascular Coagulation, DIC
Specimen Collection	3ml Citrate (Green lid). 1.4ml Citrate for paediatric (Green lid). Fill to mark.
Turnaround Time	1hr for urgent requests, 4 hours for acute work, next working day for all other requests
Test Indications	Suspicion of Deep Vein Thrombosis, Pulmonary Embolism or Vaccine Induced Thrombosis and Thrombocytopenia (VITT). Investigation of Disseminated Intravascular Coagulation, Sepsis or COVID-19 infection.
Interferences	Pregnancy, lipaemia, haemolysis, infection and inflammation, Age.
Reference Range	There is no reference range or D-Dimers. D-dimer result <250ng/mL make the diagnosis of a recent DVT or PE very unlikely, except with a moderate to high clinical probability score. NICE Guidance NG158 (26/03/2020) recommends using and age-adjusted threshold for patients >50 years. The threshold is: Age x 5 ng/mL
Minimum retesting interval	N/A

Assay	Thrombin Time
Key Words	Coagulation Screen, APTT, PT, TT, Fibrinogen
Specimen Collection	3 ml Citrate (Green lid). 1.4ml Citrate for paediatric (Green lid). Fill to mark.
Turnaround Time	4 hours
Test Indications	Hereditary or acquired fibrinogen abnormality (qualitative and quantitative).
Interferences	Lipaemia, haemolysis, anticoagulants, antiphospholipid syndrome. Samples will be processed up to 24 hours from the time of collection. However, samples older than 8 hours at processing may begin showing interferences due to sample degradation and should be interpreted with caution. The antibiotic oritavancin has been shown to react with certain coagulation reagents; it may artificially

	prolong the APTT for approximately 120 hours (5 days) post-dosage and the PT INR for approximately 12 hours post-dosage. IV Heparin can cause a prolonged TT.
Reference Range	15 -22 secs
Minimum retesting interval	N/A

Assay	Anti Xa
Key Words	Clexane, Enoxoparin, Tinzaparin, Dalteparin
Specimen Collection	3ml Citrate (Green lid). 1.4ml Citrate for paediatric (Green lid). Fill to mark. Samples must be taken 4 hours post dose (adult) or 1 ½ -2 hours post dose (children <10 years) and arrive in the laboratory within 3 hours of collection.
Turnaround Time	Next working day
Test Indications	Monitoring during pregnancy as advised by coagulation nurse specialist or haematology consultant, patient with renal failure as approved by haematology consultant.
Interferences	Anti Xa levels change markedly over time owing to the pharmacokinetics of the drug (*e.g.* levels of rivaroxaban will differ greatly 2–4 hours versus 24 hours after dosing). Interpret results with caution. Discuss with Consultant Haematologist if necessary.
Reference Range	Reported in ng/ml. No reference range available. Discuss with Consultant Haematologist if necessary.
Minimum retesting interval	N/A

Assay	Factor VIII – Emergency's Only
Key Words	Haemophillia
Specimen Collection	2x 3ml Citrate (Green lid). Equivalent volume Citrate for paediatric (Green lid). Fill to mark. Due to the nature of this assay, this test cannot be added onto a routine coagulation test without prior discussion.
Turnaround Time	4 hours
Test Indications	Investigation of prolonged APTT with a personal or family history of bleeding, or deemed a clinical emergency at time of request. Testing onsite is haematology consultant approved only.
Interferences	Lipaemia, haemolysis, anticoagulants.
Reference Range	0.5 – 1.5 IU/dl Discuss with Consultant Haematologist if necessary.

Minimum retesting interval	N/A

A guide to abnormal patient results which **will be** telephoned to the appropriate clinician is included at Appendix C

7.7 Blood Transfusion

Blood transfusion is part of the Blood Sciences service. It provides a routine and emergency service to Hinchingbrooke Hospital. Blood supplies are obtained from NHSBT via the Cambridge Blood Centre. Specialist blood and blood components may be obtained from the NHSBT Colindale Blood Centre or in rare cases from the NHSBT Bristol Centre.

Patients undergoing surgery at Hinchingbrooke Hospital must have transfusion samples sent and processed at Hinchingbrooke. Other laboratories results will not be accepted. Cross-site Pre-op assessment arrangements are in place and must be followed – please refer to the Pre-op Assessment teams at either PCH or HH for details

A Joint Hospital Transfusion Committee (HTC) chaired by a Consultant Anaesthetist, with cross-site representation to ensure continuity on both sites where possible. Regular training updates are provided by the Transfusion Practitioner Team to all hospital staff involved in the transfusion process.

It is essential that request forms for blood transfusion have all the required details completed and that the accompanying sample is clearly labelled by hand and signed and dated by person taking blood.

IMPORTANT

Addressograph or similar labelling is **unacceptable**. Transfusion specimens received labelled with an addressograph **will be** rejected.

The following information is required:

The sample and request form acceptance criteria for Blood Transfusion	
Request form	**Patient sample**
Surname	Surname
Forename(s)	Forename (s)
Date of Birth	Date of birth
Hospital number	Hospital number
NHS Number (for community)	NHS Number(for community)
Ward/ Location/ Consultant	Ward/ location
Gender	Gender
Date/ Time/ Requester Signature	Date/ Time/ Sampler Signature
Requirements	
Clinical Details including Hb if known	

Special requirements	
Blood group and antibodies if known	

If the request form and sample do not meet the criteria stated in the table above, the sample will not be accepted and the clinician will be informed as described in section 7.3. All patient identifiers must match identically. Any discrepancies between the form, sample and/or PAS record will result in the sample being rejected.

These measures are designed to protect the patient from dangerous consequences of lapses in established procedures.

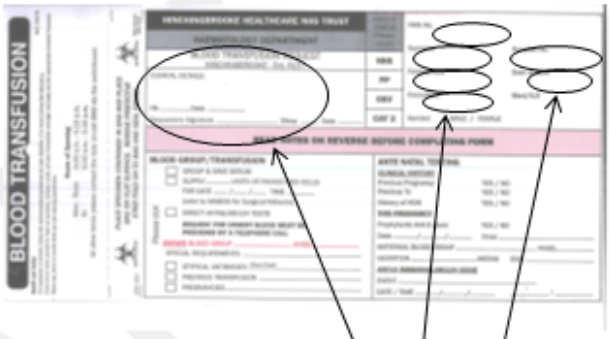
The diagram 7.7 below is adapted from the HH Blood Transfusion Procedure.

Flow Diagram for Sampling of Blood for Transfusion Samples

Only staff who have completed competency 1 are permitted to take group and save or crossmatch samples

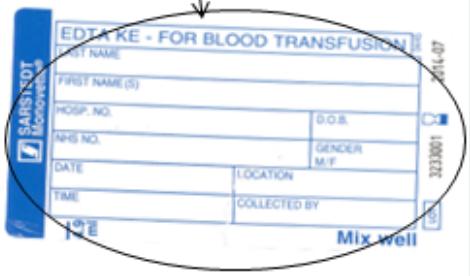
The request form must be filled in with the following information:

Surname, Forename(s)	Date of Birth
Hospital number	Gender
Ward/ Location/ Consultant	Date/ Time/ Signature
Requirements	
Clinical Details including Hb if known	



Essential Information

Samples must be in an EDTA KE (Blue top- Adult, red vial- Neonates) bottle for transfusion. Samples in other bottles will be rejected.



The sample must be clearly labelled, by hand in the presence of the patient by the staff member who took it. Addressographs are not allowed, and any sample with an addressograph will be rejected. In an inpatient setting the sample must be labelled from the identity Band

The sample must contain the following information:

Surname, Forename (s)	Date of birth	Ward/ location/ consultant
Hospital number	Gender	Date/ Time/ Signature

In the event of the patient being unidentified, the minimum requirements are A+E number, gender and approximate age

Any sample that does not meet these criteria will be rejected.

Transfusion Related Referrals

Occasionally, following routine red cell grouping and antibody screening, extra samples are required to send to the NHSBT reference laboratories, in order to:

- Confirm and/ or identify red cell antibodies
- Confirm ABO/ Rh blood groups
- Provide red cell units where patients have complex antibody/ cross matching issues.
- Monitor maternal red cell antibodies during pregnancy

If this is the case the laboratory will contact the clinical area to explain the situation and request the extra samples required.

Patients with known complex red cell antibodies **must** always have 3 x blue top EDTA samples sent on every occasion.

Monitoring of maternal red cell antibodies **will be** required at various intervals throughout a pregnancy. Information **will be** provided within transfusion reports and will follow National guidelines.

Blood and Blood Component/ Product requests – General information

Provision of all blood and blood components requires there to be a current Group and Screen sample available in the laboratory. Samples are stored in the laboratory following analysis and are valid for up to 7 days depending upon recent transfusion or pregnancy.

The national “two group” policy is in place and group related blood components will only be issued when two ABO/ Rh groups are available on the patient. This could be either a current or a historical group or two current groups obtained from samples taken in accordance with HH Blood Transfusion Procedure, see diagram 7.7 above.

Check with the laboratory if you are unsure how many samples are required.

Emergency Blood and Blood Components **will be** provided, if required, whilst waiting for samples to be obtained or processed.

Requests **must** be made in accordance with NWANGLIAFT policies, British Committee for Standards in Haematology (BCSH) guidelines and National Institute for Health and Care Excellence (NICE) guidance.

Laboratory staff will ask questions to ensure that the appropriate information for safe provision of blood is obtained and recorded. Only staff with the required level of knowledge and clinical information **must** phone the laboratory with requests. An authorising clinician **must** be named and this information **will be** recorded.

The caller may be referred to the Consultant Haematologist, Haematology Specialist Registrar and/ or the Transfusion Practitioner.

Red Blood Cells

Red blood cell request **will be** accepted either written on the original request form or by telephone. Full clinical details, reason for transfusion and any special requirements **must** be given.

Blood requests for paediatric/neonatal transfusions may require maternal information to be provided and/or information on previous transfusions given at other hospitals. This is to ensure the safe provision of appropriate blood and delays may occur if information is not available.

Fresh Frozen Plasma, Cryoprecipitate and Platelets

These blood components can only be requested by phoning the transfusion laboratory in routine hours or phoning / bleeping the duty BMS if out of hours. Relevant clinical details, such as recent clotting or platelet count results, **will be** required. The patient's weight (Kg) may be required to enable the laboratory staff to help calculate the correct volume needed.

Blood Products – Anti-D, Human Albumin Solution (HAS), Octaplex and Novo 7

All blood product requests **must** be made by telephoning the transfusion laboratory or bleeping the on-call BMS unless an alternative departmental arrangement has been made.

Relevant clinical information **must** be provided to assist the laboratory staff in supplying the correct volume of product required.

Procedure for blood collection

Collection of blood and blood products **must** only be carried out by staff that have undergone training and have been evidenced as competent by the Transfusion Practitioner.

- When collecting blood from the blood bank, blood group, donor number and date of expiry of blood pack **must** be checked against the details on the compatibility forms.
- Patient details on the forms and compatibility labels **must** also be cross-referenced with the patient blood product prescription chart, which **must** accompany the collector.
- Any discrepancy **must** be queried immediately with the BMS in Blood Transfusion.
- The Laboratory Copy of the transfusion compatibility form **must** be signed, and the date and time of removal documented after checking and replaced in the file by the blood bank when blood is collected. This **must** remain in the file as there is no ward copy of the compatibility form.
- Prior to transfusion, blood packs **must** be checked by two people against the Blood transfusion prescription chart and the patient's identity wristband for:

  Patient surname and forename,

  Patient hospital number

  Patient date of birth

  Blood group

  Expiry date
- Once the transfusion has been commenced the traceability tag on the blood pack compatibility label **must** be completed and returned to the Transfusion Laboratory.

In the event of a suspected blood transfusion reaction:

Please inform the Blood Transfusion laboratory as soon as possible.

All Blood transfusion reactions **must** be reported using the Transfusion Related Adverse Events Form, this form, C0160, is an associated document of the Blood Transfusion Policy. You will be referred to the Haematology Consultant/SpR on call or Transfusion practitioner for further advice.

Depending upon the nature of the suspected reaction the following may be requested:

1 Bags and giving sets of all transfused blood prior to and during the transfusion reaction

2 2 x EDTA blood samples (4.9ml blue top and 2.7ml red top), 1 brown top serum gel (Biochemistry) and a green to citrate sample (Coagulation).
3 Blood cultures
4 First specimen of patient's urine

Anti-D immunoglobulin injections

Anti-D immunoglobulin for prevention of haemolytic disease of the newborn (HDN) is available for all Rh D negative mothers, whose serum is free from immune anti-D in the following categories:

1 Delivery - normal and caesarean section
2 External cephalic version
3 Amniocentesis
4 Ectopic pregnancy
5 Abortion, spontaneous complete, >10 weeks in accordance with BSCH guidelines.
6 Abortion, spontaneous followed by instrumentation to evacuate the product of conception - regardless of gestation
7 Therapeutic terminations of pregnancy – In accordance with NICE guidance for Abortion Care (NG140) ->10 weeks' gestation, surgical or medical. Consider for surgical abortion only <10 weeks gestation.
8 Peritoneal/ vaginal bleeding,
9 Trauma - significant abdominal trauma during pregnancy e.g. seatbelt injury
10 Antepartum haemorrhage, usually significant bleeding
11 Intrauterine death

Issue of anti-D immunoglobulin

Anti-D immunoglobulin is issued by the Blood Transfusion laboratory. The ward **will be** telephoned when the injection is ready for collection, after the appropriate laboratory tests are performed.

The nurse collecting the injection **must** sign the laboratory copy. There is no longer a ward copy of this form. The traceability tag **must** be completed and returned to the transfusion laboratory once the anti-D has been administered.

Anti-D immunoglobulin is also available to patients in the community. The community midwife **must** contact the Transfusion laboratory (on-call Haematology BMS at weekends) to arrange collection.

Dose of anti-D Immunoglobulin Anti-D immunoglobulin is required for all RhD Negative mothers whose serum is free of immune anti-D who deliver a RhD Positive baby. For all events, anti-D immunoglobulin is given to minimise the risk of immunisation. Anti-D **must** be given within 72 hours of the event.	
Gestation:	**Dose:**
<20 weeks gestation	250 iu*
≥20 weeks	500 iu
*a standard dose of 500iu units will be issued to cover this. For large feto-maternal bleeds additional doses of anti-D may be required and a repeat Kleihauer sample **will be** requested 48 hours after injection to ensure foetal cells have been cleared from the maternal circulation.	

Specimen requirements

Blood Transfusion	Specimen Type	Description
Blood group and Crossmatch (Clinical details to be provided on request form)	4.9mL whole blood in EDTA	Blue top
Neonatal Blood group and DAT (<4 months old)	1.3 mL whole blood in EDTA	Small red top
Crossmatch	4.9mL whole blood EDTA (from mother)	Blue top
Paediatric Blood Group/Cross Match	2 mL whole blood EDTA	Small red top
Direct anti-globulin (DAT) (This **must** be a separate sample to any FBC request)	4.9mL EDTA or 2.7 mL EDTA	Blue top or red top
Cold agglutinins (Keep at 37 °C, transport to laboratory immediately)	4.9mL whole blood in EDTA x3	2 x Blue top
Ante-natal blood group and serology	4.9mL EDTA	Blue top
Red cells antibody investigation	4.9mL EDTA x3	Blue top
Platelet Antibodies	10 mL clotted + 20 mL EDTA	White top + 5 x red top
Kleihauer (estimation of FMH) **Must** be carried out on all Rh(D) Negative women of over 20 weeks gestation in the above 11 categories and at delivery. If a Full Blood Count is also required separate samples are required for both tests.		
<20 weeks gestation (group and screen and anti-D issue)	4.9mL ml whole blood in EDTA	Blue top
>20 weeks gestation (group and screen, Kleihauer and anti-D issue)	4.9 ml EDTA & 2.7 ml whole blood in EDTA	Blue top and red top
Term Delivery (group and screen, neonatal group +/- Kleihauer and anti-D issue)	2 x 4.9 ml whole blood in EDTA 2 x 2.7 ml whole blood in EDTA	1 x Maternal blue top and red top 1 x cord blue top and red top

7.8 Out-Of-Hours Service

Outside the core hours of 09:00 – 17:00, the laboratory runs a shift system, so all test results continue to be returned within contracted time scales. Outside of core hours, if referring an urgent

sample, please contact the Biochemistry (Bleep1239) or Haematology (Bleep1257) Biomedical Scientist.

7.9 Clinical enquiries

Anticoagulant Control

The anticoagulant monitoring service is provided by the Trust Anticoagulant nurse team. Please contact this team on ext. 6531 or bleep 2202.

Clinical Haematology

Clinical Haematology services are provided by the Trust via the Woodlands Centre. Please contact this team on ext. 3694 / 8097.

7.10 Cellular Pathology

A comprehensive, quality service for Surgical and Post Mortem Histology and Diagnostic non-gynae Cytology is offered for both NWANGLIAFT sites by the departments at PCH. Gynaecological Cytology is received into the department, packaged and sent to Norfolk and Norwich NHS Foundation Trust.

The Cytology department is available for Sputum, Serous Effusions, Urine, Fine needle aspirates, Bronchial Washings and Brushings.

A fully computerised information system ensures the speedy production of reports and the accurate storage and retrieval of records.

Interpretative reports and clinical advice are the responsibility of the Pathologists, Clinical Scientists and competent Biomedical Scientists. Staff are always available to discuss results with clinical colleagues. Advice on individual clinical cases or in terms of obtaining professional judgement on specific results can be obtained by contacting the laboratory results enquiry line (01733 678468).

Clinical staff are available to assist users to obtain the most effective utilisation of the laboratory service. Laboratory staff are able to offer advice to assist with the correction of specific problems that may be experienced by users, such as instances of sample rejection due to a failure to meet laboratory acceptance criteria.

Patient consent of personable identifiable data is given at point of sample collection. When referral is needed, the patients' informed consent applies to the disclosure of relevant information to appropriate healthcare professionals.

The laboratory is open from 8:30am to 5:00pm from Monday to Friday. Emergency cover outside these hours may be available but specific requests must be discussed with a consultant pathologist

Seminal Fluid Analysis

Seminal fluid analysis is not available from Hinchingbrooke Hospital.

This service is now provided by Cambridge IVF, part of Cambridge University Hospitals NHS Foundation Trust, operating from Ipswich Hospital and their clinic in Cambridge.

All patients requiring a semen analysis **must** call Cambridge IVF on 01223 349010 to book an appointment at either Ipswich or Cambridge, or email cambridgeivf@addenbrookes.nhs.uk with their preferred appointment date, location and time. Patients **will be** required to produce a sample on site unless the patient requests otherwise and can get the sample to the lab for analysis within 45 minutes of production.

7.10 Mortuary and Bereavement Services

Mortuary services provided at Hinchingbrooke Hospital are managed by the Pathology service. For all enquiries please contact the Mortuary on extension 7433. Normal working hours are Monday – Friday 08:00 – 16:00 (closed Saturday and Sunday).

Viewing of Deceased by Relatives

Appointments can be made by contacting the Bereavement office during working hours and is subject to Coronial consent (where applicable) and appointment availability. Viewings are restricted to deceased patient's Next of Kin only whilst they are under the care of the NWANGLIAFT.

Outside of these hours there is an on call technician who is available for guidance and advice, in the first instance please go through the Site Manager. Technical attendance out of hours is at the discretion of the on call technician.

Out of hour's release

Whilst every effort to facilitate religious requirements for swift release from the trust, legal and trust procedures MUST be followed to ensure compliance with all legal national and local guidelines. The decision to release is at the discretion of the on-call Mortuary technician to ensure safe practice is adhered to. There are a variety of legal requirements when issuing paperwork in regards to a patient dying, it is important not to assume or promise something that may not be possible as this can lead to unnecessary distress and upset.

Post-Mortems

It is the duty of the attending clinician to promptly issue a death certificate where a cause of death can be given. If the cause of death cannot be given or there is some other indication, the death must be reported to H. M. Coroner via his officers, Tel 0345 0451364, email coroners@cambridgeshire.gov.uk

Referral form is available via the patient's medical records on e-Track.

Guidance on referring deaths to the Coroner

A death should be referred to HM Coroner if either:

- The death of a child
- Deaths of unidentified persons
- Deaths of people not under obvious care
- Deaths which occur within 24 hours of onset of illness or where no firm clinical diagnosis has been made
- Deaths following post-operative or post invasive procedures, if directly or indirectly contributing to the cause of death
- Deaths which follow an untoward incident, fall or drug error
- A cause of death is unknown
- It cannot readily be certified as being due to natural causes
- The deceased was not attended by the doctor during his last illness or was not seen within the last 14 days or viewed after death
- There are any suspicious circumstances or history of violence

- The death may be linked to an accident (whenever it occurred)
- There is any question of self-neglect or neglect by others
- The death has occurred or the illness arisen during or shortly after detention in police or prison custody (including voluntary attendance at a police station)
- The deceased was detained under the Mental Health Act
- The death is linked with an abortion
- The death might have been contributed to by the actions of the deceased himself (such as a history of drug or solvent abuse, self-injury or overdose)
- The death could be due to industrial disease or related in any way to the deceased's employment
- The death occurred during an operation or before full recovery from the effects of an anaesthetic or was in any way related to the anaesthetic (in any event a death within 24 hours should be normally referred)
- The death may be related to a medical procedure or treatment whether invasive or not
- The death may be due to lack of medical care
- There are any other unusual or disturbing features to the case
- The death occurs within 24 hours of admission to hospital (unless the admission was purely for terminal care)
- It may be wise to report any death where there is an allegation of medical mismanagement

This note is for guidance only; it is not exhaustive and in part may represent desired local practice rather than statutory requirements. If in any doubt contact the coroner's office for further advice.

Coroner's post-mortems are transferred to the hospital of the coroner's choice.

Hospital Post Mortems (i.e. non-coronial PMs)

Permission for a hospital post-mortem must be obtained from the relatives of the deceased. A doctor from the team dealing with the deceased must contact the Mortuary & Bereavement team to request a hospital post mortem. Post mortems are not performed on the Hinchingbrooke site and arrangements would be made to transfer the deceased to the chosen site.

In order to comply with the Human Tissue Act (2004) and the Human Tissue Authority (HTA) Codes of Practice fully informed consent must be obtained prior to the examination commencing and the person obtaining the consent must be suitably trained and knowledgeable in the procedures involved.

The Bereavement Office will make a suitable appointment for the family go through the consent process with an appropriately trained member of staff. Only trained personnel who have undertaken the HTA training programme may obtain consent from the Family. The training for the taking of Post mortem examination consent differs from standard consent training to ensure compliance with HTA guidelines.

7.11 Microbiology service

Microbiology services are provided by the NWAngliaFT laboratory based at Peterborough City Hospital (PCH).

Enquiries

For general enquires telephone 01733 678437 or 01733 678424

Laboratory opening times:

Monday-Friday: 08:45 to 20:00

Saturdays: 08:15 to 17:00

Sundays and Bank Holidays: 08:45 to 17:00

An emergency service operates at all other times. The On Call Biomedical Scientist should be contacted through the hospital switchboard (678000).

Medical Advice: This is available at all times.

Contact the laboratory between the hours of 08:30 and 17:00 Monday - Friday.

Outside of these hours, please contact the Medical Microbiologist on-call via the hospital switchboard (678000).

The services that the department currently provide in-house include:

Bacteriology: Microscopy and culture a range of samples, including swabs, sterile fluids, urines, faeces, and tissue samples. Sensitivity testing on significant isolates.

Mycobacterial culture and microscopy.

Helicobacter pylori faecal antigen detection.

Serology: A wide range of tests including Antenatal Screening; Blood-borne Virus testing; EBV; CMV; Hepatitis A; Rubella, VZV, and HBV immunity tests; Measles; Syphilis; anti-streptolysin O testing.

Virology: RSV detection; Immunofluorescence for influenza A and B, Adenovirus, Parainfluenza, RSV; Rotavirus and Adenovirus in stool samples.

Molecular: MRSA; Flu A and B; SARS 2 (Covid); Mycobacterium tuberculosis (including rifampicin resistance); Chlamydia trachomatis and Neisseria gonorrhoea; Norovirus; Herpes 1 and 2 viruses.

Fungal/Parasite: Microscopy for faecal and urinary parasites.

Entomological samples.

Microscopy and culture for fungal pathogens.

As a department we continually strive to improve the ranges of tests and services that we supply to our customers/users. The above list is a guide to the types of tests that we provide. If the test you wish is not on the list, please contact the laboratory to check availability and discuss with our diagnostic team.

Other tests are sent away to specialist, or reference, centres for testing. For a list of these laboratories please click on the link at the bottom of the page.

Further details on the laboratories to which tests are referred can be obtained from the Department.

General information

1. Safety considerations

Follow universal precaution guidelines by treating all specimens as potentially hazardous. Avoid contamination of the external surfaces of specimen containers and of the accompanying request forms.

2. General guidelines for specimen collection

•If possible, specimen should be collected prior to administering antibiotics.

•Avoid contamination with resident physiologic flora.

•Use an aseptic technique to avoid introduction of microbes during invasive procedures.

•Collect an adequate amount of specimen as inadequate amounts may yield false- negative results

•Identify the specimen source and /or specific site correctly so that proper culture media will be selected during processing in the laboratory.

•Collect specimens in sterile containers with tightly fitted lids (i.e. screw cap)

•All samples must be labelled with a minimum of three patient identifiers (Forename, Surname, DOB, Address) and NHS number wherever possible.

3. Transport all specimens to the laboratory promptly.

Alternatives to prompt delivery:

Refrigerate most specimens at 2 - 8^{o}C but please be aware of the following exceptions:

a.) If blood is cultured in broth (BacT/ALERT bottles), incubate at room temperature (15-25^{o}C). On public holidays and out of hours this can be achieved by sending the blood culture bottles by air tube to the Haematology Department. Otherwise the blood cultures should be left at room temperature.

b.)Stool specimens for amoebic dysentery: stool should be sent to the laboratory immediately after being passed ("hot stool").

4. All samples submitted to the laboratory for examination must be accompanied by a request form signed by a Healthcare Professional and containing:

- patient identifying data – Forename, Surname, DOB, Address
- Specimen type and site if applicable
- date and time of collection
- relevant clinical details – Antibiotic therapy, etc. where appropriate
- examination required
- GP name and address OR Consultant name and ward/location
- The patient's NHS number should be included whenever possible

All samples are normally retained within the laboratory until 48 hours after an authorised report has been issued.

Recommended Samples

Samples from the Urinary Tract

Investigation	Specimen	Container
Bacterial M,C &S	MSU, CSU	Urine Monovette
Mycobacterial culture	Complete EMU x 3	500ml Sterile Container
Prostatitis diagnosis	Void Bladder 1,2 & 3 +/- EPS	Sterile Universal
Schistosome microscopy	Terminal urine specimen	Sterile Universal
Viral culture	MSU	Sterile Universal

Samples from the Lower Respiratory Tract

Investigation	Specimen	Container
Bacterial M,C &S	Sputum or BAL	Sterile Universal
Antigen detection or culture for *Legionella sp*	Sputum	Sterile Universal
Mycobacterial culture	Sputum x 3	Sterile Universal
Serology for respiratory pathogens	Serum samples x 2 collected at presentation and 10-14 days subsequently	Serum Gel Monovette (brown top)

Samples from the Upper Respiratory Tract

Investigation	Specimen	Container
Bacterial C&S	Throat Swab	Swab in Bacterial Transport Medium (BTM)
Viral PCR Testing	Throat swab, Nose and Throat (Covid)	Swab in Virus Transport Medium (VTM)
Bacterial M,C&S	Epiglottis swab ONLY if airway secure	Swab in BTM
Bacterial/Fungal culture	Mouth swab	Swab in BTM
Bacterial C&S	Nose swab	Swab in BTM
Bacterial/ Fungal culture	Ear Swab	Swab in BTM

Ophthalmological Samples

Investigation	Specimen	Container
M,C&S (Adult patient)	Conjunctival swab	Swab in Bacterial Transport Medium (BTM)
M,C&S (Neonate)	Conjunctival swab	Swab in BTM
Virus detection	Conjunctival swab	Swab in Virus Transport Medium (VTM)
Chlamydia investigation	Conjunctival scrapings	Swab in Abbott Multicollect Kit for Chlamydia

M,C&S	Chamber fluids and lenses	Sterile Universal
Culture for Acanthamoeba	Corneal scrapings, contact lenses/fluid	Sterile Universal in sterile saline

Samples from the Gastro-Intestinal Tract

Investigation	Specimen	Container
Culture for Salmonellae, Shigellae, *Campylobacter sp.* and *E.coli* O157	Faeces	Faeces Pot
Microscopy for Ova, Cysts and Parasites, including 'Hot' Stool	Faeces	Faeces Pot
Clostridium difficile toxin	Faeces	Faeces Pot
Virus detection	Faeces	Faeces Pot
Threadworm demonstration	'Sellotape' applied to peri-anal skin	'Sellotape' applied to slide

Samples from the Genital Tract

Investigation	Specimen	Container
Investigation of vaginal discharge	HVS	Swab in Bacterial Transport Medium (BTM)
Investigation of Pelvic Inflammatory Disease (including Chlamydia)	ECS x 2	Swab in BTM and Abbott Multicollect Kit for chlamydia
Chlamydia/*Neisseria gonorrhoeae*	Cervical swab Or Urethral swab Or Urine Or Self-taken vaginal swab	Abbott Multicollect Kit for chlamydia
Herpes simplex PCR	ECS / lesion swab	Swab in Virus Transport Medium (VTM)

Pus, tissue or fluid and cutaneous infections

Investigation	Specimen	Container
Bacterial M,C&S	Wound / ulcer swab	Swab in Bacterial Transport Medium (BTM)
M,C&S	Tissue, fluid or pus	Dry, sterile container
Screening for Group B streptococci	Nose, ear and umbilical swabs	Pre-moistened swab in BTM
Viral infections	Vesicular fluid	Swab in Virus Transport Medium (VTM)
Fungal infections	Hair, nail or skin clippings	DermaPak or Dry Sterile

		Universal container
Screening for MRSA	Nose, throat, axillae and perineum swabs, plus wounds, lesions or CSU	Pre-moistened swab in BTM

Blood

Investigation	Specimen	Container
Gentamicin Assay	Pre and 1 hour post dose blood samples	Serum Gel Monovette (brown top)
Rubella serology	Blood	Serum Gel Monovette
HIV	Blood - please note protocols for high-risk specimens	Serum Gel Monovette
Hepatitis A serology	Blood	Serum Gel Monovette
Hepatitis B surface antigen	Blood - please note protocols for high-risk specimens	Serum Gel Monovette
Hepatitis C serology	Blood - please note protocols for high-risk specimens	Serum Gel Monovette
Other Serology testing	Blood - please note protocols for high-risk specimens	Serum Gel Monovette
PCR Testing	Blood(Plasma)- please note protocols for high-risk specimens	EDTA sample

Turnaround Times

Test	TAT (90%)
Bacteriology	
Acanthoamoeba	10-12 days
Blood culture*	2-6 days
Clostridium difficile testing	18 hours
CSF culture*	≤ 5 days
Enteric routine	2-4 days
Enteric single organism screen	2-4 days
Environmental monitoring	2-8 days
Fluid (normally sterile site) culture*	≤ 7 days
Genital swabs	1-3 days
Lower respiratory	2-4 days
Lower respiratory - CF Patients*	≤ 7 days
Microscopy (Urgent)	Same Day
MRSA Screening	1-2 days
Mycobacteria Culture	42-84 days
Mycology	7-21 days
Other bacterial investigation	2-4 days

Parasitology	1-2 days
Specific organism screen	2-4 days
STD screen	2-3 days
Tissue Samples culture*	7-10 days
Upper respiratory swabs	1-3 days
Urine	1-2 days
Wound swabs (routine) Wound swabs (extended culture)*	2-4 days ≤ 7 days
Molecular	
Chlamydia	≤ 72 hours
Influenza PCR	1-2
Norovirus PCR (outbreak only)	≤ 3 days
SARS2 (Covid) PCR	<1 day
Serology	
Cytomegalovirus - CMV IgM	≤ 5 days
Epstein-Barr virus serology	≤ 5 days
Hepatitis A IgM	≤ 5 days
Hepatitis B - Anti-HBc	≤ 5 days
Hepatitis B - Anti-HBc IgM	≤ 5 days
Hepatitis B - Anti-HBe / HBe antigen	≤ 5 days
Hepatitis B - Anti-HBs	≤ 5 days
Hepatitis B surface Antigen	≤ 5 days
Hepatitis C antibody	≤ 5 days
Hepatitis D (delta) antibody [Referred to Cambridge HPA]	≤ 5 days
Herpes simplex virus IgG [Referred to Cambridge HPA]	≤ 7 days
HIV 1+2 antibody	≤ 5 days
Measles IgG \ IgM [IgM Referred to Cambridge HPA]	5-8 days
Mumps IgG \ IgM [Referred to Cambridge HPA]	5-8 days
Parvovirus B19 IgG \ IgM (EIA) [Referred to Cambridge HPA]	10-14 days
Rubella Ig	≤ 5 days
Streptococcal serology	7-10 days
Toxoplasma IgG	≤ 5 days
Treponema pallidum serology	≤ 5 days
Varicella zoster virus - VZV IgG (Urgent)	<1 day
Virus Respiratory Screen [Referred to Norwich Laboratory]	10-14 days
Antenatal Screening	3-5 days

*Interim reports issues at 48-72 hours

7.12 Inter Site Transport Schedule

Morning Collections

- 08:00 –Global Services Group (GSG) to PCH(@G1)
- 08:15 / 08:30 – GSG to CUH and any samples for CUH- Haemato-oncology service (HODS), GP Bloods, urgent referral work i.e. Lipase
- 12:30/12:40 – GSG GP Samples to CUH

Afternoon Collections

- 12:30/13:00 –GSG to PCH(@G2)
- 14:30 – GSG to CUH. HODS, GP Bloods, urgent referral work i.e .Lipase
- 17:00 – GSG to PCH (@G3)
- 17:30 – GSG to CUH. HODS, GP Bloods, urgent referral work i.e. Lipase
- 22:00 – GSG to PCH (@G7)

Weekend Collections

08:00 –GSG to PCH(@G4)
12:00 – GSG to PCH (@G5)
16:00 – GSG to PCH (@G6)
22:00 – GSG to PCH (@G7)

G1 to G7 refer to the in-house transport codes programmed into LIMS which will be seen as the transfer time on the final report in the clinical viewer.

7.13 Telephone Directory

Hospital switchboard	01480 416416
Pathology direct line	01480 416151
Fax	01480 416527
Pathology Reception at HH	x6151
Biochemistry (Technical enquiries)	x3024 / x6267
Haematology (Technical enquiries)	x3545
Transfusion	x6157
Pathology Services Manager	x7477, 01733 678440
Blood Sciences Manager	X6522, 01733 678441
Deputy Blood Sciences Manager	x6522
Transfusion Manager and Deputy Quality Lead	x6265 , PCH number
Pathology Quality manager	X 8431, 01733 678431
Biochemistry Consultant:	Mobile 07506 018055

Haematology & Transfusion Consultants	x6156
Transfusion Practitioner	PCH ext 8422 or 8480

8 Escalation in Case of Failure *(if applicable)*

Feedback/ Complaints

If users would like to feedback comments to the laboratory, please contact the Blood Sciences / Transfusion Manager or Pathology Quality Manager (details provided in section 7.1 Laboratory Personnel). Alternatively raise a Datix to Pathology clearly describing details of complaint.

9 Monitoring Compliance and Effectiveness

The User Guide is on biennial review controlled by quality management software. The Quality lead for Pathology at Hinchingbrooke is responsible to ensure this is monitored.

10 Equality and Diversity Statement

This document complies with the North West Anglia NHS Foundation Trust service equality and diversity statement.

11 References

http://www.advancedpractice.scot.nhs.uk/legal-and-ethics-guidance/consent/defining-consent.aspx

http://www.nhs.uk/conditions/consent-to-treatment/pages/introduction.aspx

12 Appendix (see below)

Appendix B

RESULTS OUTSIDE THESE LIMITS SHOULD BE GIVEN TO MEDICAL STAFF UNLESS THE ABNORMALITY IS ALREADY KNOWN.
Ideally the clinician responsible for the care of the patient should be contacted, However, if not available the results should be phoned to ward, asking that they are passed on to the appropriate clinician. If there is any doubt, please refer to senior member of the Pathology staff. This list covers routine investigations in adults unless otherwise stated.

Assay	Low: < or =	High: > or =	Units
Haemoglobin	50 micro or macrocytic. 70 normocytic /normochromic (unless patient has had a previously low Hb)	190 (unless patient has had a previously high Hb)	g/L
Haematocrit (HCT)		0.55	Ratio
Neutrophils	<0.5 (unless any other more sinister morphology)	50.0	x 10^9/L
Lymphocytes		>50	x 10^9/L
Platelets	30 (unless the patient has had a previously low count)	600	x 10^9/L
Film	Blasts present or diagnosis of CML		
Malarial Parasites	Positive		
PT	-	25 20 (if paracetamol overdose)	seconds
APTT	-	50	seconds
Fibrinogen	1.5	-	
D Dimers	Only if evidence of DIC		
INR	-	5.0	Ratio
Sodium	120	160	mmol/L
Sodium if <16 years	130	160	mmol/L
Potassium	2.5	6.5	mmol/L
Urea	-	30.0	mmol/L
Urea if <16 years	-	10	mmol/L
Creatinine	-	354	µmol/L
Creatinine if <16 years	-	200	µmol/L

Glucose	2.5	25.0	mmol/L
Glucose if <16 years	-	15	mmol/L
Adjusted Calcium	1.8	3.5	mmol/l
Phosphate	0.3	-	g/L
Magnesium	0.4	2.0	mmol/L
Amylase	-	500	U/L
Bilirubin	All neonate on Day 1, otherwise	300	
Conjugated Bilirubin	-	25	µmol/L
Albumin	20	-	g/L
ALT	-	Female 495 Male 615	U/L
CK (creatine kinase)	-	5000	iU/L
Salicylate	-	300	mg/L
Paracetamol	-	100	mg/L
Uric Acid	-	340 (antenatal)	µmol/L
Fe	-	55	µmol/L
Digoxin	-	2.5 at not less than 6 hours post dose	µg/L
Theophylline	-	25	mg/L
CRP	-	300	mg/L
AKI	-	Stage 1 if K>6.0 and all stage 2 and 3	
Ammonia	-	100	µmol/L
Ethanol		400 (10 if <18 yrs)	mg/dL
Gentamicin	-	1.5	mg/L
Vancomycin	10	20	mg/L
TSH	-	50	mU/L
FT4	-	50	pmol/L
FT3	-	20	pmol/L
B12	125	-	ng/L
Referred work	Any results telephoned by referral laboratory.		

Appendix C

Referral Laboratories used by Blood Sciences

Test name	Sample required	Where analysed
1, 25-dihydroxy Vitamin D	Serum	Manchester Royal Infirmary
11-deoxycortisol	Serum	St Thomas'
17-OH progesterone	Serum	CUHFT
24hr adrenaline	Urine	CUHFT
24hr dopamine	Urine	CUHFT
24hr Urine metanephrines	Urine	PCH
5HIAA (urine)	Urine	PCH
7-dehydrocholesterol	LiHep or EDTA plasma	Sheffield Children's Hospital
ACTH	EDTA plasma Frozen	CUHFT
ACRA	Serum	PCH
Acyl carnitine profile	Serum or LiHep plasma	CUHFT
Adrenaline	EDTA plasma	CUHFT
ADAMTS 13	x2 citrate	CUHFT
Adalimumab	Serum	City Hospital Birmingham (via PCH)
Aldosterone/renin	EDTA plasma	CUHFT
Alpha-galactosidase	LiHep whole blood	Guy's London
Alkaline phosphatase isoenzymes bone	Serum	CUHFT
Alpha 1-antitrypsin	Serum	PCH
Alpha-1-antitrypsin genotype	Serum	CUHFT
Alpha 1-antitrypsin phenotype	Serum	CUHFT
Amino acids	LiHep plasma Frozen	CUHFT
Amiodarone	EDTA or LiHep plasma Frozen	Cardiff Toxicology Lab
Amitriptyline & nortriptyline	Serum	CUHFT
Amylase isoenzymes	Serum	King's College Hospital London
Amyloid A protein	Serum	PRU Sheffield

Androstenedione	Serum	CUHFT
Angiotension converting enzyme	Serum	PCH
Anti Mullerian hormone	Serum	Manchester University NHS Foundation Trust
Anti-voltage gated k/Ca channel abs	Serum	Churchill Hospital Oxford (Via PCH)
Apixaban	Citrate	PCH
Apolipoprotein a1	EDTA plasma	Viapath Guy's & St Thomas'
Apolipoprotein b	EDTA plasma	Viapath Guy's & St Thomas'
Apolipoprotein e genotype	EDTA whole blood	CUHFT
Arsenic	EDTA whole blood	West Midlands Toxicology Lab
AST	Serum	PCH
aTPO	Serum	PCH
Benzodiazepine	LiHep whole blood	West Midlands Toxicology Lab
Beta 2 microglobulin	Serum	PCH
Bile acids	Serum	PCH
Biotinidase	LiHep plasma	CUHFT (BGU)
Ca15-3	Serum	PCH
Ca19-9	Serum	PCH
Cadmium	EDTA whole blood	West Midlands Toxicology Lab
Caeruloplasmin	Serum	PCH
Caffeine	LiHep plasma	West Midlands Toxicology Lab
Calcitonin	Serum or LiHep plasma frozen	Imperial College
Carbamazepine	Serum	PCH
Carbohydrate deficient transferrin	Serum	King's College Hospital London
Carotenoids	EDTA or LiHep plasma frozen	City Hospital Birmingham
Cholinesterase (red cell)	LiHep whole blood	Cardiff Toxicology Lab
Cholinesterase (suxamethonium sensitivity)	Serum or LiHep plasma	St Thomas' London

Cholinesterase (?environmental exposure to pesticides)	EDTA whole blood	HSE Buxton
Chromium	Serum (avoid o-ring tube for aliquot)	West Midlands Toxicology Lab
Chromium (whole blood) (mom hip)	EDTA whole blood	West Midlands Toxicology Lab
Chromogranin a or b	EDTA plasma frozen	Charing Cross London
Citrate	Urine	UCLH
CK isoenzymes (macro CK)	Serum	Royal Free
Clobazam	Serum or LiHep plasma	St Thomas'
Clozapine	EDTA plasma	King's College Hospital London
Cobalt	Serum (avoid o-ring tube for aliquot)	West Midlands Toxicology Lab
Cobalt (whole blood) (mom hip)	EDTA whole blood	West Midlands Toxicology Lab
Copper	Serum (avoid o-ring tubes for aliquot)	West Midlands Toxicology Lab
Cortisol	Serum	PCH
Cortisol (saliva)	Salivette tube	Southampton
Cortisol (urine)/ urine free cortisol	Urine	CUHFT
Cotinine	Urine	Southampton
C-peptide	Serum	PCH
C-peptide/creat ratio (urine)	Urine in boric acid universal	City Hosp. Nottingham
CSF xanthochromia analysis See section 7.5 Biochemistry special requests	Plain universal, protected from light sent via Biochem Hinchingbrooke	PCH
Cyclosporin	EDTA whole blood sent on next available transport	PCH
Cystine	Urine	CUHFT
CTX / CTX-beta-crosslaps	EDTA plasma frozen	Norfolk & Norwich
Dabigatran	Citrate	PCH
Dehydroepiandrostenedione (DHEAS)	Serum	CUHFT
Desethylamiodarone	EDTA or LiHep plasma	Cardiff Toxicology Lab
Diazepam	LiHep plasma	St Thomas'

Dihydro testosterone	Serum	Charing Cross London
Dopamine	Serum	CUHFT
Edoxapan	Citrate	CUHFT
EMA	EDTA	CUHFT
Erythropoietin	Serum	King's College Hospital London
Ertapenem	Serum on ice	Southmead Bristol
Ethosuximide	LiHep plasma	West Midlands Toxicology Lab
Factor Assays	Citrate	PCH
Faecal total porphyrins	Faeces protected from light	Bedford
Faecal calprotectin	Faeces	PCH
Faecal elastase	Faeces	CUHFT
FK506 (tacrolimus)	EDTA whole blood sent on next available transport	PCH
Flecainide	Serum	St George's London
Folicle stimulating hormone (FSH)	Serum	PCH
Free fatty acids	Fluoride EDTA plasma (yellow top)	Sheffield Children's Hospital
Fructosamine	Serum	City Hospital Birmingham
G6PD	EDTA	PCH
Gabapentin	LiHep plasma	West Midlands Toxicology Lab
Gastrin	2x EDTA plasma frozen	Charing Cross London
Growth hormone	Serum	PCH
Gut hormones / gastrin	2x EDTA plasma frozen	Charing Cross London
Haemachromatosis gene studies	EDTA whole blood	CUHFT
Haemoglobinopathy	EDTA	PCH
Haemato-oncology molecular diagnostic tests	EDTA	CUHFT - Haemato-oncology diagnostic services (HODS)
Haptoglobin	Serum	CUHFT
Heparin Induced Thrombocytopenia	Citrate & Serum	CUHFT
Hip fluid cobalt	Plain universal	West Midlands Toxicology Lab

Hip fluid chromium	Plain universal	West Midlands Toxicology Lab
Homocystine (total)	LiHep plasma frozen	CUHFT
Beta (3)-hydroxybutyrate	Fluoride EDTA plasma (yellow top)	Sheffield Children's Hospital
IGF-1	Serum	PCH
IGF-2	Seum	Guilford
Immunoglobulins (IgG/ IgM/ IgA)	Serum	PCH
Immunophenotyping	EDTA	CUHFT
Infliximab profile	Serum	City Hospital Birmingham (via PCH)
Inhibin B	Serum	Charing Cross London
Insulin	LiHep plasma or serum - frozen	CUHFT
Insulin abs	Serum	PCH
Lamotrigine (lamicital)	LiHep plasma	West Midlands Toxicology Lab
LDH	Serum separated, not haemolysed	PCH
Lead	EDTA whole blood	Cardiff Trace Element Laboratory
Lead (occupational exposure)	EDTA whole blood	HSE Buxton
Levitiracetam	Serum	Epilepsy Society TDM unit , Chalfont St Peter
Lipoprotein a	EDTA plasma	Viapath Guy's & St Thomas'
Lithium	Serum (sent on next available transport)	PCH
Lupus	3 Citrate & 1 Serum (in addition to the routine sample to be processed at HH)	PCH
Luteinising Hormone (LH)	Serum	PCH
Macro amylase	Serum	Southend University Hospital
Macro CK (isoenzymes)	Serum	Royal Free
Magnesium (red cell)	EDTA whole blood	Southampton General
Metadrenaline (metanephrines)	EDTA plasma frozen	CUHFT
Methotrexate	Serum	CUHFT

Molar hCG	Serum & urine	Charing Cross London
Mycophenolate / mycophenolic acid / mycophenolate mofetil	EDTA plasma	St George's London
N-terminal propeptide of type 111 collagen	LiHep plasma frozen	Southampton General
Oestradiol	Serum	PCH
Oligoclonal bands (csf)	CSF and serum	CUHFT
Organic acids (urine)	Urine Frozen	CUHFT
Oxalate	Acidified urine	UCLH
Phenobarbitone	Serum	PCH
Phenytoin	Serum	PCH
PIVKA II	Serum	St Thomas' London
Porphobilinogen screen (urgent)Urine protected from light (sent on next available transport)PCHPorphyrin studies	EDTA whole blood, urine and faeces all protected from light. Plasma separated from cells but both sent.	Bedford
Pre-albumin	Serum	PRU Sheffield
Progesterone	Serum	PCH
Prolactin	Serum	PCH
Primidone	Serum	CUHFT
Pyruvate Kinase	EDTA	Kings College Hospital
Renin	EDTA plasma	CUHFT
Retinol binding protein	Serum	PRU Sheffield
Rivoxaban	Citrate	PCH
Rohypnol	Serum	West Midlands Toxicology Lab
Selenium	Serum (avoid o-ring tubes for aliquot)	West Midlands Toxicology Lab
Serotonin	EDTA whole blood frozen	Leeds General Infirmary
SHBG (sex hormone binding globulin)	Serum	PCH
Sirolimus (Rapamycin)	EDTA whole blood sent on next available transport	CUHFT
Steroid profile	Urine	UCLH

Stone analysis	Stone in plain universal	UCLH
Sulphonylurea	Serum or urine	Royal Surrey County Hospital Guilford
Tacrolimus (FK506)	EDTA whole blood sent on next available transport	PCH
TAU protein	Csf/ nasal/ear secretion	Institute of Neurology, Queen's Square, London
Teicoplanin	Serum	Southmead Hospital Bristol
Testosterone	Serum	PCH
Thiopurine methyltransferase (TPMT)	EDTA whole blood not refrigerated	City Hospital Birmingham
Thioguanine Nucleotide (TGN)	EDTA whole blood not refrigerated	City Hospital Birmingham
Thrombophilia Screening Tests (PS, PC, AT, APCR, FVL)	x3 Citrate, x1 Serum & Buffy Coat from EDTA sample (in addition to citrate for routine testing at HH)	PCH
Thyroglobulin	Serum	Cardiff Medical Biochemistry
Thyroxin binding globulin	Serum	CUHFT
TSH releasing Ab(TRAB) / Thyroid Stimulating Immunoglobulin (TSI)	Serum	PCH
Topiramate	Serum	Cardiff Toxicology Laboratory
Transferrin isoforms / transferrin glycoforms	Serum	Institute Of Neurology, Queens Square, London
Tryptase	Serum	PCH
Urine cobalt	Urine	West Midlands Toxicology Lab
Urine copper	24 hr urine collected in acid-washed bottle	West Midlands Toxicology Lab
Urine cortisol	24hr urine	CUHFT
Urine cotinine	Urine	Southampton General
Urine metanephrines	24hr urine collected into acid	PCH
Urine Microalbumin	Urine in urine monovette	PCH
Urine porphyrin	Urine protected from light	Bedford
Vigabatrin	LiHep plasma	West Midlands Toxicology Lab

Valproate	Serum	CUHFT
Very long chain fatty acids	EDTA plasma	CUHFT
Vitamin A	Serum or LiHep plasma	City Hospital Birmingham
Vitamin B1 (thiamine)	EDTA or LiHep whole blood	Viapath Nutristasis Unit
Vitamin B2 (riboflavin)	EDTA whole blood protected from light	Viapath Nutristasis Unit
Vitamin B6	EDTA whole blood protected from light	Viapath Nutrisatasis Unit
Vitamin E	Serum or LiHep plasma protected from light	City Hospital Birmingham
Vitamin K / vitamin K1	Serum	St Thomas' London
Vitamin K1 epoxide	Serum	St Thomas' London
VMA (paediatric)	Urine in plain universal, acid added on receipt	CUHFT
Warfarin Assays	Citrate	Guys and St Thomas' London
White cell enzymes	2xedta whole blood	Willink Unit, Manchester
Xanthochromia analysis See section 7.5 Biochemistry special requests	CSF in a plain universal, protected from light sent via biochem Hinchingbrooke	PCH
Zinc	Serum (avoid o-ring tubes for aliquot if sent to City Hospital Birmingham)	CUHFT or City Hospital Birmingham if small sample with Cu/ Sel request
Antibiotics		
Tobramycin	Serum sent on next available transport	PCH
Amikacin	Serum sent on next available transport	CUHFT

Addresses of Referral Laboratories

Department of Pathology (all disciplines) Cambridge University Hospitals NHSFT Cambridge, CB2 0QQ	Health and Safety Executive Buxton, Derbyshire
Department of Immunology Churchill Hospital Headington, Oxford OX3 7LJ	Charing Cross Hospital Fulham Rd, London W6 8RF

East Midlands Hospital Bordersley Green, Birmingham B9 5ST	SAS EPO Laboratory Kings College Hospital, Denmark Hill, London SE5 9RS
Great Ormond Street Hospital London WC1	Hammersmith Hospital Du Cane Rd, London W12 0HS
Department of Biochemistry Kings College Hospital, Denmark Hill, London SE5 9RS	Leeds General Hospital Great George St, Leeds LS1 3EX
Meningococcal Reference Centre PHL, Withington Hospital, Manchester	National Hospital for Neurology and Neurosurgery, Queen Sq. London WC1N 3BG
Norfolk and Norwich University Hospital Colney La, Norwich NR4 7UY	Royal Victoria Infirmary Queen Victoria Road, Newcastle NE1 4LP
Department of Immunology University Hospital, Queens Medical Centre, Nottingham	Tenovus Laboratory Southampton University Hospital Southampton
Chemical Pathology, Bedford Hospital Kempston Road Bedford MK42 9DJ	Peterborough City Hospital, Edith Cavell Campus, Bretton Gate, Peterborough PE3 9GZ
Purine Research Laboratory, Floor 5 Thomas Guy House Guy's Hospital, London SE1 9RT	Respiratory Virus Unit, ERVL Central, HPA 61 Colindale Road, London
St James' University Hospital Beckett Street, Leeds LS9 7TF	Haemaglobinopathy Reference Centre John Radcliffe Hospital, Oxford OX3 9DU
West Midlands Toxicology Laboratory City Hospital, Dudley Road Birmingham, B18 7QH	Specialist Assay Lab, Clinical Sciences Building 3, Central Manchester University Hospitals NHS Foundation Trust, Manchester Royal Infirmary, Oxford Rd, Manchester, M12 9WL
University College Hospital 1122 Hampstead Road, London NW1 2LT	University Hospital Wales Heath Park Cardiff CF4 4XW
West Suffolk Hospital Hardwick La. Bury St Edmonds IP33 2QZ	London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT
Royal Gwent Hospital Cardiff Road, Newport NP9 2UB	Selly Oak Hospital, Raddle Barn Road, Selly Oak Birmingham B29 6JD
Royal Hallamshire Hospital Glossop Road, Sheffield S5 7YT	Royal Postgraduate Medical School Duncane Road, London
St Bartholomew's Hospital West Smithfield, London EC1A 7BE	Kent & Sussex Hospital Tunbridge Wells, Kent
The Rubens Institute, University of Surrey Guildford, Surry GU2 5XH	Kings College Hospital Denmark Hill, London SE5 9RS
Kings College School of Medicine and Dentistry Bessemer Road, London SE5 9PJ	Regional Genetic Service, Molecular Genetics Laboratory - Kefford House, Maris Lane, Trumpington CB2 2FF
Royal Free Hampstead NHS Trust Pond Street, London NW3 2Q	
NHSBT Colindale	IBGRL Bristol

Appendix D

S-Monovette®

The enclosed blood collection system

North West Anglia NHS Foundation Trust (Hinchingbrooke Site)

Colour Code	Investigation	Colour Code	Investigation
White – Serum	Serum Zinc and Copper NB White Label Tube	Red – EDTA K	Full Blood Count, Malarial Parasites, Glandular Fever, PTH, ACTH Molecular Genetics, Haemoglobinopathy Screen **Biochemistry assays on whole blood** e.g. Lead Porphyrins, Cyclosporin / FK506,Red Cell Folate Contact laboratory for further details
Brown – Serum Gel	All Routine Biochemistry Investigations Including Endocrinology, Immunology, Vitamin B12 For Immunology, Virology and Microbiology separate form and sample required	Mauve – ESR	ESR Only **NB** Label by hand NOT addressograph **MIX WELL**
Orange – Lithium Heparin	Ammonia, Gut Hormones, Trace Elements, Some Drugs, Cytogenetics, T-Spots Please contact the laboratory for details of other specialised investigations **MIX WELL**	Green – Coagulation	Coagulation Screen, D Dimers, Anticoagulant Control (INR) **NB** Fill to 3ml mark to achieve correct blood to anticoagulant ration Contact laboratory for Lupus and Thrombophilia Screens **MIX WELL**
Yellow – Fluoride	Blood Glucose, Alcohol, Lactate NB for glucose samples taking < 3 hours to reach the laboratory Serum Gel (brown) tubes are preferred **MIX WELL**	Blue – EDTA K Blood Transfusion	**Blood Transfusion** **NB** Blue Label Tube – label by hand NOT addressograph Ante-natal Serology

Order of Draw for Multiple Sampling

According to Gurr[1]:	According to CLSI[2]:
Blood culture	Blood culture
Serum/Serum-Gel blood	Citrate blood
Citrate blood	Serum/Serum-Gel blood
Heparin/Heparin-Gel blood	Heparin/Heparin-Gel blood
EDTA blood	EDTA blood
Fluoride/Citrate-fluoride blood	Fluoride/Citrate-fluoride blood

[1] Gurr et al "Musterstandardarbeitsanweisung Präanalytik" J Lab Med 2011
[2] CLSI Procedures for the Collection of Diagnostic Blood Specimens by Venipuncture, Approved Standard, 6th edition GP 41-A6 (former H3-A6), 27 (26) 2007

With S-Monovette® you have the choice:

Aspiration principle

Vacuum principle

Needles and adapters - can be individually combined with the S-Monovette®

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