A Users' Guide to Laboratory Services

LOOKING FOR SPECIFIC INFORMATION?

Type the "test name" or a "key word" in the text search box on the tool bar above and press enter
(or use 'Ctrl + F' keyboard shortcut if search box not displayed)

USEFUL LINK

Belfast Trust Laboratories Handbook - BHSCT Belfast Trust Laboratory User Manual

VACUETTE® TUBE GUIDE CHART

and Recommended Order of Draw for Adults

Northern Health and Social Care Trust

Version 2.2 Last updated 18.01.2023

Take Blood Cultures first – then samples in the following Order of Draw

	PPC Code	Draw Vol.	Cap Colour	Tube Type	Tests	Special Instructions
1	KBC000150 KBC000151	2 ml 3 ml	Blue	Sodium Citrate 3.2%	**HAEMATOLOGY:** Coagulation Studies including Anticoagulant drug control.	Tube MUST be filled to within the arrow MINIMUM VOLUME. Invert 4–5 Times
2	KBC000139	4 ml	Red	Serum with Clot Activator. No Gel	**BIOCHEMISTRY:** Specialised Referral Tests See Laboratory Manual / Contact Laboratory **SEROLOGY:** ASOT, Infectious Mononucleosis	Invert 5–10 Times
3	KBC000141 KBC000142	3.5 ml 5 ml	Gold	Serum with Clot Activator and Separation Gel	**BIOCHEMISTRY:** Lithium, Serum Protein Electrophoresis, Immunoglobulins, Referral Tests **IMMUNOLOGY:** All immunology referrals including Serum Free Light Chains **SEROLOGY:** Routine. See Laboratory Manual / Contact Laboratory	Invert 5–10 Times
4	KBC000144	4 ml	Green	Lithium Heparin	**BIOCHEMISTRY:** Specialised Referral Tests, See Laboratory Manual / Contact Laboratory **DO NOT USE FOR ROUTINE TESTS**	Invert 5–10 Times
5	KBC000219	3 ml	Green	Lithium Heparin and Separation Gel	**BIOCHEMISTRY:** Most Routine Tests including Gentamicin, Vancomycin and Teicoplanin	Invert 5–10 Times
6	KBC000148 KBC000149	2 ml 4 ml	Lavender	K3 EDTA	**HAEMATOLOGY:** Full Blood Count including automated DWCC, ESR. **BIOCHEMISTRY:** HbA1c, Ammonia (on ice), PTH, Blood Porphyrins – Protect from light. **SEROLOGY:** Meningococcal PCR. (Paediatric pink top EDTA tubes are acceptable) **BLOOD TRANSFUSION:** Kleihauer, Direct Coombs	Invert 5–10 Times
7	KBC000152	8 ml	Pink	EDTA	**BLOOD TRANSFUSION:** Blood Grouping, Cross Matches.	ADDRESSGRAPH LABELS MUST NOT BE USED ON THE SAMPLE TUBE. Invert 5–10 Times
8	KBC000147	2 ml	Grey	Sodium Fluoride / K3 EDTA	**BIOCHEMISTRY:** Glucose	Invert 5–10 Times
9	KBC000154	8 ml	Dk Blue	Sodium Heparin Trace Elements	**BIOCHEMISTRY:** Trace Metals	Invert 5–10 Times

IMPORTANT INFORMATION

- Where appropriate collect Blood Cultures first: Please refer to the Trust 'Blood Culture Policy for Adults' NHSCT/17/1182 (available in the Staffnet Policy Library).
- If no Blood Culture is required the recommended order of draw is: coagulation, serum, heparin, EDTA, glucose, followed by all other tubes with additives.
- When using a Safety Blood Collection Set, and no Blood Culture is required, please use a DISCARD tube prior to the above order of draw.
- Following blood collection, all tubes should be gently inverted 5-10 times (coagulation tubes 4-5 times). Thorough mixing is necessary to ensure adequate performance of the tube contents (additive) with the blood sample. A full inversion is when the air bubble moves from one end of the tube to the other.
- For test information consult the Laboratory Handbook: Available on **STAFFNET** (Business Areas » Laboratory) and the NHSCT **website** (Services » A-Z Services » Laboratory/Pathology Service)
- PLEASE SEND A SEPARATE SAMPLE AND REQUEST FORM FOR ALL NON-ROUTINE AND REFERRED TEST REQUESTS.

IMPORTANT

Hold tube in place with the thumb until filled to the required level

greiner BIO-ONE

www.gbo.com

Greiner Bio-One Ltd
E-MAIL info-uk@gbo.com

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

The RIGHT result for the RIGHT patient at the RIGHT time

Step 1. The requesting clinician ensures:

Correct Patient → Correct time → Request the appropriate analysis → Notes patient circumstances appropriate to analysis e.g. fasting

Sample time is an essential piece of information to ensure all analytes are reported and that results appear in the correct order within the patient's record

Step 2. The phlebotomist, nurse or clinician collecting the sample checks and ensures using patient wrist band double checked against request form and specimen label:

The correct patient and correct time → The test requested → The correct specimen taken → Correct & complete labelling → Safe handling & waste disposal

Step 3: The ward, theatre or surgery ensures:

Safe handling & infection control → Secure and appropriate storage → Timely onward transfer**

**By most appropriate means depending upon the urgency

Step 4: The person undertaking sample transport e.g. porter, driver, ATC / SBATS

Reasonable scheduling → Safe Handling → Secure and appropriate carriage → Meeting H&S / ADR regulations → Timely transfer to the laboratory

Step 5: The laboratory checks and ensures:

Patient details on sample and form → The correct specimen received → The correct results / advice given

NB: the laboratory may reject an inappropriately collected or incorrectly labelled specimen or wrong specimen type

Step 6: The responsible clinician checks and ensures:

Receipt of the results / advice → **The correct patient** → **The correct therapeutic action** → **The validity of the patient record**

Type the test name / keyword into the text search box in the toolbar
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Please see Specimen Chart on first page for summary of Adult blood samples, volumes of blood & mixing required in addition to the Order of Draw.

Looking for specific information?

Click on Bookmarks to the left of the screen to navigate to the chosen topic. Open or Collapse the options as required

OR

Type the test name or a keyword into the text search box on the tool bar above

INTRODUCTION

The Laboratory services for the NHSCT are provided from two sites, one at Antrim Hospital and the other at the Causeway hospital.

Antrim Laboratory is situated at the front of the Antrim Hospital, beside the main visitor car park. It provides a routine and 24-hour emergency laboratory service for the hospitals and General Practitioners within the local catchment area. This service includes Microbiology, Clinical Biochemistry, Haematology and Blood Bank, Cellular and Molecular Pathology and Morturary services.

Clinical Pathology Laboratory
Antrim Hospital
45 Bush Road
ANTRIM
BT41 2RL

Causeway laboratory is situated in the North West corner of the Causeway Hospital site.

Causeway Laboratory
Causeway Hospital
2 Newbridge Rd,
Coleraine
BT52 1HS

It provides a routine and 24-hour emergency laboratory service for the hospitals and General Practitioners within the local catchment area. This service includes Clinical Biochemistry, Haematology and Blood Bank. The Regional Bowel Cancer Screening Laboratory is located in the Causeway laboratory.
Certain tests e.g.: endocrine, immunology, serology are referred to Antrim Area Laboratory or Regional Laboratories. Causeway Laboratory provides a transport link for referrals and records receipt of samples for referral. Reports are issued directly to users from referral laboratories to keep turnaround times to a minimum. Issues with regard to interpretation or reporting times need to be addressed directly to the referral laboratory.

Laboratory consultants advise on the interpretation of results, further investigations, selection of appropriate therapy, monitoring of drug treatment and clinical response. Where appropriate, a direct clinical service to patients is provided.

If there is any additional information which users think might be useful for inclusion in guide please contact Gerry Duffy, Laboratory Clinical Services Manager **Gerard.Duffy@northerntrust.hscni.net** A copy of this manual will be available on the Trust's Intranet site and the NHSCT website.

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

SCOPE OF SERVICE

Analytical Service
We have endeavoured to be as comprehensive as possible in detailing the tests and investigations available to clinicians. However, continuing development inevitably leads to the addition of new techniques and amendments or phasing out of out-moded procedures. Users will be circulated with any such new information as required.

Interpretation and Reference Ranges
The ranges quoted in this handbook are applicable to the population served using current methodology. This data should be used in preference to publications from other laboratory services, textbooks or journals as significant differences in interpretation can arise. Interpretation must also take account of any other clinically significant factors, particularly current medication, which may affect the results obtained.

Measurement Uncertainty
The laboratory considers measurement uncertainty when interpreting measured quantity values; estimates of measurement uncertainty are available to users on request from the relevant Head BMS.

Turnaround Times and Assay Frequency
Results for some emergency requests are available within minutes of the sample arriving in the laboratory. Whenever possible, routine requests are reported within one working day of receipt. However, the frequency and turnaround times of some investigations, is of necessity longer. Details are available from each department on request. Additional tests can be added to the original requests on contacting relevant department. Users must be aware that time limits may exist for add-ons due to specimen retention, quality and volume requirement issues.

During normal working hours it is necessary to telephone the relevant laboratory department to arrange emergency requests in order that they may be given priority.

Outside normal working hours,

On-call staff should be contacted as follows: -

Antrim

Clinical Biochemistry	**331241**
Haematology / Blood Bank	**331240**
Microbiology	**331242**
Histopathology / Cytopathology	Contact Antrim Switchboard

Causeway

Clinical Biochemistry	**376046** or Direct Dial 7034 6180
Haematology / Blood Bank	**375178** or Direct Dial 7034 6178

Type the test name / keyword into the text search box in the toolbar
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Quality Assurance

It is our aim to maintain the highest professional and service standards possible in the provision of Clinical Laboratory Services to clinicians and patients. Each individual laboratory operates comprehensive Quality Assurance policies and participates in External Quality Assurance programmes in addition to the practice of internal and local quality control and audit procedures. Results of EQA performance are reviewed and discussed at departmental meetings in addition to being displayed within the laboratory. Users can request information from the relevant service manager if required.
All staff undergo regular staff appraisal , medical staff are registered with the GMC and biomedical staff are registered with the HCPC.

Accreditation

The laboratory regularly undergoes inspections by the following accreditation agencies:

- The Medicines and Health care Products Regulatory Agency (MHRA)
- Human Tissue Authority (HTA)
- United Kingdom Accreditation Service UKAS

For further information and the scope of tests accredited for each NHSCT laboratory see Northern Health and Social Care Trust Departmental Schedule:
UKAS 8111 Northern Health and Social Care Trust

UKAS GEN6 Statement

The Laboratory utilises Winpath Enterprise (provided by Clinisys) as our Laboratory Information Management System (LIMS). As this is a regional system, covering the whole of Northern Ireland, we are currently unable to fully meet the requirements of the UKAS publication GEN 6 – Reference to accreditation and multilateral recognition signatory status.

The UKAS publication GEN 6 sets out the requirements of reports/results released by the Laboratory containing the appropriate use of UKAS logos and identifying any tests that are accredited and those that are not. Although the LIMS currently being utilised by our Laboratory could allow us to present the UKAS logo within our reports, we could not remove it from reports where we have non-accredited tests. Also, whilst it is possible to enter a small amount of additional text without any difference in formatting at the end of each report, the referencing to the accreditation of tests could potentially interfere or cause the misinterpretation of pathology results (particularly tests that already have statements at the end of the reports explaining reference ranges, clinical advice, etc.). If the text were to be added in regards to accreditation status of each test, this would also have to be site specific or would have to state the accreditation status of all Laboratories within the region.

The Laboratory, along with our regional colleagues, have risk assessed this matter. Although we are not able to present this information on our reports Tests that are out of scope for accreditation are noted in the departmental test lists below and full details of our accreditation, including a link to the UKAS page for our up-to-date schedule of accreditation, is available.

Referral laboratory generated reports will be accredited under the scope of the referral laboratory performing the test. Where the referral lab is unaccredited , the laboratory will seek an alternative supplier. If no other referral laboratory is available, the test may be withdrawn or continuined pending a risk assessment, to ascertain if the laboratory is providing reliable results and the user will be notified.

Additionally, if a user presents a request to the Laboratory for analysis the user is entering into an agreement for testing and as such are agreeing to the fact that any reports associated with this testing cannot be regarded as having been issued under its accreditation, and therefore it is not covered by the multilateral agreements (i.e. EA MLA, ILAC MRA and IAF MLA) that UKAS is a signatory of.

Confidentiality
It is the duty of all staff not to improperly disclose any information to which they have access to, or have obtained in their official capacity, whilst employed in the department or subsequent to leaving employment.

There are appropriate security measures in place to prevent unauthorised access to or alteration, disclosure or destruction of personal data and against accidental loss or destruction of personal data.

Consent
Consent is implied by the receipt of the sample and form from the requesting physician at source . The laboratory must get the service user's informed consent if they are passing on their information, and get express consent, in writing, if they are using the information for reasons which are not related to providing care or services for the service user; (HCPC Confidentiality Guidance for Registrants).

Complaints
We request that users promptly report problems encountered with any aspect of the Services as soon as possible. This would normally be directly to the Head BMS of the department concerned. Where issues of major concern arise, the Clinical Director of Laboratory Services, Clinical Services Manager or Quality Manager should be informed. All complaints are logged and a record retained of actions taken in line with the NHSCT Complaints and Service User Feedback Policy and Procedure NHSCT/20/1422.

Point of Care Testing
We are able to advise on the selection and suitable instrumentation, associated training needs and Quality Control procedures for extra-laboratory testing. In certain circumstances, laboratory staff can provide routine analyser maintenance and Quality Control as well as on-going user training.

The responsibility for individual test results lies with the user and the appropriate Consultant.

Any new POCT proposals must be submitted to the Trust POC committee in the first instance.

Laboratory Supplies
All consumables required for laboratory tests (e.g.: specimen containers, forms etc) for the primary care sector are supplied by the Laboratory Stores Department at Antrim Laboratory. These can be obtained by submitting a completed form from a Laboratory Stores Requisition Book, available on request from the Laboratory Stores Department. A generic email address lab.stores@northerntrust.hscni.net.

NOTE
It is the responsibility of the Users to ensure Blood collection bottles and other containers are within their expiry dates as this may affect sample quality.

Hospital wards and outpatients use the EMM system.

Type the test name / keyword into the text search box in the toolbar
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USEFUL TELEPHONE NUMBERS

Antrim Hospital Switchboard Tel: 028 9442 4000
Causeway Hospital Switchboard Tel: 028 7032 7032

Title	Name	Telephone Number Ext.
Clinical Director	Dr S Gidwani	375739 CAU 332102 ANT
Laboratory Clinical Services Manager	Mr G Duffy	336432
Head BMS Biochemistry	Mr N Quinn	334158
Head BMS Haematology	Mrs C Henry	334105
Head BMS Microbiology	Mrs K Shields	334103
Head BMS Blood Transfusion	Miss S Hill	334174
Head BMS CMP/Mortuary	Mrs Gillian Stewart	334866
Quality Manager	Mrs A Holmes	332091
Transport Co-Ordinator	Miss D Fleck	334857
Laboratory Stores	Miss D Fleck/ Mrs K McDowell	334155/334854
Bowel Screening Manager CAU	Mrs R Nicholl	375727
Antrim office Manager	Mrs B Hutchinson	334834
Antrim General enquiries	Mrs G Cairns	334797
Antrim Lab Porters	8am-7pm weekdays 10am -2pm weekend/BH	331424
Causeway office Manager **Causeway Specimen Reception.**	Mrs H Devine -	375740 375749

USEFUL LINK

Belfast Trust Laboratories Handbook - BHSCT Belfast Trust Laboratory User Manual

LABORATORY HOURS

Clinical Biochemistry, Haematology, Blood Transfusion and Microbiology operate a 24-hour emergency service

Service	Opening Hours	Core Specimens
Routine Service Excluding Blood Transfusion	**Mon-Fri 9am-8pm**	**Routine specimen collections from hospitals and GP Practices.**
Routine Service Saturday, Sunday Public Holidays	**Sat 9am-5pm Sun 9am-5pm**	**Routine specimen collections from hospitals and urgent GP samples.**
Emergency only	**Mon-Fri 8pm-9am Sat 5pm-9am Sun 5pm-9am**	**Emergency specimens from hospitals.**
Cellular and Molecular Pathology	**Mon-Fri 9am-5.15 pm**	**Histology/Cytology specimens**

Type the test name / keyword into the text search box in the toolbar
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SPECIMEN COLLECTION

If valid results are to be obtained it is essential that the requirements for individual tests and investigations, detailed in this handbook, are adhered to. Certain tests require particular attention to factors such as patient preparation, collection technique, timing and preservation of sample, and speed of transportation to the laboratory. Please consult the relevant sections of this handbook for details on individual tests and procedures; should clarification or further information be required, contact the appropriate laboratory department directly.

Agreements with the service user:

Each request for examination received by the laboratory is considered an agreement. However, receipt of a request does not constitute acceptance for diagnostic laboratory testing. On receipt of a sample, the laboratory will determine if the sample is suitable for performing the diagnostic test for which it was supplied. The Laboratory is under no obligation to carry out the examination if, in its opinion, the sample is of unsatisfactory quality, or if the minimum data set is not met

REQUESTING TESTS

Laboratory tests may be requested as follows:

Electronic Ordering

Where applicable, test requests should be ordered electronically on the Encompass system. Once collected, the electronic order must be completed before sending the barcoded sample to the laboratory.

Paper Request Form

Each laboratory department has colour coded request forms. Whenever possible pre-printed addressograph labels, recording the necessary patient identification details should be used.

Type the test name / keyword into the text search box in the toolbar
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MINIMUM ACCEPTANCE CRITERIA

In order to maintain high standards of practice and patient safety the Northern Ireland Pathology Network has developed a Regional Sample Request Acceptance & Rejection Policy for Pathology Services. This will ensure that stringent minimum acceptance criteria (MAC) are in place for the receipt and identification of Laboratory samples, allowing the Laboratories to ensure results are available to the requesting clinician on a timely basis. For more information The policy can be found on the Trust Policy Unit Page.

MAC is noted below and **MUST be present** on both the sample bottle and request form for samples to be processed.

SAMPLE	REQUEST FORM
• H&C number [1] • Patient Official First Name • Surname • Date of Birth (dd/mm/yyyy) • Name of Staff member taking the sample [4]	• H&C number [1] • Patient Official First Name • Surname • Sex • Date of Birth (dd/mm/yyyy) • Date & Time of Sample Collection • Full Name of Consultant / Authorised Healthcare Professional • HCP Code [2] of Consultant / Authorised Healthcare Professional or GP Cypher Code • Source – Ward / Clinic / GP Practice • Test Requested • Specimen type and Anatomical Site [3] • Name of Staff member taking the sample [4]

1. The H&C Number must be used unless the patient is not registered with a GP in NI / is registered but does not yet have their H&C number (in which case, it must clearly state “No H&C number available” on the request form) or in an emergency situation (in which case, use the local hospital emergency numbering system)
2. HPC code must be registered by Information Standards Group. To request an HCP code please visit https://regional.sharepoint.hscni.net/sites/CCIS/SitePages/NIHCPCodeRequest.aspx
3. Mandatory for Microbiology only
4. Mandatory for Blood Transfusion only

MAC will be strictly enforced and requests that do not fulfil the MAC will be rejected without analysis.

Labelling High Risk Samples

For suspected or known Category 3 pathogens, hazard warning Category 3 pathogen labels should be affixed both to the container and the accompanying request form.

All biological samples present a potential health hazard to healthcare staff. Please ensure that specimens are properly sealed before transportation; syringe needles must be removed from blood gas syringes and replaced by caps. Containers should not be overfilled as they may leak. Leaking or contaminated sample containers cannot be processed. **All samples & request forms, when appropriately labelled, should be placed in the appropriate secondary transport bag.**

High risk specimens from patients known or suspected of being infected with a Hazard Group 3 (Cat 3) pathogen e.g. TB, Hep B, HIV, must have a hazard warning label affixed to the specimen container and the accompanying request form. All high risk specimens should be segregated from routine specimens for transportation (bagged / boxed separately).

For information regarding COVID-19 samples, see discipline specific information in the relevant sections.

Storage of samples pre-collection

Samples should be stored in an appropriate manner by the user pre-collection, in a suitable container or bag, not around an air-conditioning unit, radiator or direct sunlight where the enrivonment might affect the validity if the results.

Disposal of Clincial Waste.

Material used in the collection of samples such as needles, containers etc must be disposed of according to the Trust waste disposal policy **NHSCT/21/1593**

Type the test name / keyword into the text search box in the toolbar
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ANTRIM SPECIMEN TRANSPORTATION

Portering Service		**Routine** hospital collections
Monday – Friday	08:30 09:30 11:00 12.:30 14:00 16:00	Each weekday the Lab porter makes six routine specimen collections from wards / clinics in Antrim Hospital. Times for collection of specimens are indicated left. The times listed are the latest times at which specimens should be ready for collection.
Sat / Sun / BH	11:00 12:45	There are two collections of samples from wards in Antrim
Air Tube System		**Emergency and Urgent specimens ONLY**
		Ensure sample and form are secured within the canister Key in destination address on the keypad **2 for Haematology / Blood Bank** **13 for Biochemistry** **14 for Microbiology**
Specimens which would be difficult to repeat e.g. CSF and those from patients known or suspected of having infection with a **Hazard Group 3 (Cat 3) pathogen (e.g. TB, Hep B, HIV etc) are not suitable for transportation in the Air Tube**: contact the hospital portering department. Cellular and Molecular Pathology specimens should not be transported via the air tube system. Estates Department are responsible for the Air Tube system		
Laboratory van transport		**Routine GP** / Health Centres / Mid Ulster / Whiteabbey / Braid Valley / Holywell / Moyle Vans arrive for the collection of samples Mon – Fri **Whiteabbey Hospital at 10am, 1pm, 3 pm &5.30 pm** **Mid-Ulster Hospital at 10am, 1pm, 3pm & 5pm** Van collections are provided each weekday to GPs/Health Centres/ throughout the day, contact the laboratory for specific pick up times.

Emergency GP/Health Centres/ Hospital sites (other than Antrim): when emergency investigation is required, appropriate transport of specimens to the laboratory must be arranged locally.

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

CAUSEWAY SPECIMEN TRANSPORTATION

Portering Service		**Routine** hospital collections
Monday – Friday Weekends/Bank Holidays	09:00 10:15 12:30 15:30 17:15 10:30	Each weekday the hospital porter makes five routine specimen collections from wards / clinics in Causeway Hospital. Times for collection of specimens are indicated left. The times listed are the latest times at which specimens should be ready for collection.
SBATS (Small Bore Air Tube System)		**Emergency and Urgent** specimens
		Ensure sample and form are secured and fully contained within the carrier and the end caps are closed. Press 0001 or 0002 on the keypad depending on your zone area 1 or 2.
Arrangement should be made with the relevant laboratory department prior to forwarding specimens via the SBATS. Specimens which would be difficult to repeat e.g. CSF and those from patients known or suspected of having infection with a Hazard Group 3 (Cat 3) pathogen (e.g. TB, Hep B, HIV etc) are **not suitable for transportation in the SBATS**: contact the hospital portering department. SBATS failure – contact the hospital portering department.		
Laboratory van transport		**Routine** GP / Health Centres / Dalriada / Robinson Two van collections are provided each weekday. GPs/Health Centres/Dalriada/Robinson are each advised of the latest times at which specimens should be ready for collection. (Some areas will get 4).
Sat / Sun 10:15		Ward to arrange taxi if required

Emergency GP/Health Centres/Dalriada/Robinson: when emergency investigation is required, appropriate transport of specimens to the laboratory must be arranged locally.

Type the test name / keyword into the text search box in the toolbar
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LABORATORY REPORTS

With the introduction of the new Laboratory Information System, hard copy reports for tests are no longer available, although there are a limited amount of agreed exceptions where a hard copy will still be provided, such as for Histology samples.
Secondary care reports are available on both Encompass and NIECR for look up.
Primary care reports will be available on GP systems and NIECR for look up.
NIECR is used primarily for periods of downtime as a back -up for encompass and GP systems . Both NIECR and GP systems accept electronic reports from Winpath .

Urgent Results (Clinical Biochemistry, Haematology and Microbiology**)**

- Where possible, **electronic recall systems** should be used to minimise the possibility of error in communication.
- Where the laboratory has been notified of an **Urgent Request** we will endeavour to communicate the results to the requestor by phone.
- **Critical Result Communication** (Abnormal results meeting the agreed Phone Out Limits) will be communicated directly to the requestor by the Laboratory.
- Results which are judged to have particular **clinical significance** are also telephoned to the requesting clinician / relevant clinical area and may be brought to the attention of the Laboratory Consultants.

Note * The transfer of electronic reports from BSO Labs or LabCentre to NIECR is dependent on an exact match of the Minimum Dataset referred to earlier.

Telephone requests for results.

- Only where electronic links are not available should the appropriate laboratory Department be contacted by telephone.
- Prior to issuing a result by telephone, laboratory staff are required to establish the requester's identity.
- Enquiries should be made **before 17:00**
- Requests for **urgent analysis** must be telephoned to the appropriate department prior to despatch.)

Cellular and Molecular Pathology - Urgent FNA or Molecular Pathology for information regarding urgent requests as CMP do not generally accept telephoned urgent requests.

CSF Specimen Collection

Antrim Biochemistry Mon – Fri 9am - 5pm ext 334774 at all other times ext 331241.

Antrim Microbiology Mon – Fri 9am - 5pm ext 334494, at all other times ext 331242.

Cellular & Molecular Pathology Mon – Fri 9am - 5pm ext 334488, at all other times please contact switchboard.

- **Details on Collecting CSF are provided in the Lumbar Puncture pack.**
  The insert in the Adult CSF pack that provides detailed information on sample requirements and preparation is reproduced overleaf. Paediatric requests (no pack is made up for these) should follow an equivalent sample requirement.

- **Please Notify the laboratory prior to sending samples to ensure appropriate prioritisation of analysis for each discipline.**

- **DO NOT USE THE PNEUMATIC TUBE SYSTEM.**

- **Send the samples to the lab without delay**
  samples should be received in Antrim laboratory within 1 hour of collection.

- All CSF samples from Causeway site must be dispatched directly from the ward to the Antrim laboratory.

- Please ensure CSF Spectrophotometry is light protected

- CSF Spectroscopy analysis may be complicated and time consuming and is best performed in routine hours when experienced staff are available

- If required, CSF spectrophometry may be analysed out of hours by arrangement with the Chemical Pathologist.

- Cytology specimens need to arrive in the laboratory on ice within an hour of sampling and the cytology laboratory staff need to be phoned beforehand on ext 334184

- If sent out of hours please contact Antrim Hospital switchboard for out of hours Cytology.

Sample/ Order	Sample	Tube	Volume	Test (Colour coding indicates lab form to be used)
1	CSF		1.5ml	Virology Microbiology Form PCR if encephalitis suspected
2	CSF		0.5ml	Glucose & Protein
3	CSF		1.5ml	Microbiology Cell Count, Culture & Gram Stain
4	CSF		0.5ml	CSF Spectrophotometry (optional) Biochemistry Form [1] Protect CSF Spectrophotometry sample from light by placing in envelope provided. Lumbar puncture for CSF Spectrophotometry should only be performed >12hour post event. CSF Spectrophotometry can reliably detect Sub Arachnoid Haemorrhage up to 2 weeks after onset of symptoms, negative results should be treated with caution if > 2 weeks post event.
5	CSF		1ml	Oligoclonal Bands (optional)
6	CSF		1ml	Cytology (optional) Only send if strong clinical suspicion of carcinomatous meningitis
7	BLOOD		5ml	Bilirubin (Liver profile) or Oligoclonal bands
8	BLOOD		2ml	Glucose

Clearly write on the indicated form, the tests required and clinical indication for request and if the differential diagnosis includes meningitis. For CSF Spectrophotometry, state the result of CT scan, Time of onset of symptoms/event, Time of Lumbar Puncture [1](complete the sticky label in the CSF pack). Indicate if the blood staining is uniform or declines for CSF samples 1 - 6.

Do not use Pneumatic tube, transport samples via porter within 30 min for Antrim site or for Causeway send via taxis directly from ward to Antrim Laboratory. Sample **MUST** be received by the lab, centrifuged and stored at 2 - 8°C within 1 h of lumbar puncture.

HSC Northern Health and Social Care Trust

Type the test name / keyword into the text search box in the toolbar
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CLINICAL BIOCHEMISTRY

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

Title	Name	Telephone number ext
Out of hours Antrim	-	331241
Out of hours Causeway	-	376046 or 70346730
Clinical Lead Chemical Pathologist	Dr Elinor Hanna	334104
Clinical Director Chemical Pathologist	Dr Sumana Gidwani	334723 CAU (375739)
Speciality Doctor	-	
Pathologist Secretary	-	334136
Pathologist Secretary (Cau)	-	375741/375740
Head BMS	Nigel Quinn	334158
Deputy Head BMS	Ryan Da Prato	334723 CAU (375738)
Point of Care Co-ordinator	Joanne Jackson	334718
Point of Care Support	Email clinical.biochemistry@northerntrust.hscni.net	334718

AUTOMATED TELEPHONE FOR CLINICAL BIOCHEMISTRY

In office hours, the most efficient method of contacting the Department is to use the Automated Telephone - there are multiple lines to this number.
Do NOT use the Emergency DECT phone number for non-emergencies.

Antrim Automated Telephone 334774 Menu

1	2	3	4	5	6
Emergency	Results	Information	Clinical	POC Team	Voice Mail

Consultant Pathologist advice is available 24/7 via switchboard or on contacting the Department; advice should be available within 60 minutes of making contact

Causeway Automated Telephone 375180 Menu

1	2	3	4	5	6
Emergency	Results	Information	Clinical	POC Team	Voice Mail

Consultant Pathologist advice is available 24/7 via switchboard or on contacting the Department; advice should be available within 60 minutes of making contact

The following sub-sections give specific information on sampling requirements and interpretation of investigations. A **Consultative service** is available to advise further on appropriate investigative strategies, interpretation and clinical management and useful telephone numbers are listed.

1. Haemolysis of Blood Samples

Excessive haemolysis of blood samples may invalidate some results for some analytes. The Haemolytic Index measured with most requests is used to determine which results are valid and can be reported. An acceptable degree of error can still allow clinically valid results to be released in some haemolysed samples.

Haemolysis is the most common reason for invalidating an analysis. In many cases, this can be minimised by adopting appropriate phlebotomy techniques. To minimise delay and avoid fresh venepuncture, do NOT

- Insert a syringe / needle into a Vacutainer. The vacuum will draw in the blood against the syringe plunger, rupturing the cells.
- Squirt the blood through a needle into a Vacutainer. This trauma will rupture the cells.
- Shake the sample. Mix thoroughly by gentle inversion as indicated.
- Expose the sample to excessive temperatures (Room Temperature for blood samples unless otherwise indicated).

The **pneumatic air tube transport system** has been identified as a potential cause of haemolysis. When suspected, please report to Clinical Biochemistry who will investigate with Estates. In Antrim, the system is designed for Urgent sample transport, not bulk samples (as in Causeway), and is not a substitute for routine ward collections.

2. Minimum Retesting Intervals (MRI) – Demand Optimisation

MRI aim to reduce repeated and unnecessary pathology testing, minimize harm to patients and save valuable resources. In the table below, the minimum re-test intervals are listed for tests currently performed in-house. Test requests that breach the minimum frequency threshold will not be processed. It is recognized that repeat testing more frequently may be necessary if there is an overriding clinical need. In such cases there is an override procedure which is detailed below.
(d= day; w= week; m= month)

Profiles	MRI		Analyte	MRI
BNP	**30 d**		**PSA (Total)**	**13 d**
Protein Electrophoresis	**21 d**		**Bence Jones screen**	**21 d**

Override procedure in the event of urgent clinical need

For Departments intensively managing patients such as Oncology, Renal, Casualty, Neonatal and Intensive Care, MRI rules are not applied for most tests.

Where a test is required within the interval for a particular clinical purpose, **please provide clinical details on the request form** so the laboratory can process these samples, otherwise they will be rejected. **Samples are only held for 2 days**; please contact the laboratory as soon as possible.

For further information please use this link to access the RCPATH National Minimum Retesting Intervals in Pathology

3. Add-On requests

The Add On facility is **a limited service** to clinicians to minimise repeated phlebotomy. It is not recommended where a patient's condition or treatment is rapidly changing. **Do not use the Add On facility for an URGENT request. You must send a fresh sample.**
Requests to add on additional tests to samples already receipted in the Laboratory will be **considered** if the sample is suitable for the Add On request and less than 24 hours old.

Unsuitable sample includes

- wrong sample type
- insufficient sample
- haemolysis
- aged or deteriorated sample
- referral samples, etc.

Requests from the Hospital must be sent **on a request form** giving the **patient details, the sample identifying number, and the Add On request.**

Primary care, please only contact the laboratory between 09:00 and 12:00.

4. Turn-Around-Times

The following turn-around-times are calculated from receipt of sample in the laboratory until the result is available on ward recall for tests in a priority category, i.e. those results affecting immediate patient care.

All emergency samples	**1 hour**
In-patient samples	**4 hours**
Out-patient & Primary Care	**24 hours**

Some requests may take 2-5 working days to report. They may be

- part of a complex series of investigations
- infrequently requested and those performed in batches

Type the test name / keyword into the text search box in the toolbar
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- tests only available in routine hours

Other tests are referred to Laboratories in Belfast or Great Britain and take much longer for results to be made available.

Please remember there may be circumstances beyond our control where services may have to be prioritised to emergency and in patient requests.

5. Inconsistent or Discordant results

Assays may be subject to interference from prescribed drugs, antibodies, or substances with similar structure to the analyte being measured. The interference may cause falsely elevated or falsely decreased results.

For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings.

Please contact the laboratory if you have any concerns about the validity of results obtained.

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6. HbA1c Interpretation Guide Version 3.0 August 2023

NI Pathology Network Clinical Biochemistry Speciality Forum

Hb A1c reference intervals, diagnostic cut offs and treatment targets all assume that patients have both a normal haemoglobin (Hb A0) and a normal associated red blood cell (RBC) lifespan.

In patients with haemoglobin variants and/or altered RBC survival (Table 1):
a) Hb A1c should **not** be used for diagnosis.
b) Care should be taken when Hb A1c is used for monitoring (Table 2.)

Table 1. Clinical conditions affecting Hb A1c measurement		
Increase	**Decrease**	**Variable**
Iron deficiency anaemia	Iron treatment	Haemoglobin Variants**
Vitamin B12 deficiency	Vitamin B12 treatment	Blood Transfusion
CKD 4 and 5	Liver disease	
Splenectomy	EPO treatment	
Venesection	Haemolytic anaemia, Low Hb levels *	
	Splenomegaly	
	Medications: antiretrovirals, ribavirin, dapsone	

*RBC lifespan does not interfere analytically but the result obtained may not reflect the “true” glycation rate for the patient.

** Haemoglobin Variants occur in approximately 6% of the NI population.

Haemoglobin variants may have different glycation rates and/or altered RBC survival, thus their Hb A1c results need to be interpreted with caution as this may result in misleadingly higher or lower Hb A1c results.

The routine methodology used in the laboratory (Sebia Capillary Electrophoresis) can detect haemoglobin variants. These will be flagged up for users.

For those variants that do not cause any analytical interference in the routine methodology, the result will be reported and flagged with a comment as per Table 3 below.

For those variants that do interfere analytically with the routine method the sample will be rerun using an alternative method (Boronic acid) and the result from this method reported and flagged with a comment as per Table 3. In some cases it will not be possible to report any Hb A1c results from either method.

Hb A1c results reported by the laboratory will be analytically correct, but it is important to remember that although such results will be analytically correct the presence of the variant

will affect how these result should be interpreted physiologically, especially if the reported result does not fit with the patient's clinical condition or other glucose measurements. See Table 2.

Please note: Sebia Capillary Electrophoresis can also detect Hb A2. High Hb A2 levels (>3%) may be due to Vitamin B12 / Folate deficiency; Antiretroviral treatments; Hyperthyroidism and Beta-Thalassaemia. High levels will be flagged up using the associated comment – see Table 3. The advice is to evaluate the clinical context and consider possible clinical relevance.

Table 2. Alternative methods used when Hb A1c monitoring is invalid or physiologically misleading.
• Quality-controlled blood glucose profiles using personal glucose meters • Serum Fructosamine (yellow top tube). This is useful for monitoring patients with variants that interfere with Hb A0 and Hb A1c results. Please contact laboratory to discuss. • Unexplained discrepancies between Hb A1c and other glucose measurements should always be investigated. Seek advice from Clinical Biochemistry. • The patient's own analytically valid Hb A1c results can be used to monitor trends on an individual basis but traditional reference intervals, diagnostic cut offs and treatment targets should not be used.

Guidance is available at: **http://www.nice.org.uk/Guidance/NG28 : 2011 WHO report: Use of Glycated Haemoglobin (Hb A1c) in the Diagnosis of Diabetes Mellitus.**

Table 3: Results from samples with a variant or analytical issue are reported using the following comments:

Note: Comments in black font are in use in BHSCT and comments in red font are in use in the other four Trusts

Code	Comment	Explanation
HbA1	Patient has a haemoglobin variant that does not interfere analytically with Hb A1c result. See link or lab user manual for guidance. Patient has Hb variant – see lab manual for guidance.	A variant has been detected, but it does not interfere analytically with the routine method Hb A1c result.

Type the test name / keyword into the text search box in the toolbar
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HbA2	Patient has a haemoglobin variant. Hb A1c analysed by alternate method. See link or lab user manual for guidance. Use HbA1 comment and HbA1c analysed by alternate method.	A variant has been detected that interferes analytically with the routine Hb A1c result. The Hb A1c has been analysed by the alternative method.
HbA3	Hb A1c result may not reflect true glycaemic status. See link or lab user manual for guidance. A1c may not reflect true glycaemic status – see lab manual.	No variant has been detected, but the Hb A1c is physiologically unreliable for another reason (see Table 1)
HbA4	Unable to report Hb A1c result. Contact Clinical Biochemistry lab if further guidance required. Unable to report Hb A1c result – see lab manual for guidance.	In cases where Hb A1c cannot be measured, the Clinical Biochemistry Laboratory should be contacted to discuss further management.
HbA5	Hb A1c analysed by alternate method. See link or lab user manual for guidance. HbA1c analysed by alternate method – see lab manual	Sample volume received was too low for analysis using routine method. Reported HbA1c has been analysed by alternative method and will be equivalent to those from the routine method.
HbA6	Elevated HbA2 – causes include VitB12/Folate deficiency; Antiretrovirals; Hyperthyroidism and Beta-Thalassaemia. If no clinical suspicion of these, no further action needed. High HbA2 ?low B12/Fol; retrovirals; high T4; thalassaemia	HbA2 greater than 3% - causes include VitB12/Folate deficiency; Antiretrovirals; Hyperthyroidism and Beta-Thalassaemia. If no clinical suspicion of these conditions, no further action required.
HbA7	If no clinical suspicion of these, no further action needed.	

8.Telephoning Critical Results

Results from patients which fall outside the following range or are not in keeping with established history will be telephoned to source ASAP.
A repeat sample should be sought if not in keeping with patient's condition.
Results should be phoned within one hour unless otherwise stated.

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Analyte / Alert	Units	Age Range / Classification	Less than / equal to	Greater than / equal to
AKIN 1 AKIN 2 AKIN 3	Notify Primary Care of new occurrences AKIN1 if K >6.0** Notify Primary Care / DDoc of new occurrences AKIN2** *AKIN3 (new occurrences) within an hour*.			
Ammonia	µmol/L			≥ 100
Amylase	U/L			≥ 500
ALT	U/L			≥ 500
AST	U/L			≥ 500
Bicarbonate	mmol/L		≤ 10	
Bilirubin Direct	µmol/L	Neonates		≥25
Bilirubin Total	µmol/L	≥16yrs <16 yrs		≥ 300 ≥ 250
Calcium Adjusted	mmol/L		≤ 1.8	≥ 3.5
CK	U/L			≥ 5000
Cortisol	nmol/L		≤ 65 if not DST. Consider SST level <250	
Creatinine	µmol/L	≥16yrs <16 yrs		≥ 354 ≥ 200
CRP	mg/L	GPs		≥ 300
Digoxin	ug/L			≥ 2.5
Ethanol	mg/L	≥16yrs <16yrs		≥ 4000 ≥ 100
Free T4	pmol/L			> 50
Glucose (not DM)	mmol/L	≥16yrs <16 yrs	≤ 2.5	≥ 25.0 ≥ 15
HbA1c	mmol/mol			≥ 130**
Iron	µmol/L	<16yrs		≥ 55
Lithium	mmol/L			≥ 1.1
Magnesium	mmol/L		≤ 0.4	
Paracetamol	mg/L	≥16yrs <16yrs		≥ 10 any detectable level
Phosphate	mmol/L		≤ 0.3	
Potassium	mmol/L		≤ 2.5	≥ 6.5
Salicylate	mg/L			≥300
Sodium	mmol/L	≥16yrs <16 yrs	≤ 125 ≤ 130	≥160 ≥160
Theophylline	mg/L			≥ 25
Triglyceride	mmol/L			≥ 20
Troponin-T hs	ng/L	Hospital GPs		> 52 ≥ 10 Female ≥ 18 Male
TSH	µIU/mL			>40
Urea (non-renal)	mmol/L	≥16yrs <16 yrs		≥ 30.0 ≥ 10.0

Type the test name / keyword into the text search box in the toolbar
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9. MINIMUM REQUIREMENTS FOR PAEDIATRIC REQUESTS

TEST	SAMPLE TYPE -PAEDIATRIC BOTTLES	MINIMUM VOLUME REQUIRED	SPECIAL INSTRUCTIONS / REFERRAL
T&D BIL or CRP only	**Green Top Lithium Heparin**	0.2mls	
Routine Biochemistry U&E, LFT, Bone, Mg, CRP, Amylase, T&D BIL, Lipids, CK, Uric Acid	**Green Top Lithium Heparin**	Single request 0.4mls Multiple requests 0.8mls	
Proteins IgA, IgG, IgM RF, Comp	**Gold Top Clotted**	Single request 0.4mls Multiple requests 0.6mls	
Endocrine TSH, FT4, FT3, B12&Folate, Ferritin, Cortisol, *Thyroid Abs**	**Green Top Lithium Heparin**	Single request 0.4mls Multiple requests 0.6mls	** Forwarded to Biochemistry Dept. Causeway Laboratory*
Drugs Digoxin, Theophylline, Paracetamol,	**Green Top Lithium Heparin**	Single request 0.4mls Multiple requests 0.6mls	

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

TEST	SAMPLE TYPE -PAEDIATRIC BOTTLES	MINIMUM VOLUME REQUIRED	SPECIAL INSTRUCTIONS / REFERRAL
Antibiotics Amikacin, Gentamicin, Vancomycin	**Green Top Lithium Heparin**	0.4mls	*Sample times should be clearly marked i.e. Trough / Peak*
POC Testing , Blood Gas Analysis, Na, K, Glucose, Hb & derivatives	BD dry balanced vented Heparin syringe Protech wet Heparin non-vented syringe Heparinised plastic capillary	Syringe Minimum Fill 0.6ml Scalp pH 37uL Full Profile 140uL	*Parameters may be deselected to reduce volume required*
MISCELLANEOUS TESTS			
HbA1c	**Pink or Purple Top EDTA**	0.2mls	
Plasma Glucose, (*alternatively, see POC testing*)	**Grey Top Fluoride EDTA**	0.4mls	
Beta Hydroxybutyrate, (*alternatively, see POC testing*)	**Grey Top Fluoride EDTA**	0.4mls	
Lactate, (*alternatively, see POC testing*)	**Grey Top Fluoride EDTA**	0.4mls	
Ammonia	**Pink or Purple Top EDTA**	Fill Tube >1.3mls (no air)	*Send sample immediately*
PTH	**Pink or Purple Top EDTA**	0.4mls	

FSH, LH, Prolactin, Progesterone, Oestradiol	**Green Top Lithium Heparin**	Single request 0.4mls Multiple requests 0.6mls	
HYPOPAK – SEE HYPOPAK PROTOCOL / POC TESTING			

10. MINIMUM REQUIREMENTS FOR PAEDIATRIC REFERRED TESTS

Miscellaneous Test	Sample Type- Paediatric Bottles	Minimum Volume	Instructions/Referral
Coeliac Screen	**Gold Top Clotted only**	1.3mls	**Immunology RVH** Sample volume can be reduced if samples are sent on the same tube
Anti-nuclear Antibodies	**Gold Top Clotted only**	1.0mls	
Liver Associated Antibodies	**Gold Top Clotted only**	1.0mls	
Total IgE	**Gold Top Clotted only**	1.0mls	
Allergen (specify suspected allergen)	**Gold Top Clotted only**	1.0mls	
Ig Subclasses	**Gold Top Clotted only**	1.0mls	Biochemistry, Belfast Laboratory RVH
Alpha-1 Antitrypsin	**Gold Top Clotted only**	0.6mls	
HCG (tumour marker)	**Green Top Lithium Heparin**	1.0mls	
Caeruloplasmin	**Gold Top Clotted only**	1.3mls	
Tacrolimus	**Pink or Purple Top EDTA**	0.5mls	
Cyclosporin	**Pink or Purple Top EDTA**	0.5mls	
Phenobarbitone	**Green Top Lithium Heparin**	0.4mls	
Phenytoin	**Green Top Lithium Heparin**	0.4mls	
Carbamazepine	**Green Top Lithium Heparin**	0.4mls	
Copper	**Trace metals bottle (blue / black cap)**	1.3mls	

Type the test name / keyword into the text search box in the toolbar
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17-OH Progesterone	**Red Top Clotted only**	0.6mls	
Growth Hormone	**Green Top Lithium Heparin (gel)**	1.3mls	
Zinc	**Trace metals bottle (blue / black cap)**	1.3mls	Trace Metals, Belfast RVH
Amino Acid Chromatogram	**Green Top Lithium Heparin (gel) or Purple Top EDTA OR Urine (plain bottle)**	1.0mls (plasma) 2.0mls (Urine)	Paediatric laboratory Belfast RVH

MEDICAL GENETICS (*forms & bottles available from Biochemistry Lab, Antrim x333060)*			
Chromosome Analysis	**Green Top Lithium Heparin**	5mls	Medical Genetics, BCH
FISH Analysis	**Green Top Lithium Heparin and** **Purple Top EDTA**	5mls	
Microdeletion MLPA	**Purple Top EDTA**	5-10mls	
DNA Testing	**Purple Top EDTA**	5-10mls	

Please refer to the Belfast Trust laboratories

11. Dynamic Tests

Short Synacthen test for suspected adrenal failure in Adults

See Bulletin in Laboratory Business Area of Staffnet for further details

Dexamethazone Suppression Test

See Bulletin in Laboratory Business Area of Staffnet for further details

Belfast Laboratory Handbook

Type the test name / keyword into the text search box in the toolbar
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12. TOXICOLOGY

Most diagnostic problems presented by a patient, who may have ingested a toxin or a drug overdose, are best solved by a thorough history, clinical examination and basic biochemical investigations. The range of toxic compounds which may be implicated is vast. However, with a few important exceptions, the vast majority need not to be positively detected or measured by the laboratory, as patients will most often recover satisfactorily with intensive supportive therapy alone.

The concept of a "toxicology screen" while understandably attractive can only be effectively undertaken in few specialised centres and studies have shown that such a comprehensive approach does not significantly alter patient management or outcome in the acute phase.

The Clinical Biochemistry Department can measure a limited number of drugs and other agents that have been shown to be of value in the prognosis and treatment.

Urine Drugs of Abuse screen is carried out in Belfast Trust Regional Toxicology Centre.

Urgent Urine Drug Screens must be arranged with Belfast RVH Chemical Pathologists. Routine Laboratory transport to Belfast, twice daily at 8am and 1pm, Monday to Friday. Transport outside these arrangements is by taxi, directly from ward. (Ward cost centre approval required.)

Confirmation analysis of positive results may take up to 5 days.

In suspected overdose cases, it is prudent to collect and retain samples of blood, urine and gastric contents and, when available, any samples of the suspected agent. Where the patient makes an uneventful recovery these samples can be discarded but should complications arise analysis can be arranged at an appropriate specialised centre.

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13. THERAPEUTIC DRUG MONITORING

Rationale

Measurement of the circulating concentration of certain drugs can be an invaluable aid to patient management in allowing dosage regimes to be tailored to the individual. This approach is useful for only the limited number of drugs where one or more of the following applies:- the therapeutic response correlates better with the circulating level than the dose administered; there is a 'therapeutic range' of concentrations within which the majority of patients experience maximum clinical benefit with the minimum of toxic side effects; that adjustments made on the basis of measured levels derives more benefit for the patient than would be possible by the exercise of sound clinical judgement alone.

The 'therapeutic range' quoted for individual drugs is essentially derived from the 'minimum effective' and the 'maximum safe' concentrations and is best regarded as providing guidance for the interpretation of patient clinical status rather than an absolute range of values which must be attained at all costs. It should be noted that there is much evidence that drugs can be effective at supposed 'subtherapeutic' concentrations and, similarly, it may be necessary, with caution, to exceed the accepted range in order to achieve the desired therapeutic benefit for some individuals.

The majority of drugs do not require concentration monitoring. For example, where therapeutic effect can easily be established by clinical means (e.g., antihypertensives, analgesics, hypnotics), or using laboratory markers of drug action (anticoagulants, hypoglycaemic agents, lipid lowering drugs, hormone preparations).

TDM now has an established place in the individualisation of dosage for drugs which
cannot be readily assessed clinically (e.g: prophylaxis of seizure or mania)
those with a narrow therapeutic index (the range of concentrations between therapeutic and toxic effects)
where there is a risk of undetectable irreversible toxicity (e.g. the aminoglycoside antibiotics).
However, it must be emphasised that clinical and other criteria remain important and TDM should never be the sole basis for individualising therapy.

Sampling

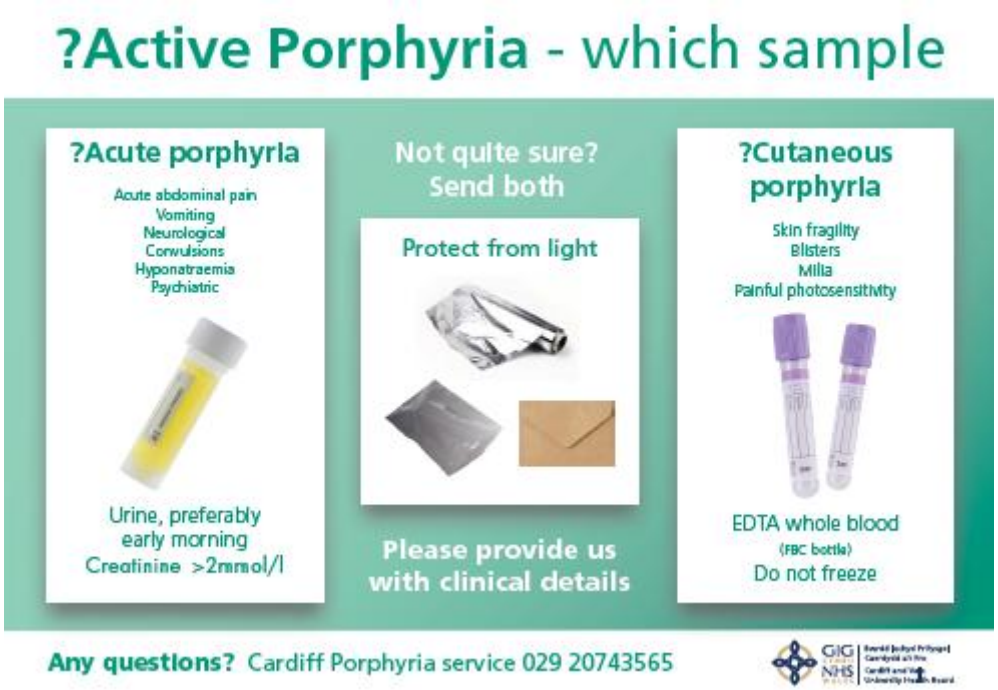
Except where suspected toxicity is being considered, samples should be taken only when the patient is at steady state on the present dose of the drug. The time taken to reach a steady-state is a function of the elimination half life of the drug it takes some five half lives to achieve plateau concentrations. This can be regarded as the optimal sampling time after starting a drug or changing the dose.
It is also important that samples are taken at an appropriate time in relation to dose. The most reproducible time to take measurements is immediately pre-dose (trough concentration) when the lowest level of the cycle is obtained. Peak concentrations are more relevant to the diagnosis of toxicity (except aminoglyoscide antibiotics) but more difficult to predict. Contact the laboratory where any doubts or queries arise.

Refer to NHSCT policy "Antibiotic Therapy (first line empirical) in Hospitalised Adults" for further information. See links below

	Sampling time	Elimination Half Life
Digoxin	Pre dose or at least 6 h post dose	36h
Carbamazepine	Pre dose	10-20h
Lithium	12 hours post dose	10-35h
Phenytoin	Pre dose	6-24h
Theophylline	Pre dose	3-9h
Amikacin	See Staffnet for most recent policy	
Gentamicin		
Vancomycin		
Teicoplanin	Trough level. Not normally repeated within 4 days	
Valproate	Routine monitoring unnecessary. Only to check compliance.	11-17h

14. Porphyria Investigations

http://www.cardiff-porphyria.org/ is one of two national centres for porphyria investigations. The extract below indicates sample types according to clinical suspicion. Further advice can be found on the website.



Type the test name / keyword into the text search box in the toolbar
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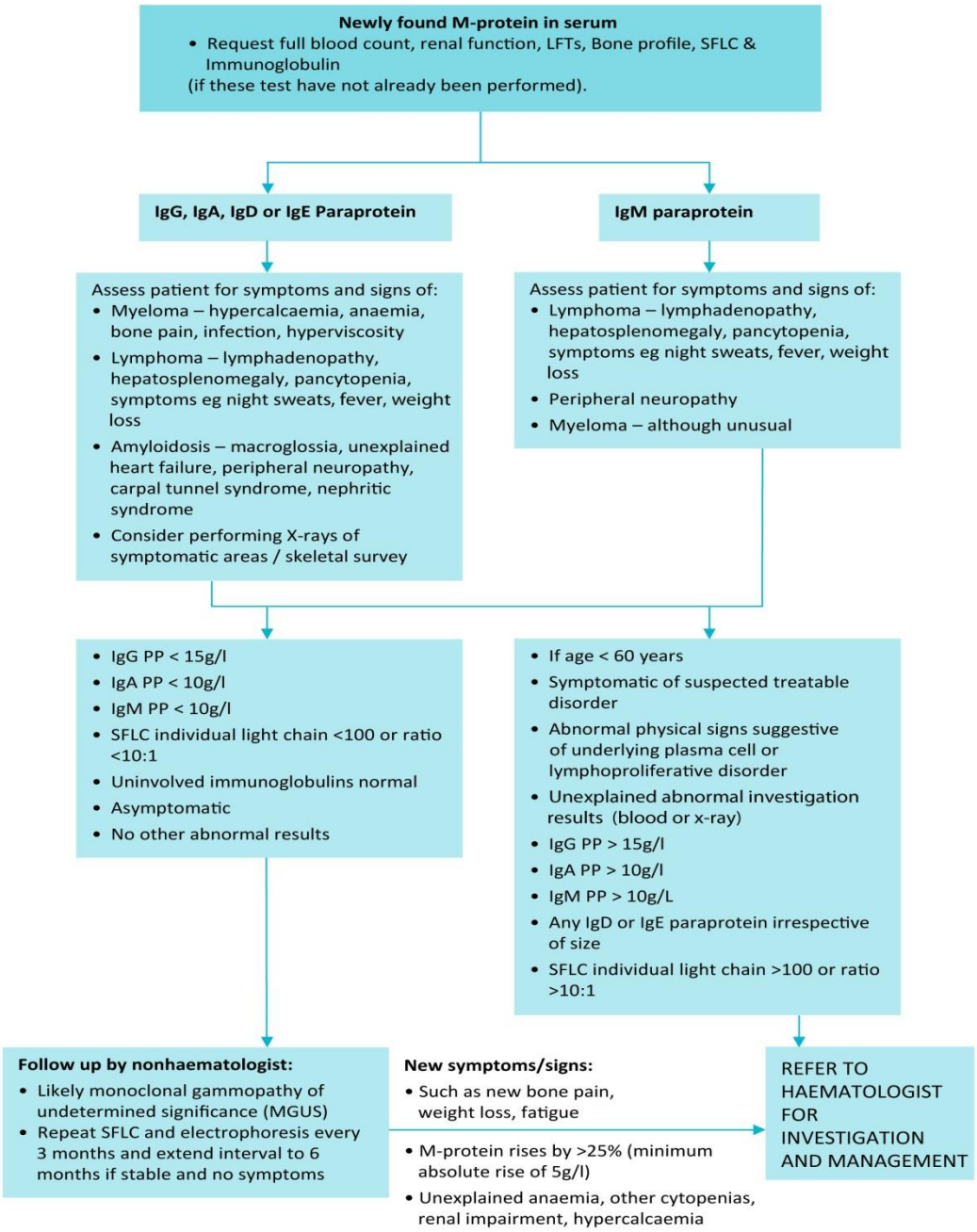
15. Newly detected Paraprotein Investigation Algorithm

Algorithm for investigation of a newly detected paraprotein



Adapted from UK Myeloma forum (UKMF) and Nordic Myeloma Study Group guidelines for the investigation of newly detected M proteins and the management of monoclonal gammopathy of undetermined significance, British Journal of Haematology, 147, 22-42

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

17. Biotin/Vitamin B7 Interference in Immunoassays

The use of over-the-counter high dose biotin (vitamin B7) has increased recently. Supplements marketed as beauty products to improve the health of hair, skin and nails (generally 5-10 mg tablets) may be taken by patients. High-dose biotin (100 mg) may be prescribed to treat certain inherited metabolic diseases and there are ongoing trials of mega-dose (up to 300mg/day) biotin in multiple sclerosis.

Taking large doses of biotin can interfere with laboratory immunoassay test results and further information is available from the Duty Biochemist if required. Interference may be positive (falsely elevated results) or negative (falsely lowered results) depending on the assay design. Clinicians should ask their patients if they are taking any biotin supplements, including products marketed for hair, skin, and nail growth. Clinicians must recognise that product labelling is sometimes obscure and patients may not be aware that they are taking biotin.

If the clinician has a test result that does not fit with the clinical picture, biotin ingestion should be considered as a potential cause of test interference. Close communication between the laboratory, clinician and patient is vital in this context as it is difficult to positively identify samples that contain biotin.
Clinicians should contact the Duty Biochemist when such results are considered. If appropriate arrangements can be made to send samples to a referral laboratory that uses an alternative assay.

Circulating serum concentrations of biotin in the general population typically range from 0.1 ng/mL to 0.8 ng/mL. Biotin is rapidly absorbed, reaches peak plasma concentrations within 1–2 hours, and has an effective serum half-life of 15 hours. Oral administration of biotin doses of 10 mg resulted in peak plasma concentrations ranging from 53 ng/mL to 141 ng/mL

Current lab method Roche Cobas states that samples should not be taken from patients receiving therapy with high biotin doses (i.e. > 5 mg/day) until at least 8 hours following the last biotin administration.

Analyte and method generation	Max plasma biotin concentration without interference ng/ml	Analyser	Type of assay	Will interference increase or decrease level?
Anti TPO	≤ 10	Roche Cobas	competitive	↑
Cortisol II	≤ 70	Roche Cobas	competitive	↑
Digoxin	≤ 100	Roche Cobas	competitive	↑
Ferritin	≤50	Roche Cobas	sandwich	↓
Folate III	≤ 1200	Roche Cobas	competitive	↑
FSH	≤ 1200	Roche Cobas	sandwich	↓
FT3 III	≤ 1200	Roche Cobas	competitive	↑
FT4 IV	≤ 1200	Roche Cobas	competitive	↑
HCG	≤ 70	Roche Cobas	sandwich	↓
LH	≤ 50	Roche Cobas	sandwich	↓
NT Pro BNP	≤ 3500	Roche Cobas	sandwich	↓
Estradiol III (oestradiol)	≤36	Roche Cobas	competitive	↑
Progesterone III	≤30	Roche Cobas	competitive	↑
Prolactin II	≤40	Roche Cobas	sandwich	↓
PTH	≤1200	Roche Cobas	sandwich	↓
Total PSA	≤ 1200	Roche Cobas	sandwich	↓
Troponin T hs	≤ 1200	Roche Cobas	sandwich	↓
TSH	≤ 1200	Roche Cobas	sandwich	↓
Vitamin B12	≤ 50	Roche Cobas	competitive	↑

Tests highlighted with the lower cut-offs for biotin interference are more likely to cause interference at the 10mg dose. The assay methods are continually being updated to reduce the impact of biotin interference.

There some immunoassay tests performed in BHSCT or referred to other laboratories. Please refer to the BHSCT lab manual for further information on the tests below.

ACTH	17 OH Progesterone	SHBG
AFP	IGF1	Testosterone
CA 125	Insulin	Thyroglobulin
CA 19-9	C peptide	Thyroglobulin Ab
Calcitonin	DHAS	
CEA	GH	

References

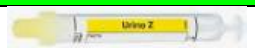
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6933059/
Roche cobas kit inserts

TESTS - Clinical Biochemistry

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS			COMMENTS
ACTH* (Adrenocorticotrophic hormone) **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.			
Alanine Amino-Transferase (ALT)	Heparin (Gel tube)	M/F: M/F: F: M: F: M:	0 to <1yr: 1yr to <13yrs: 13yrs to <19yrs: 13yrs to <19yrs: 19yrs and over: 19yrs and over:	0 - 25 U/L 0 - 19 U/L 0 - 17 U/L 0 - 18 U/L 0 - 33 U/L 0 - 41 U/L	Reference Interval Source: Paed (up to & inc. 18 yr.) - Caliper (Roche Cobas) Adult – Roche Kit Insert
Albumin	Heparin (Gel tube)	M/F: M/F: M/F: M/F: F: M: M/F:	0 to <15 days 15 days to <1yr 1yr to <8yrs 8yrs to <15yrs 15yrs to <19yrs 15yrs to <19yrs 19yrs and over	33 – 45 g/L 31 - 50 g/L 40 - 49 g/L 42 - 51 g/L 40 - 53 g/L 43 - 53 g/L 35 – 50 g/L	Reference Interval Source: Paed (up to & inc. 18 yr.) - Caliper (Roche Modular) [BCG method]. Adult – Pathology Harmony

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Albumin Creatinine Ratio ACR (Micro albumin)	 Random urine sample - Yellow Monovette	M/F: <3.0 mg/mmol creatinine	Frank haematuria or existing urinary tract infection invalidates test. Reference Interval Source: NICE
Aldosterone* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Laboratory User Manual for reference values.	
Allergen Requests* **Referral Test**	See BHSCT Immunology Laboratory User Manual for specimen requirement information	See BHSCT Immunology Laboratory User Manual for reference values.	
Alkaline phosphatase (ALP)	Heparin (Gel tube)	M/F: 0 to <15 days: 83–248 U/L M/F: 15 days to <1yr: 122–469 U/L M/F: 1yr to <10yrs: 142-335 U/L M/F: 10yrs to <13yrs: 129-417 U/L F: 13yrs to <15yrs: 57-254 U/L	Reference Interval Source: Paed (up to & inc. 18 yr.) - Caliper (Roche Cobas) Adult – Pathology Harmony

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
		M: 13yrs to <15yrs: 116-468 U/L F: 15yrs to <17yrs: 50-117 U/L M: 15yrs to <17yrs: 82-331 U/L F: 17yrs to <19yrs: 45-87 U/L M: 17yrs to <19yrs: 55-149 U/L M/F: 19yrs and above: 30-130 U/L	
Alkaline phosphatase (ALP) isoenzyme* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Alpha-fetoprotein* (AFP) **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Alpha-1-Antitrypsin* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Alpha Galactosidase* (Fabry's Disease) **Referral Test**	5 ml EDTA sample tube. Send to lab immediately. Must reach lab referral Laboratory within 72 hrs. **Draw samples Mon-Thurs, only, to allow for postage to referral lab.**	Refer to Willink lab handbook at www.mangen.co.uk	Contact Willink Biochemical Genetics Laboratory, Manchester University NHS Foundation Trust. Telephone: 0161 70 12137/8 for further information
Aluminium* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values	Contact Antrim 334774 or Causeway 375180 for Blood Trace Metals Bottle
Amikacin	Heparin (Gel tube) Indicate sample type (Peak or Trough).	M/F: Trough levels <5 mg/L For multiple daily dose regime, peak plasma amikacin concentration should not exceed 30 mg/L; trough concentration should be less than 10 mg/L. For once daily dose regimen, trough concentration should be less than 5mg/L.	Reference Interval Source: Microbiology Consensus. **Refer to Staffnet for local Antibiotic Policies and Guidelines**

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Amino acids - Plasma * Amino acids - Urine * Amino acids - CSF * Referral Test	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	It is important to give full clinical details including diet and any drug treatment. For diagnostic purposes please send both **blood and urine**.
Ammonia (Antrim Site)	EDTA sample tube, fill to the top to exclude air. **Time sensitive assay, recommended that the sample reach the laboratory within 15 minutes of venepuncture. Inform Laboratory that assay is being requested prior to taking samples**. **Please be aware causes of increased Ammonia can be attributed to but not limited to:**	M/F: Neonate (Term): <100 µmol/L M/F: 29 days and over: <40 µmol/L Note: Premature neonate noted in guidelines with a ref Interval of <150 µmol/L. Comment included with all 28 day neonate results	Reference Interval Source: MetBioNet Guidelines, Hyperammonaemia, V3. For Paediatric advice consult www.metbio.net UNDIAGNOSED HYPERAMMONAEMIA Diagnosis and Immediate Management see below link: https://bimdg.org.uk/wp-content/uploads/2024/12/

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
	• Skin contamination • Physical exercise • Difficult venepuncture • Prolonged tourniquet use • Ammonia contamination; - Cigarette smoking (patient & collection staff) - Atmospheric - Contamination from other reagents i.e urease containing solutions and water supply. - Cleaning products - Contamination from blood tubes. • Certain drugs can increase blood ammonia concentration include: alcohol, barbiturates, diuretics, valproic acid, narcotics, cefoxitin, intralipid.		Hyperammonaemiaand_manage_2016_415469_09092016.pdf A free-flowing venous blood sample should be collected into specimen tubes containing EDTA as anticoagulant as per local laboratory instructions. Drawing blood through a small indwelling catheter may cause haemolysis and hence spuriously elevated ammonia; ideally blood obtained this way should be avoided.

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
	Causes of decreased Ammonia • High blood pressure • Certain drugs i.e Neomycin		
Amylase	**Blood** Heparin (Gel tube)	M/F: 28 – 100 U/L	Reference Interval Source: Roche Kit Insert 2022-02 v8
	Urine Random sample (Urine Monovette Yellow)	M: 16 - 491 U/L F: 21 – 447 U/L	Reference Interval Source: Roche Kit Insert 2022-02 v8
Androstenedione* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Angiotensin converting enzyme (ACE)* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Anti CCP* **Referral Test**	See BHSCT Immunology Laboratory User Manual for specimen requirement information	See BHSCT Immunology Laboratory User Manual for reference values.	
Anti cardiolipin antibody* **Referral Test**	See BHSCT Immunology Laboratory User Manual for specimen requirement information	See BHSCT Immunology Laboratory User Manual for reference values.	
Anti-gliadin antibody* **Referral Test**	See BHSCT Immunology Laboratory User Manual for specimen requirement information	See BHSCT Immunology Laboratory User Manual for reference values.	
Anti-glomerular basement membrane antibodies* **Referral Test**	See BHSCT Immunology Laboratory User Manual for specimen requirement information.	See BHSCT Immunology Laboratory User Manual for reference values.	

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Anti Mullerian Hormone AMH* **Referral Test**	Clotted blood (Gel tube)	Unfunded Test. This test is only available privately by special arrangement with the laboratory.	
Anti-phospholipid antibodies* **Referral Test**	See BHSCT Immunology Laboratory User Manual for specimen requirement information.	See BHSCT Immunology Laboratory User Manual for reference values.	
Anti-nuclear antibodies* (ANA) **Referral Test**	See BHSCT Immunology Laboratory User Manual for specimen requirement information.	See BHSCT Immunology Laboratory User Manual for reference values.	

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Aspartate Amino-Transferase (AST)	Heparin (Gel tube)	M/F 0 to <15 days 0 – 155 U/L M/F 15 days to <1yr 0 – 63 U/L M/F 1yr to <7yrs 0 – 41 U/L M/F 7yrs to <12yrs 0 – 33 U/L F 12yrs to <19yrs 0 – 23 U/L M 12yrs to <19yrs 0 – 32 U/L F 19yrs and over 0 – 32 U/L M 19yrs and over 0 – 40 U/L	Reference Interval Source: Paed (up to & inc. 18 yr.) - Caliper (Roche Cobas) Adult – Roche Kit Insert
Bence Jones Protein (BJP)	Random Sample (Urine Monovette Yellow)	Not normally detected	
Beta Carotene* **Referral test**	Clotted blood (Gel tube) Protect from light		Contact Department of Blood Sciences St Helier Hospital Wrythe Lane Carshalton SM5 1AA Telephone 0208296553
Beta Hydroxybutyrate (Antrim Site)	Sodium Fluoride (Grey)	M/F 0.03 - 0.3 mmol/L	Reference Interval Source: Randox Kit Insert

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Beta 2 Microgobulin* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Bicarbonate (CO2)	Heparin (Gel tube) **Time sensitive assay, result from samples > 12 hrs, on receipt into the laboratory, are invalid and removed from report. (Stability)**	M/F 0 to <15 days 10-20 mmol/L M/F 15 days to <1yr 10-24 mmol/L M/F 1yr to <5yrs 14-24 mmol/L M/F 5yrs to <15yrs 17-26 mmol/L F 15yrs to <19yrs 17-26 mmol/L M 15yrs to <19yrs 18-28 mmol/L M/F 19yrs and above 22-29 mmol/L	Part of Electrolyte profile. Reference Interval Source: Paed (up to & inc. 18 yr.) - Caliper (Abbott Architect) *NOTE: Low limit of 10 mmol/L agreed by regional NICU team (differs from Caliper). Adult – Pathology Harmony
Bile Acids * **Referral Test**	See SEHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See SEHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Results are available on NIECR, not on local Laboratory Recall.

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS			COMMENTS
Bilirubin	Heparin (Gel tube) **Total Bilirubin**	M F M/F M/F M/F M/F M/F M/F	0 to <15 days 15 days to <1yr 1yr to <9yrs 9yrs to <12yrs 12yrs to <15yrs 15yrs to <19yrs 19yrs and above	0-250 µmol/L 0-10 µmol/L 0-5 µmol/L 0-8 µmol/L 0-10 µmol/L 0-12 µmol/L 0-21 µmol/L	Reference Interval Source: Paed (up to & inc. 18 yr.) - Caliper (Roche Cobas) Adult – Pathology Harmony
	Direct Bilirubin	M/F M/F M/F M/F F M M/F	0 to <15 days 15 days to <1yr 1yr to <9yrs 9yrs to <13yrs 13yrs to <19yrs 13yrs to <19yrs 19yrs and over	4.3-9.4µmol/L 0.0-3.9µmol/L 0.0-2.4µmol/L 0.0-3.7µmol/L 0.0-5.1µmol/L 1.2-5.4µmol/L 0.0-3.4µmol/L	Reference Interval Source: Paed (up to & inc. 18 yr.) - Caliper (Roche Cobas) Adult – Pathology Harmony

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Blood Gas Analysis **Point of Care analysis only.**	Dry Heparinised Syringe Arterial blood	For reference intervals please refer to Staffnet, Point of Care Testing Area.	Reference Interval Source: Refer to Staffnet: Point of Care Testing Area.
Beta Trace Protein (CDT)* **Referral Test**	CSF / Fluid Unhaemolysed fluid in a SMALL 2ml plain tube, **paired with serum sample**	Contact Laboratory to Discuss	Contact Neuroimmunology & CSF Laboratory, (Box 76) 9th floor UCL Queen Square Institute of Neurology Queen Square London WC1N 3BG Telephone: 020 3448 3812

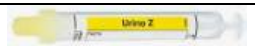
Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

Brain Natriuretic Peptide pro-BNP	Heparin (Gel tube)	M/F	<1yr	*-- ng/L	Processed on Causeway Site 09:00-17:00, Monday-Friday Reference Interval Source: Roche Kit Insert 2023-12 v4 *Note – no ref Interval available / quoted for < 1 yr old Refer to NICE Chronic Heart Failure Guidelines http://pathways.nice.org.uk/pathways/chronic-heart-failure
		M/F	1yr to 3yrs	<320 ng/L	
		M/F	4yrs to 6yrs	<190 ng/L	
		M/F	7yrs to 9yrs	<145 ng/L	
		M/F	10yrs	<112 ng/L	
		M/F	11yrs	<317 ng/L	
		M/F	12yrs	<186 ng/L	
		M/F	13yrs	<370 ng/L	
		M/F	14yrs	<363 ng/L	
		M/F	15yrs	<217 ng/L	
		M/F	16yrs	<206 ng/L	
		M/F	17yrs	<135 ng/L	
		M/F	18yr	<115 ng/L	
		M/F	19yr to 34yrs	<115 ng/L	
		F	35yrs to 44yrs	<237 ng/L	
		M	35yrs to 44yrs	<115 ng/L	
		F	45yrs to 54yrs	<284 ng/L	
		M	45yrs to 54yrs	<173 ng/L	
		F	55yrs to 64yrs	<352 ng/L	
		M	55yrs to 64yrs	<386 ng/L	
		F	65yrs to 74yrs	<623 ng/L	
		M	65yrs to 74yrs	<879 ng/L	
		M/F	75yrs and over	<1800 ng/L	

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
C1 esterase inhibitor* **Referral Test**	See BHSCT Clinical Immunology User Manual for specimen requirement information.	See BHSCT Immunology Laboratory User Manual for reference values.	
CA 125* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
CA 19-9* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Cadmium* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Contact Antrim 334774 or Causeway 375180 for Blood Trace Metals Bottle
Caeruloplasmin* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Calcitonin* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Calcium (Blood) (inc. adjusted Ca)	Heparin (Gel tube) Blood sample should be taken without tourniquet if possible.	M/F 0 to <1yr 2.16-2.74mmol/L M/F 1 to <19yrs 2.31-2.64 mmol/L M/F ≥19yrs 2.20-2.60 mmol/L Adjusted Calcium calculation is in line with the Regional Pathology Harmonisation guidelines. Results will differ from many on-line calculators	Reference Interval Source: Paed (up to & inc. 18 yr.) - Caliper (Roche Cobas) Adult - Pathology Harmony
Calcium (Urine)	**Urine** **24 hour collection. Contact Biochemistry for acidified 24 hour collection bottle.**	M/F 2.5 – 7.5 mmol/24h	Reference Interval Source: Regional Harmonisation Group
Calcium : Creatinine Ratio	 Random sample (Urine Monovette Yellow) **Plain Monovette – Acid added in Laboratory upon receipt.**	M/F <12mths <2.0 mmol/L 1yr to 3yrs <1.5 mmol/L 3yrs to 5yrs <1.1 mmol/L 5yrs to 7yrs <0.8 mmol/L >7yrs <0.6 mmol/L	Reference Interval Source: European Association of Urology 2015

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Carbamazepine* (Tegretol) **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Carboxyhaemoglobin **Point Of Care Test**	Dry Heparinised Syringe	For reference intervals please refer to Staffnet, Point of Care Testing Area.	Reference Interval Source: Refer to Staffnet: Point of Care Testing Area.
Calprotectin* Referral Test	See SEHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See SEHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Results are available on NIECR, not on local Laboratory Recall.
Carcinoembryonic Antigen (CEA)* Referral Test	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Catecholamine* (Adrenalin, Noradrenalin & Dopamine) Replaced by Metanephrine Referral Test	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Contact Antrim 334774 or Causeway 375180 for acidified containers.

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Chloride (Blood)	**Blood** Heparin (Gel tube)	M/F 95 – 108 mmol/L	Reference Interval Source: Pathology Harmony
Chloride (Urine)	**Urine: Random** Random sample (Urine Monovette Yellow)	M/F No reference Interval. (mmol/L) Random urine - Interpretation depends on associated clinical details	Reference Interval Source: N/A
	Urine: 24 Hour Collection 24hr urine in a plain container	M/F 110 – 250 mmol/24h	Reference Interval Source: Roche kit insert 2022-06 v7
Cholesterol (Total)	Heparin (Gel tube)	F 0 to <15 days 1.3–3.2mmol/L M 0 to <15 days 1.2-2.8 mmol/L M/F 15 days to <1yr 1.7-6.1 mmol/L M/F 1yr to <19yrs 2.9-5.4 mmol/L M/F ≥19yrs 2.8-5.0 mmol/L	Reference Interval Source: Paed (up to & inc. 18 yr.) - Caliper (Roche Cobas) Adult – Regionally agreed
Cholinesterase* activity e.g. investigation of	EDTA sample tube		For investigation of scoline Apnoea Contact Severn Pathology Pathology Sciences Building

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Organophosphate toxicity **Cholinesterase Phenotyping*** **Referral Test**	Clotted blood (Gel tube) acceptable for Cholinesterase Activity and Phenotyping		Southmead Hospital Westbury-on-Trym Bristol BS10 5NB Telephone: 0117 4148383
Chromium* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Contact Antrim 334774 or Causeway 375180 for Blood Trace Metals Bottle
Chromosome Studies* Request form available from your local laboratory **Referral Test**	See BHSCT Regional Molecular Diagnostics Service User Manual for specimen requirement information.	See BHSCT Regional Molecular Diagnostics Service User Manual for reference values.	
Creatinine Kinase (CK)	Heparin (Gel tube)	F 26 – 192 U/L M 39 – 308 U/L	Reference Interval Source: Roche Kit Insert 2023-12 v11

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
CK Creatinine Kinase Isoenzyme* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Cobalt* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Contact Antrim 334774 or Causeway 375180 for Blood Trace Metals Bottle
Coeliac Screen* **Referral Test**	See BHSCT Clinical Immunology User Manual for specimen requirement information.	See BHSCT Immunology Laboratory User Manual for reference values.	
Complement analysis (C3 C4)	Heparin (Gel tube)	C3 M/F 0.75 – 1.65 g/L C4 M/F 0.14 – 0.54 g/L	Reference Interval Source: PRU Handbook of clinical Immunochemistry
Copper * **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Contact Antrim 334774 or Causeway 375180 for Blood Trace Metals Bottle

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS			COMMENTS
Cortisol	**Blood** Heparin (Gel tube) **Record sample times on bottles.** NB. Routine method unsuitable for investigation of Congenital Adrenal Hyperplasia. Contact the Laboratory	M/F M/F See Staffnet Laboratory area for interpretation of Synacthen Stimulation Test and Dexamethasone suppression test	6am to 10am 4pm to 8pm	166 – 507 nmol/L 74 – 291 nmol/L	Processed on Antrim Site. Reference Interval Source: Roche Kit Insert 2021-12 v6
Cortisol, Urinary Free* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.			
Creatinine	**Blood** Heparin (Gel tube)	M/F M/F M/F M/F M/F F M	15 days to <2yrs 2yrs to <5yrs 5yrs to <12yrs 12yrs to <15yrs 15yrs to <19yrs ≥19yrs ≥19yrs	15 -38 µmol/L 24 – 43 µmol/L 33 – 59 µmol/L 45 – 77 µmol/L 48 – 79 µmol/L 45 – 84 µmol/L 59-104 µmol/L	Part of Electrolyte Profile. Reference Interval Source: Paed (up to & inc. 18 yr.) - Caliper (Roche Cobas) Adult – Roche Kit Insert 2023-08 v14

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
	Urine: Random Random sample (Urine Monovette Yellow)	F 2.55 – 20.4 mmol/L M 3.54 – 24.6 mmol/L	Part of Urine Electrolyte Profile. Reference Interval Source: Roche kit insert 2023-08 v14
	Urine 24 hr urine collection in a plain container	F 6 – 13 mmol/24h M 9 – 19 mmol/24h	Reference Interval Source: Roche kit insert 2023-08 v14
Creatinine Clearance CRCL	24 hr urine – plain container **and** Heparin (Gel tube)	M/F 66 – 143 mL/min Age and body surface area need to be considered when interpreting paediatric results.	Reference Interval Source: Roche kit insert 2023-08 v14
C-Peptide* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
CRP (C-Reactive Protein)	Heparin (Gel tube)	M/F <5 mg/L	Reference Interval Source: Roche Kit Insert 2023-09 v4

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Cryoprotein (Cryoglobulin and Cry fibrinogen)	Clotted (no gel) X 6-8, preheated to 37ºC by laboratory staff- must be present when sample is taken 4ml blood in EDTA bottle X 3		Contact Clinical Chemistry pathologists Dr Elinor Hanna or Dr Sumana Gidwani via email to arrange testing. Available Mon-Fri 09:00-17:00 Reported as Cryoglobulin, allow 14 days for report to be issued
CSF Glucose **Do not send by air tube** **Notify Biochemistry to expect request.**	See CSF sample collection details (Pg.14 in Lab Handbook- needs revised)	M/F 0 to18 yr. 3.3-4.4 mmol/L M/F 18 yr and over 2.2-3.9 mmol/L	Reference Interval Source: Roche kit insert 2022-03 V11
CSF Lactate* **Do not send by air tube** **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Notify Biochemistry to expect request. Clinical details required. **Do not send by air tube**

Type the test name / keyword into the text search box in the toolbar
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Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
CSF Protein **Do not send by air tube** **Notify Biochemistry to expect request.**	See CSF sample collection details (Pg.14 in Lab Handbook- needs revised)	M/F 0.15 – 0.45 g/L	Reference Interval Source: Roche kit insert 2022-02 v9
CSF Spectrophotometry (Xanthochromia) **Do not send by air tube** **Notify Biochemistry to expect request.**	Wait >12hrs post event before sampling. Request CSF bottle pack from laboratory. Plain sterile container with yellow cap. **Protect from light** See CSF sample collection details (Pg.14 in Lab Handbook- needs revised)	Not normally detected.	Notify Biochemistry to expect request. Clinical details required. **Analysed in Antrim. Available between 09:00-16:00**

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
CSF (Oligoclonal Band)* **Referral Test**	See BHSCT Clinical Immunology User Manual for specimen requirement information.	See BHSCT Immunology Laboratory User Manual for reference values.	**Contemporaneous blood sample essential**
Cyclosporin* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Cystic Fibrosis genetic analysis* **Referral Test**	See BHSCT Regional Molecular Diagnostics Service User Manual for specimen requirement information.	See BHSCT Regional Molecular Diagnostics Service User Manual for reference values.	
DHEAS (Dehydroepiandrosterone sulphate) **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Digoxin	Heparin (Gel tube)	M/F 6-8hrs post dose 0.5 – 2.0 µg/L	Reference Interval Source: Pathology Harmony

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
	Digibind interferes with assay. Half-life is about 1 day. Wait 3 days after discontinuation before measuring digoxin		
Drug Screen – Drugs of Abuse – Urine* Amphetamines, Benzodiazepines, Cannabinoids, Cocaine, Methadone and Opiates **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	If urgent processing is required, discuss with Belfast (RVH) duty Pathologist. Routine transport to Belfast at 8am and 1pm Mon to Fri. Outside these times please organise taxi transport directly from Ward to Belfast.
Estimated GFR eGFR (CKD-EPI) (calculated) Part of Electrolyte profile	Heparin (Gel tube)	>60 mL/min	Reference Interval Source: Regional agreement with renal team to report >60 eGFR not applicable to under 18yrs Calculation : CKD-EPI 2009

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Ethanol (Alcohol)	Heparin (Gel tube) **This test cannot be added on to a previous request sample (Volatile).**	M/F: Not Detected (mg/L)	Analysed for clinical reasons only. Reference Interval Source: Roche Kit Insert 2022-06 v11
Ethylene glycol* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	If urgent processing is required, discuss with Belfast (RVH) duty Pathologist. Routine transport to Belfast at 8am and 1pm Mon to Fri. Outside these times please organise taxi transport directly from Ward to Belfast.
Faecal Immunochemical test [FIT] (symptomatic – RFIT)	Symptomatic FIT Picker	Please refer to: qFIT for lower GI symptoms | Northern Ireland Cancer Network (hscni.net)	No dietary preparation necessary Causeway laboratory is the site for the regional screening service.

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS			COMMENTS
Ferritin	Heparin (Gel tube) Patients receiving iron supplementation should be monitored by FBC.	M/F M/F M/F F M F M F M	0 to <1mth 1mth to <6mths 6mths to <15yrs 15yrs to <19yrs 15yrs to <19yrs 19yrs to <60yrs 19yrs to <60yrs ≥60 years ≥60 years	150.0 - 973 µg/L 8.5 - 580 µg/L 14.0 -101 µg/L 3.9 - 114 µg/L 21.0 - 173 µg/L 15.0 - 173 µg/L 30.0-400 µg/L 15.0-330 µg/L 30.0-400 µg/L	Reference Interval Source: Paed (up to & inc. 18 yr.) - Caliper (Roche Cobas) Adult Intervals – Roche Method insert BSG Guidelines for the management of iron deficiency anaemia (Gut; 2021: 2030-2051)
Fluid Analysis:- **Pleural Fluid: chylomicrons protein, LDH, pH, glucose, triglyceride, cholesterol, amylase, creatinine** **Peritoneal Fluid: albumin, SAAG (serum/ascetic**	Plain universal container Please state fluid type – Pleural, peritoneal (ascitic), drain, *etc.* Heparin (Gel tube) required to aid interpretation. Sodium Fluoride (grey top tube) For pH, refer to POC instructions. Write result on lab request form.				Appearance reported on all samples. For other tests please contact lab for advice. **These tests are unaccredited. (UKAS)** **If SAAG is requested a plasma sample taken within 2 hours of fluid is required.**

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
albumin gradient), protein.			
Folic acid (Folate)	Heparin (Gel tube) Patients on Folate supplementation should be monitored by FBC	M/F 3.0 – 26.8 µg/L	Reference Interval Source: Regionally agreed (Biochemistry Forum)
Follicle Stimulating Hormone (FSH)	Heparin (Gel tube)	M 1.5 – 12.4 IU/L F Follicular Phase 3.5 – 12.5 IU/L F Ovulation Phase 4.7 – 21.5 IU/L F Luteal Phase 1.7 – 7.7 IU/L F Post Menopause 25.8 -134.8 IU/L	Reference Interval Source: Roche kit insert 2020-11 v3.0 (5th-95th centile)
FT4	Heparin (Gel tube)	M/F 0 to 6 days 11.0-32.0 pmol/L M/F >6 days to ≤3mths 11.5-28.3 pmol/L M/F >3mths to ≤12mths 11.9-25.6 pmol/L M/F >1yr to ≤6yrs 12.3-22.8 pmol/L M/F >6yrs to ≤11yrs 12.5-21.5 pmol/L M/F >11yrs to ≤20yrs 12.6-21.0 pmol/L M/F 21yrs and over 12.0-22.0 pmol/L **Pregnancy** F 1st Trimester 12.1-19.6 pmol/L	Reference Interval Source: Reference intervals for children and adults. Elecsys thyroid tests. Roche2009 Adult – Roche Kit Insert 2022-02 v6

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS			COMMENTS
		F	2nd Trimester	9.6-17.0 pmol/L	Pregnancy related reference ranges are not quoted on reports. The user is directed to this Laboratory User Guide.
		F	3rd Trimester	8.4-15.6 pmol/L	
FT3	Heparin (Gel tube) See TFT Cascade testing protocol. FT3 as indicated or requested. Page 35	M/F	0 to 6 days	2.65-9.68 pmol/L	Reference Interval Source: Reference intervals for children and adults. Elecsys thyroid tests. Roche2009 Adult – Roche Kit Insert 2022-02 v6 Pregnancy related reference ranges are not quoted on reports. The user is directed to this Laboratory User Guide
		M/F	>6 days to ≤3mths	3.00-9.28 pmol/L	
		M/F	>3mths to ≤12mths	3.30-8.95 pmol/L	
		M/F	>1yr to ≤6yrs	3.69-8.46 pmol/L	
		M/F	>6yrs to ≤11yrs	3.88-8.02 pmol/L	
		M/F	>11yrs to ≤20yrs	3.93-7.70 pmol/L	
		M/F	21yrs and over	3.10-6.80 pmol/L	
			Pregnancy		
		F	1st Trimester	3.78-5.97 pmol/L	
		F	2nd Trimester	3.21-5.45	
		F	3rd Trimester	3.09-5.03	
Galactose I phosphate uridyl transferase (RBC) (GAL1PUT) screening only* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.			Qualitative screen for Classical Galactosaemia Advise contact Metabolic laboratory before sending (tel 02896 151480).

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Gastrin* Plasma **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Gentamicin	Heparin (Gel tube) Indicate sample type (Peak or Trough).	M/F Trough levels <1 mg/L For multiple daily dose regimen, peak plasma Gentamycin concentration should be 5-10 mg/L (3-5mg/L for endocarditis); trough concentration should be less than 2 mg/L. For once daily dose regimen, cosult local guidelines on monitoring plasma - gentamicin concentration.	Reference Interval Source: Microbiology Consensus **Refer to Staffnet for local Antibiotic Policies and Guidelines**
Gestational Diabetes Screening	2ml blood in Sodium Fluoride (grey cap) tube Fasting sample and 2hrs post glucose load	Please see link below for diagnostic criteria details http://www.nice.org.uk/guidance/ng3/chapter/1-recommendations#gestational-diabetes-2	

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS			COMMENTS
GGT Gamma Glutamyl Transferase	Heparin (Gel tube)	M/F M/F M/F M/F F M	0 to <15 days 15 days to <1yr 1yr to <11yrs 11yrs to <19yrs 19yrs and over 19yrs and over	17 - 175 U/L 5 - 101 U/L 4 - 12 U/L 4 - 16 U/L 6 - 42 U/L 10 - 71 U/L	Reference Interval Source: Paed (up to & inc. 18 yr.) - Caliper (Roche Cobas) Adult – Roche Kit Insert
Globulin (Serum)	Clotted blood (Gel tube) Part of Immunoprotein Profile Valid sample, SERUM only.	M/F	18 – 34 g/L		Reference Interval Source: Locally derived reference interval.
Glucose (Plasma)	2ml blood in Sodium Fluoride (grey cap) tube	M/F	Fasting	4.1 – 6.1 mmol/L	Reference Interval Source: Roche Kit Insert 2022-03 v11
Glycosaminoglycan (Mucopolysaccharidosis screen) screening only *	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.			

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Referral Test			
Growth Hormone (GH)* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Gut and Islet Cell Hormones* :- (Specify) **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Contact Clinical Biochemistry lab prior to taking samples.
5HIAA* 5-Hydroxy-Indoleacetic Acid No screening available **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Can be done with 5NT (5 Hydroxytryptamine)
Haptoglobin	Clotted blood (Gel tube), or, Heparin (Gel tube)	M/F 0.3 – 2.0 g/L	Reference Interval Source: Roche kit insert 2021-11 v7.0 Analysed in Causeway Site Between 09:00 and 16:00, Tuesday and Thursday.

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Haemochromatosis HFE* **Referral Test**	See BHSCT Regional Molecular Diagnostics Service User Manual for specimen requirement information.	See BHSCT Regional Molecular Diagnostics Service User Manual for reference values.	Indicate on request form that patient has met the appropriate Haemochromatosis testing criteria.
HbA1c	4ml blood in EDTA tube.	M/F 20 – 41 mmol/mol	Reference Interval Source: Regionally Agreed. (Biochemistry Forum)
HCG tumour marker* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
HCG levels Serum (Beta Human Chorionic Gonadotropin)	Heparin (Gel tube) **HCG requests cannot be added on to processed bloods.**	M 0 - 5 U/L *F Non-pregnant 0 - 5 U/L *Interval quoted for non-pregnant pre-menopausal women. Interval = <15 U/L for healthy post-menopausal women.	Reference Interval Source: Roche kit insert 2023-01 v7.0 & ACBI Scientific Committee Guideline – Use of Tumour Markers. **Not available for routine pregnancy testing**.

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
(Quantitative) HCG levels* Hydatidiform mole **Referral Test**	Clotted blood (Gel tube) **and** 25ml urine in a sterile universal container		Samples sent to Charing Cross Hospital Clinical Biochemistry Department Fulham Palace Road London, W6 8RF. Telephone: 020 3313 5353
HDL-Cholesterol	Heparin (Gel tube)	M/F 15 days to <1yr 0.0–1.95 mmol/L M/F 1yr to <4yrs 0.72-1.68 mmol/L M/F 4yrs to <13yrs 0.81-1.99 mmol/L F 13yrs to <19yrs 0.70-1.96 mmol/L M 13yrs to <19yrs 0.69-1.85 mmol/L M/F 19yrs and over 1.00-2.50 mmol/L	Reference Interval Source: Paed (up to & inc. 18 yr) - Caliper (Roche Cobas) Adult – Regionally agreed (Biochemistry Forum)

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Homocysteine **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Sample must arrive in the laboratory ON ICE within 30 min.
17 Hydroxyprogesterone **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Ig E* **Referral Test**	See BHSCT Clinical Immunology User Manual for specimen requirement information.	See BHSCT Immunology Laboratory User Manual for reference values.	
IGF 1* **Insulin-like Growth Factor 1** **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
IgA	Clotted blood (Gel tube)	M/F Cord <0.02 g/L M/F <2wks 0.01 – 0.08 g/L M/F 2wks to 6wks 0.02 – 0.15 g/L M/F 6wks to 12wks 0.05 – 0.40 g/L	Reference Interval Source: PRU Handbook of clinical Immunology

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS			COMMENTS
		M/F	3mths to 6mths	0.10 – 0.50 g/L	
		M/F	6mths to 9mths	0.15 – 0.70 g/L	
		M/F	9mths to 12mths	0.20 – 0.70 g/L	
		M/F	1yr to 2yrs	0.30 – 1.20 g/L	
		M/F	2yrs to 3yrs	0.30 – 1.30 g/L	
		M/F	3yrs to 6yrs	0.40 – 2.00 g/L	
		M/F	6yrs to 9yrs	0.50 – 2.40 g/L	
		M/F	9yrs to 12yrs	0.70 – 2.50 g/L	
		M/F	12yrs to 15yrs	0.80 – 2.80 g/L	
		M/F	15yrs to 45yrs	0.80 – 2.80 g/L	
		M/F	≥45yrs	0.80 – 4.00 g/L	

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS			COMMENTS
IgG	Clotted blood (Gel tube)	M/F	Cord	5.2 - 18.0 g/L	Reference Interval Source: PRU Handbook of clinical Immunology
		M/F	<2wks	5.0 - 17.0 g/L	
		M/F	2wks to 6wks	3.9 - 13.0 g/L	
		M/F	6wks to 12wks	2.1 - 7.7 g/L	
		M/F	3mths to 6mths	2.4 - 8.8 g/L	
		M/F	6mths to 9mths	3.0 - 9.0 g/L	
		M/F	9mths to 12mths	3.0 - 10.9 g/L	
		M/F	1yr to 2yrs	3.1 - 13.8 g/L	
		M/F	2yrs to 3yrs	3.7 - 15.8 g/L	
		M/F	3yrs to 6yrs	4.9 - 16.1 g/L	
		M/F	6yrs to 9yrs	5.4 - 16.1 g/L	
		M/F	9yrs to 12yrs	5.4 - 16.1 g/L	
		M/F	12yrs to 15yrs	5.4 - 16.1 g/L	
		M/F	15yrs to 45yrs	6.0 - 16.0 g/L	
		M/F	≥45yrs	6.0 - 16.0 g/L	
IgM	Clotted blood (Gel tube)	M/F	Cord	0.02 - 0.20 g/L	Reference Interval Source: PRU Handbook of clinical Immunology
		M/F	<2wks	0.05 - 0.20 g/L	
		M/F	2wks to 6wks	0.08 - 0.40 g/L	
		M/F	6wks to 12wks	0.15 - 0.70 g/L	
		M/F	3mths to 6mths	0.20 - 1.00 g/L	
		M/F	6mths to 9mths	0.40 - 1.60 g/L	
		M/F	9mths to 12mths	0.60 - 2.10 g/L	

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
		M/F 1yr to 2yrs 0.50 - 2.20 g/L M/F 2yrs to 3yrs 0.50 - 2.20 g/L M/F 3yrs to 6yrs 0.50 - 2.00 g/L M/F 6yrs to 9yrs 0.50 - 1.80 g/L M/F 9yrs to 12yrs 0.50 - 1.80 g/L M/F 12yrs to 15yrs 0.50 - 1.90 g/L M/F 15yrs to 45yrs 0.50 - 1.90 g/L M/F ≥45yrs 0.50 - 2.00 g/L	
Immunoprotein Profile - IP (Including Immunoglobulins and Protein Electrophoresis)	Clotted blood (Gel tube)		Please note, ONE sample required.
IgG subclasses (IgG 1,2,3) * **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Contact Belfast Trust Immunoproteins Dept for further information
Ionised Calcium Point of Care Test	Dry Heparinised Syringe Arterial blood	1.15 – 1.33 mmol/L	See StaffNet Point of Care area or click here for Instructions

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Insulin* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Iron	Heparin (Gel tube) Patients receiving iron supplementation should be monitored by FBC.	M/F 0 to <14yrs 5 - 25 µmol/L F 14yrs to <19yrs 6 - 30 µmol/L M 14yrs to <19yrs 8 - 31 µmol/L M/F 19yrs and over 10 – 30 µmol/L Reference values refer to fasting patients not on iron supplements.	Reference Interval Source: Paed (up to & inc. 18 yr.) - Caliper (Roche Cobas) Regionally agreed – Iron overload audit
Lactate (Antrim Site)	Sodium Fluoride (Grey) **Time sensitive assay, recommended that the sample reach the laboratory within 15 minutes of venepuncture.**	M/F 0 to <14yrs 0.6 – 2.5 mmol/L M/F 16 yrs and over 0.5 – 2.2 mmol/L	Reference Interval Source: Pathology Harmony

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Lamotrigine* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
LDH **Lactate Dehydrogenase**	Heparin (Gel tube) Unable to add on LDH requests to samples which have been refrigerated.	M/F 0 to <15 days 0 - 1128 U/L M/F 15 days to < 1yr 0 - 424 U/L M/F 1yr to <10 yr 0 - 305 U/L F 10 yr to <15 yr 0 - 260 U/L M 10 yr to <15 yr 0 - 270 U/L M/F 15 yr to <19yr 0 - 240 U/L F 19 yr and over 135 - 214 U/L M 19 yr and over 135 - 225 U/L	Reference Interval Source: Paed (up to & inc. 18 yr) - Caliper (Roche Cobas) Adult – Roche kit insert
LDL Cholesterol (Calculated) Part of Lipid profile	Heparin (Gel tube) Friedewald formula used for calculation	M/F <3 mmol/L Triglyceride result >4.5 mmol/L, invalidates the calculation, and an LDL result will not be issued.	Reference Interval Source: Regionally agreed (Biochemistry Forum)

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Lead* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Contact Antrim 334774 or Causeway 375180 for Blood Trace Metals Bottle
Lithium	Clotted blood (Gel tube) **Heparin tube not suitable**. Take sample 12 hours after previous dose	M/F ≤65yrs 0.4 – 1.0 mmol/L M/F >65yrs 0.4 – 0.8 mmol/L	Reference Interval Source: BNF and Pathology Harmony **Note: Heparin tubes contain lithium as part of the anticoagulant, therefore, cannot be used for this assay.**
Liver Associated Antibodies* **Referral Test**	See BHSCT Clinical Immunology User Manual for specimen requirement information.	See BHSCT Immunology Laboratory User Manual for reference values.	
Luteinising Hormone (LH)	Heparin (Gel tube)	M 1.7 - 8.6 IU/L F Follicular Phase 2.4 - 12.6 F Ovulation Phase 14.0 - 95.6 F Luteal Phase 1.0 - 11.4 F Post Menopause 7.7 - 58.5	Reference Interval Source: Roche kit insert kit insert 2020-11 v3.0 (5th-95th centile

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Magnesium (Blood)	Heparin (Gel tube)	M/F 0 to <15 days 0.82-1.62 mmol/L M/F 15 days to <1yr 0.81-1.27 mmol/L M/F 1 to <19yrs 0.86-1.17 mmol/L M/F 19yrs and over 0.70-1.00 mmol/L	Reference Interval Source: Paed (up to & inc. 18 yr.) - Caliper (Abbott) Adult Interval – Pathology Harmony
Magnesium (Urine)	**Urine** 24hr collection in acidified 24hr bottle, contact laboratory for container.	M/F 2.4 – 6.5 mmol/24h	Reference Interval Source: Pathology Harmony
Manganese* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Contact Antrim 334774 or Causeway 375180 for Blood Trace Metals Bottle
Mercury* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Contact Antrim 334774 or Causeway 375180 for Blood Trace Metals Bottle

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Metanephrine Normetanephrine (Catecholamines) **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	**Plasma**. Not routinely available. Part of Clonidine Stimulation Test Contact Antrim 334774 or Causeway 375180 for acidified container
Methaemoglobin	Dry Heparinised syringe This assay is available on POC Blood Gas Analysis analysers	0 – 2.0 %	See StaffNet Point of Care area or click here for Instructions
Methanol* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Available 24/7 by prior arrangement only. Contact laboratory.
Methotrexate* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Micronutrient Screen **Trace metals (Selenium, Copper, Zinc)*** **Vitamins A & E*** **Vitamin C*** **All above Referral Tests** **Vitamin B12, Folate, Iron** **Analysed in NHSCT**	Send separate form with each sample tube See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information. Heparin (Gel tube)	See individual analytes for reference ranges See BHSCT Clinical Biochemistry Laboratory User Manual for reference values. Refer to specific assay (Vitamin B12, Folate, and Iron) within this table for reference intervals.	Contact Antrim 334774 or Causeway 375180 for Blood Trace Metals Bottle
Nickel* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values	Contact Antrim 334774 or Causeway 375180 for Blood Trace Metals Bottle

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Non HDL Cholesterol (Calculated) Part of Lipid profile	Heparin (Gel tube)		See Lipid Profile
Nuclear Antibody Profile* (Anti-nuclear antibodies) **Referral Tests**	See BHSCT Clinical Immunology User Manual for specimen requirement information.	See BHSCT Immunology Laboratory User Manual for reference values.	
Oestradiol	Heparin (Gel tube)	M 41 - 159 pmol/L F Follicular Phase 114 - 332 pmol/L F Ovulation Phase 222 -1959 pmol/L F Luteal Phase 222 - 854 pmol/L F Post Menopause <505 pmol/L **Pregnancy** F 1st trimester: 563 - 11902 pmol/L F 2nd trimester: 5729 - 78,098 pmol/L F 3rd trimester: 31287 - >110,100 pmol/L	Reference Interval Source: Roche kit insert -2020-09 V5 (2.5th-97.5th centile for males and pregnant woman; 5th – 95Th percentile for healthy woman cycle phases)

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Osmolality (Blood)	Heparin (Gel tube)	M/F 275 – 295 mOsm/Kg	Reference Interval Source: Assay Manufacturer
Osmolality (Urine)	Random sample (Urine Monovette Yellow)	M/F No Ref Interval quoted. (mOsm/kg) Interpret result in line with patient fluid status	Reference Interval Source: N/A
Organic Acids* – investigation of inborn errors of metabolism only **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Paracetamol	Heparin (Gel tube)	M/F 4hr therapeutic level <10 mg/L Refer to TOXBASE for the most current advice on paracetamol overdose and poisoning	Reference Interval Source: BNF
Parathyroid Hormone (PTH)	4ml Blood into an EDTA tube.	M/F 17 – 74 pg/mL	Reference Interval Source: Roche kit insert 2024-05, V1.0

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Paraquat* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Available by arrangement only. Please contact BHSCT laboratory.
Phenobarbital* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Phenytoin* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Phosphate (Blood)	Heparin (Gel tube) **Time sensitive assay, result from samples > 12 hrs, on receipt into the laboratory, are invalid and removed from report. (Stability)**	M/F 0 to <15 days 1.71 - 3.15 mmol/L M/F 15 days to <1yr 1.47 - 2.54 mmol/L M/F 1yr to <5yrs 1.33 - 2.06 mmol/L M/F 5yrs to <13yrs 1.28 - 1.82 mmol/L F 13yrs to <16yrs 1.00 - 1.70 mmol/L M 13yrs to <16yrs 1.11 - 1.88 mmol/L M/F 16yrs to <19yrs 0.94 - 1.55 mmol/L M/F 19yrs and over 0.80 - 1.50 mmol/L	Reference Interval Source: Paed (up to & inc. 18 yr.) - Caliper (Roche Cobas) Adult - Pathology Harmony

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Phosphate (Urine)	**Urine** 24hr collection in acidified 24hr bottle, contact laboratory for container.	M/F 13 – 42 mmol/24h	Reference Interval Source: Roche kit insert
Porphobilinogen * To exclude acute Porphyria **Referral Test**	Fresh urine sample in a yellow Urine Monovette Contact laboratory before sending sample See Porphyria Investigations table from Cardiff centre		**Protect sample from light – place in an envelope or wrap in tin foil.** All samples will be sent to Cardiff to confirm diagnosis - http://www.cardiff-porphyria.org/
Porphyrins* **Referral Test**	**Urine** - Fresh urine sample in a yellow Urine Monovette **Blood** - EDTA sample		Please provide full clinical information to ensure relevant assays are carried out. http://www.cardiff-porphyria.org/

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS			COMMENTS
	Faeces - Universal stool sample Contact lab before sending sample and **protect all samples from light**.				
Potassium (Blood)	Heparin (Gel tube) **Time sensitive assay, result from samples > 12 hrs, on receipt into the laboratory, are invalid and removed from report. (Stability)**	M/F M/F M/F M/F M/F	0 to <1wk 1wk to <26wks 26wks to <2yrs 2yrs to <18yrs 18yrs and over	3.5 - 6.2 mmol/L 3.8 - 6.4 mmol/L 3.5 - 5.4 mmol/L 3.3 - 4.9 mmol/L 3.5 - 4.6 mmol/L	Reference Interval Source: AACB publication Adult Interval: J Lab Med 2010; 34(1):39-44
Potassium (Urine)	**Urine: Random** Random sample (Urine Mononvette Yellow)	M/F	No reference Interval. (mmol/) Random urine – Interpretation depends on associated clinical details		Reference Interval Source: N/A
	Urine: 24 Hour Collection 24 hr collection in plain container	M/F	25 – 125 mmol/24h		Reference Interval Source: Roche kit insert
Procalcitonin [PCT]	Heparin (Gel tube)	M/F	> 2.0 ng/mL- represents high risk of severe sepsis and/or septic shock.		Reference Interval Source: Roche kit Insert, 2024, V2.0
Progesterone	Heparin (Gel tube)	F	Progesterone Reference Range 16 – 25 nmol/L. Lower limit indicative of ovulation'.		Reference Interval Source: Female comment taken from NICE guidelines

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS			COMMENTS
Prolactin	Heparin (Gel tube)	M F	 Non-pregnant	86 – 324 mIU/L 102 – 496 mIU/L	Reference Interval Source: Roche kit insert 2020-12 V 10.0 (2.5th-97.5th centile)
Prolactin Monomeric Analysis undertaken if Prolactin result >700 mIU/L	Heparin (Gel tube)	M F	 Non-pregnant	63 - 245 mIU/L 75 - 381 mIU/L	Reference Interval Source: Clin Chem 56:3 p484 (2010) Monomeric prolactin is the biologically active fraction.
Prostate Specific Antigen (PSA)	Heparin (Gel tube)	M M M M M	<49yrs 49yrs to 59yrs 60yrs to 69yrs 70yrs to 79yrs 80yrs to 140yrs	<2.5 ng/mL <3.5 ng/mL <4.5 ng/mL <6.5 ng/mL <7.5 ng/mL	Reference Interval Source: PSA Intervals agreed in line with NI Cancer Network (NICaN) guidance
		NiCaN guidelines for Referral of Patients <40 years use Clinical judgement 40-49 years > 2.5 ng/mL 50-59 years >3.5 ng/mL 60-69 years >4.5 ng/mL 70-79 years >6.5 ng/mL >79 years use Clinical judgement.			**Reference Interval Source: Referral ranges as per NiCaN guidelines**

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Protein (Blood)	Heparin (Gel tube)	M/F 0 to <15 days 51 - 80 g/L M/F 15 days to <1yr 43 - 69 g/L M F 1yr to <6yrs 59 - 73 g/L M/F 6yrs to <9yrs 62 - 75 g/L M/F 9yrs to <19yrs 63 - 78 g/L M/F 19yrs and over 60 - 80 g/L	Reference Interval Source: Paed (up to & inc. 18 yr.) - Caliper (Roche Cobas) Adult - Pathology Harmony
Protein (Urine)	**Urine** 24 hr collection in plain container	M/F < 14.0 g/24h	Reference Interval Source: Roche kit insert 2022-02 v9
Protein Creatinine Ratio (Urine)	Random urine sample. Random sample (Urine Mononvette Yellow)	M/F <15 mg/mmol creatinine	Reference Interval Source: NICE Guideline
Renin (Direct)* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Aldosterone may be tested on same sample
Rheumatoid Factor (RF) Not available for Primary Care	Clotted blood (Gel tube) Or, Heparin (Gel tube)	M/F < 14 IU/mL All results below 14 IU/mL are reported as negative.	Reference Interval Source: Roche kit insert 2022-03 v9

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Salicylate	Heparin (Gel tube) >4h post dose.	No reference Interval (mg/L) Salicylate not normally detected. Therapeutic Intervals may vary. Refer to TOXBASE for the most current advice on salicylate overdose and poisoning	Reference Interval Source: N/A Prognosis cannot be determined from drug concentration alone. NB pH and blood gases
Selenium* **Referral Test***	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Contact Antrim 334774 or Causeway 375180 for Blood Trace Metals Bottle
Serum Free Light Chains * **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
SHBG (sex hormone binding globulin) *	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Referral Test			
Sodium (Blood)	Heparin (Gel tube)	M/F 135 – 146 mmol/L	Reference Interval Source: NICE definition of hyponatraemia.
Sodium (Urine)	**Urine: Random** Random sample (Urine Monovette Yellow)	M/F No reference Interval. (mmol/L) Random urine – Interpretation depends on associated clinical details	Reference Interval Source: N/A
	Urine: 24 Hour Collection 24 hr collection in plain container	M/F 40 – 220 mmol/24h	Reference Interval Source: Roche ISE Na electrode insert 2022-06 v8
Sweat Test	Parental consent is MANDATORY prior to booking an appointment for the test on a minor.	Sweat Chloride < 30 mmol/l. Age related result comment is added to each report.	Contact Antrim 334718 to arrange test.
Tacrolimus, FK m506* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Teicoplanin Please note. Analysis will only be carried out daily between 09:00 and 16:00.	Heparin (Gel tube) **Trough sample** **In normal renal function** – trough levels only required if patient is receiving >7 days of therapy. Take first level at day 7 and weekly thereafter. **Impaired renal function** – trough level prior to the dose on day 5. Re-assay every 5 days if renal function stable or more frequently if unstable	M/F Trough levels 20 – 50 mg/L	Reference Interval Source: Microbiology Consensus. **Refer to Staffnet for local Antibiotic Policies and Guidelines**
Testosterone* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Thallium* **Referral Test***	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Contact Antrim 334774 or Causeway 375180 for Blood Trace Metals Bottle

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Theophylline	Heparin (Gel tube) **Oral**: Check 5 days after starting and >3 days after dose adjustment. Sample time should be consistent: ideally trough levels or peak 4–6 hours post-dose. **Intravenous:** 4–6 hours after starting treatment.	M/F 10 -20 mg/L Refer to TOXBASE for the most current advice on theophylline overdose and poisoning	Reference Interval Source: Roche kit insert 2021-08 v6.0
Thiopurinemethyl transferase (TPMT)* **Referral Test** **Once only test. Check Labs computer or NIECR for previous entry before requesting.**	4ml blood in EDTA bottle		Department of Clinical Biochemistry City Hospital Dudley Road Birmingham B18 7QH Telephone: 0121 507 5345

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Thyroglobulin* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Thyroglobulin Antibodies* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Thyroid Antibody: Anti-Thyroid Peroxidase Antibody (TPO)	Heparin (Gel tube)	M/F 0 to 6 days <117 IU/mL M/F >6 days to <3mths <47 IU/mL M/F >3mths to <12mths <32 IU/mL M/F >1yr to <6yrs <13 IU/mL M/F >6yrs to <11yrs <18 IU/mL M/F 11yrs to <20yrs <26 IU/mL M/F >20yrs <34 IU/mL **Pregnancy** F 1st trimester <64 IU/mL F 2nd trimester <51 IU/mL F 3rd trimester <123 IU/mL	Reference Interval Source: Reference intervals for children and adults. Elecsys thyroid tests. Roche 2009. Roche kit insert 2020-11 v5.0(97.5th centile) Pregnancy related reference ranges are not quoted on reports. The user is directed to this Laboratory User Guide

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS			COMMENTS
Thyroid Stimulating Hormone (TSH)	Heparin (Gel tube)	M/F	0 to 6 days	0.70-15.20 mIU/L	Reference Interval Source: Reference intervals for children and adults. Elecsys thyroid tests. Roche 2009 Adult – Roche Kit Insert 2023-06 v6 Pregnancy related reference ranges are not quoted on reports. The user is directed to this Laboratory User Guide
		M/F	6 days to ≤3mths	0.72-11.00 mIU/L	
		M/F	>3mths to ≤12mths	0.73- 8.35 mIU/L	
		M/F	>1yr to ≤6yrs	0.70- 5.97 mIU/L	
		M/F	>6yrs to ≤11yrs	0.60- 4.84 mIU/L	
		M/F	>11yrs to ≤20yrs	0.51- 4.30 mIU/L	
		M/F	21yrs and over	0.27- 4.20 mIU/L	
			Pregnancy		
		F	1st Trimester	0.33 - 4.59 mIU/L	
		F	2nd Trimester	0.35 - 4.10 mIU/L	
		F	3rd Trimester	0.21 - 3.15 mIU/L	
Trace metals (Selenium, Copper, Zinc)* **Referral Test**	See BHSCT Belfast Trust Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.			Contact Antrim 334774 or Causeway 375180 for Blood Trace Metals Bottle
Transferrin	Heparin (Gel tube)	M/F	0 to <9wks	1.11 – 2.43 g/L	Reference Interval Source: Paed (up to & inc. 18 yr.) - Caliper (Roche Cobas) Adult – Roche kit insert
		M/F	9wks to <1yr	1.15 – 3.52 g/L	
		M/F	1yr to <19yrs	2.38 – 3.66 g/L	
		M/F	19yrs and over	2.00 – 3.60 g/L	

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS			COMMENTS
Transferrin Saturation (Calculation)	Heparin (Gel tube) Part if Iron Profile. Calculation, based on iron and transferrin concentration.	M/F M/F F M F M	0 to <1yr 1yr to <14yrs 14yrs to <16 yrs. 14yrs to <16yrs 16 yrs. and over 16 yrs. and over	4.1 – 59 % 6.5 – 39 % 5.2 – 44 % 9.6 – 58 % 16.0 – 40 % 16.0 – 50 %	Reference Interval Source: Paed (up to & inc. 18 yr.) - Caliper (Abbott Architect). BJH Good Practice Papers – Fletcher A, et al. 2022; 196: 523-529 BJH - Fitzsimons E et al. 2018; 181: 293-303
Triglyceride	Heparin (Gel tube) Clotted blood (Gel tube) Fasting (14 hrs) sample	M/F M/F M/F M/F M/F	0 to <15 days 15 days to <1yr 1yrs to <19yrs 19yrs and over 0 to <15 days	1.02-3.25 mmol/L 0.65-3.24 mmol/L 0.54-2.47 mmol/L 0.40-1.70 mmol/L 0.18-1.01 mmol/L	Reference Interval Source: Paed (up to & inc. 18 yr.) - Caliper (Roche Cobas) Adult – Regionally agreed (Biochemistry Forum)
Troponin-T High Sensitive (hsTnT)	Heparin (Gel tube)	F M	≤9 ng/L ≤17 ng/L		Reference Interval Source: Roche Kit Insert 2022-07 v3
Urea (Blood)	Heparin (Gel tube)	M/F M/F M/F	0 to <15 days 15 days to <1yr 1yr to < 10yrs	1.1- 7.9 mmol/L 1.3- 5.8 mmol/L 3.2- 7.6 mmol/L	Reference Interval Source: Paed (up to & inc. 18 yr.) - Caliper (Roche Cobas)

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
		F 10yrs to <19yrs 2.6- 6.5 mmol/L M 10yrs to <19yrs 2.6- 7.2 mmol/L M/F 19yrs and over 2.5- 7.8 mmol/L M/F	Adult Interval – Pathology Harmony
Urea (Urine)	**Urine: Random** Random sample (Urine Monovette Yellow)	M/F No reference Interval. (mmol/L) Random urine – Interpretation depends on associated clinical details	Reference Interval Source: N/A
	Urine: 24 hour collection 24 hr collection in plain container	M/F 428 – 714 mmol/24h	Reference Interval Source: Roche kit insert 2022-03 v11
Uric Acid (Blood)	Heparin (Gel tube)	F 143 - 339 µmol/L M 202 - 417 µmol/L	Reference Interval Source: Roche Kit Insert 2023-11 v13
Uric Acid (Urine)	**Urine** 24 hr collection, plain container	M/F 1.5 – 4.5 mmol/24h	Reference Interval Source: Pathology Harmony
Valproate (Epilim)* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Vancomycin	Heparin (Gel tube)	M/F Trough levels 10 - 20 mg/L Trough vancomycin concentrations >20mg/L may be associated with the onset of nephrotoxicity.	Reference Interval Source: Microbiology Consensus. **Refer to Staffnet for local Antibiotic Policies and Guidelines**
Vasculitis Screen*	See BHSCT Clinical Immunology User Manual for specimen requirement information.	See BHSCT Immunology Laboratory User Manual for reference values.	
Vitamin B12	Heparin (Gel tube) Patients on B12 supplementation should be monitored by FBC	M/F >350 ng/L • <180 = 'Confirmed B12 deficiency' • 180-350 = 'Indeterminate test result – possible B12 deficiency' • >350 = 'Suggests vitamin B12 deficiency unlikely'	Reference Interval Source: NICE guidelines (NG239)
Vitamin A* & E* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	

Samples referred to laboratory outside NHSCT - please send separate form and sample

TEST	SAMPLE / AMOUNT	REFERENCE INTERVALS	COMMENTS
Vitamin C* **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	
Vitamin D* (Total) **Referral Test**	See BHSCT Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	**Clinical justification for request MUST be provided.**
Zinc * **Referral Test**	See BHSCT Belfast Trust Clinical Biochemistry Laboratory User Manual for specimen requirement information.	See BHSCT Clinical Biochemistry Laboratory User Manual for reference values.	Contact Antrim 334774 or Causeway 375180 for Blood Trace Metals Bottle

Microbiology

MICROBIOLOGY

The laboratory offers consultant-lead scientific and clinical advice and interpretation on a comprehensive range of tests for the microbiological investigation of patients.

Our aim is to provide the highest quality of service with prompt delivery of accurate results. Where specific tests are not available locally, they will be referred to colleagues in other centres.
When a test is sent to a reference laboratory, every effort is made to use a PHE recognised laboratory, the details of which will be published with the result received.

The benefit to the patient from examination of specimens and associated reports is primarily dependent on the quality of the request form and of the specimen. In order to obtain best results from the laboratory please submit the most suitable specimen, correctly taken and in the appropriate container with the relevant information on the accompanying request form.

Microbiology Laboratory Hours

Microbiology offers a 24 hour service, 7 days a week, as detailed below:

During emergency service hours, urgent requests for Microbiology testing should be made by **telephoning** the BMS on duty as follows:-
Contact from NHSCT site 331242
Contact from outside Trust via switchboard ask for Microbiology BMS on call

Title	Name	Telephone Number
Consultant Microbiologist/Clinical Lead	Dr David Farren	334119
Consultant Microbiologist	Dr Peter Yew	334113
Consultant Microbiologist	Dr Eileen Dorgan	336240
Microbiology Head BMS	Mrs Karen Shields	334103
Deputy Head BMS	Mr Derek Smyth	334916
Administration SAA	Mrs Barbara Hutchinson	334834
Enquiries		334873
On call		1242 or 331242 from another site

Clinical Advice and Interpretation

Clinical advice or interpretation of results is available at all times, see contact details on page 12.
During emergency service hours, contact the Consultant Microbiologist via switchboard.

Sending Specimens from Patients with/suspected of being infected with a Hazard Group 3 Pathogen

Definition of Hazard Group 3 Pathogen

Biological agents have been categorised into four hazard groups by the Advisory Committee on Dangerous Pathogens. These are defined as:

Hazard Group 3	**A biological agent that can cause severe human disease and presents a serious hazard to employees; it may present a risk of spreading to the community, but there is usually effective prophylaxis or treatment available.**

Examples of Hazard Group 3 Pathogens

Bacteria :-	**Viruses** :-
• *Bacillus anthracis* • *Brucella* species • *Escherichia coli*, vero-cytotoxigenic strains(e.g.: 0157: H7 and others) • *Mycobacterium tuberculosis* • Mycobacteria other than tuberculosis (MOTT) • *Salmonella typhi* • *Salmonella paratyphi* • *Shigella dysenteriae* (Type 1)	• All viral hepatitis (except Hepatitis A) • HIV • Severe Acute Respiratory Syndrome (SARS) **Prion Proteins:-** • Transmissible spongiform encephalopathies (TSE) - e.g: the agents of Creutzfeldt-Jacob disease (CJD): variant Creutzfeldt-Jacob disease (vCJD) • Fatal familial insomnia • Gerstman-Straussler-Scheinker syndrome • Kuru

For suspected or known Hazard Group 3 pathogens, hazard warning Hazard Group 3 pathogen labels should be affixed both to the container and the accompanying request form. These labels may be obtained from Antrim Laboratory Stores Department.

Collection of Blood Specimens

Adhere to the following precautions: -

- Complete the laboratory request form and enter details onto the specimen bottle **prior to obtaining specimen.** Care must be taken to protect patient confidentiality.
- Wash hands and dry thoroughly prior to donning gloves.
- Wear appropriate PPE as per Trust policy.
- Special care must be taken to avoid contamination of either the outside of the specimen bottle or laboratory request form.
- Any accidental blood spillage should be decontaminated immediately using the current TRUST approved disinfectant.
- Attach a 'Hazard Warning Hazard Group 3 Pathogen' sticker to the specimen bottle and laboratory request form.
- Put the bottle into the plastic pouch and seal. Do not use pins, staples or metal clips to seal the bag.
- Keep the request form separate from the specimen bottle.

Collection of specimens other than blood

- Wear appropriate PPE as per Trust policy.
- After collection, close container securely and attach a 'Hazard Warning Hazard Group 3 Pathogen' sticker to the container.
- Special care should be taken to avoid contamination of the outside of the specimen container.
- Seal the specimen container in a plastic bag; do not use pins, staples or metal clips.
- Keep the request form separate from the specimen container.
- Label the laboratory request form with a 'Hazard Warning Hazard Group 3 Pathogen' sticker.

Send all Hazard Group 3 specimens in a separate sealed Laboratory Specimen Transport Bag.
To avoid accidental blood spillage transport to the laboratory in a leak-proof pathology transport box.
Do NOT send specimens from patients '**known**' or '**suspected**' to have Hazard Group 3 pathogens via the pneumatic carrier system (air tube system)

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

Specimen Collection Guidelines and Factors that May Affect the Quality of Results

It is essential to follow the guidelines for proper specimen collection as this can significantly affect the performance of the examination or the interpretation of results.

Guidance on sample collection can be found on the following website:
http://labtestsonline.org.uk/

- Collect an adequate amount of specimen. Inadequate amounts of specimen may yield false-negative results.
- Appropriate and adequate samples should be collected **prior** to commencement of antimicrobial therapy.
- Pus / body fluid is superior to a swab
- Before sampling a dry infected area, moisten swab with sterile water / saline.
- Avoid contamination of the sample by employing aseptic technique and using sterile containers to collect specimens thus preventing the introduction of microorganisms during invasive procedures.
- Inflamed areas should be sampled under direct vision e.g. high vaginal swab (speculum), throat swab (spatula).
- Clinical information is vital to appropriate processing of samples.
- When there is clear evidence of infection, full details should be provided and repeat sampling considered.

A delay in transport to the laboratory may affect sample quality and compromise the results produced. It is essential that the specimens reach the laboratory as soon as possible to allow processing before the sample quality deteriorates.

Transport all samples to the laboratory as soon as possible, Store @ 4 ^{O}C if transport delayed

Laboratory Reports

All laboratory results should be interpreted in conjunction with the clinical state of the patient. If inappropriate results are received, please contact the laboratory and/or repeat the specimen.

Microbiology results are available electronically immediately after the result is authorised.

Please Note:
Electronic recall systems must be used to minimise the possibility of error in communication.

Add On Request

If requesting a further test, this should be requested within 48hrs of receiving the original report and will be dependent on specimen retention, quality and volume requirement issues.

Antimicrobial susceptibility testing

If the patient is on a specific antibiotic, or you are considering an antibiotic which is not listed on the Microbiology report, please contact the laboratory for further information.
To allow for increasing levels of antibiotic resistance to standard dosing regimens and in recognition that, for some organisms, low level resistance can be overcome by increasing the dosage of some antibiotics. Antimicrobial susceptibility testing will now be reported as follows:

‘’S” – Susceptible with standard dosing regimen: high likelihood of therapeutic success using a standard dosing regimen.

“I” – Susceptible with increased exposure: high likelihood of therapeutic success using a higher than standard dosing regimen *(see below Table).*

“R” – Resistant: high likelihood of therapeutic failure.

Please note:
You may see an increased number of susceptible results being reported in the **“I” – susceptible with increased exposure** category.
In fact for some organisms (eg. most *Pseudomonas* species) the majority of susceptible results will be reported in the **“I” – susceptible with increased exposure** category.

Antibiotics reported as “I” should be considered viable treatment options.

Guideline on high dose regimens to be used for infections caused by organisms reported as 'I' = Susceptible, increased exposure

Antimicrobial	High dose regimen
Amoxicillin IV	2g 4 hourly
Amoxicillin PO	1g 8 hourly
Co-Amoxiclav IV	1.2g 8 hourly
Co-Amoxiclav PO	625mg 8 hourly
Aztreonam IV	2g 6 hourly
Benzylpenicillin IV	1.2g 4 hourly (if meningitis discuss with microbiologist)
Ceftazidime IV	2g 8 hourly
Ceftriaxone IV	2g 12 hourly
Cefuroxime IV	1.5g 8 hourly
Cefuroxime PO	500mg 12 hourly
Ciprofloxacin IV	400mg 8 hourly
Ciprofloxacin PO	750mg 12 hourly
Clindamycin IV	1.2g 8 hourly
Clindamycin PO	450mg 6 hourly
Doxycycline PO	100mg 12 hourly
Erythromycin PO	1g 6 hourly
Levofloxacin IV	500mg 12 hourly
Levofloxacin PO	500mg 12 hourly
Piperacillin-tazobactam IV	4.5g 6 hourly or by extended infusion
Trimethoprim-sulfamethoxazole	1.44g 12 hourly (if pneumocystis infection discuss with microbiologist)

Frequency of Requesting Microbiology Examinations

The Royal College of Pathologists have published advice on the minimum retesting intervals in pathology: National minimum retesting intervals in pathology

For further advice on the use of the services provided, see repertoire table below or contact the laboratory.

Microbiology Test Repertoire

If the test or specimen type that you require is not listed, please contact the laboratory to discuss clinical requirements.

Bacteriology

Test	Specimen Requirements	Container / Volume	Comments	Turnaround Time
ASOT	Min 2mL blood Filled bottle	Clotted blood bottle Paediatric blood bottle	Haemolytic, lipaemic and turbid sera are unsuitable for testing.	1 day
Blood Culture	Adult – set of blood cultures 10mL in each bottle	FA PLUS (aerobic) – green top FN PLUS (anaerobic) – orange top	**For Adult Blood Cultures see Trust Policy: NHSCT/21/1529** • **Do not remove the detachable Barcodes from the bottle(s)- for lab Use only** • Do not cover the barcode with the Patient identifier	Positive Gram stain results are telephoned the same day to the ward. An interim report of "**Under Test. Lab to Update**" will be issued immediately.

Test	Specimen Requirements	Container / Volume	Comments	Turnaround Time
	Paediatric – single bottle 4mL blood	FP PLUS – yellow top	• Do not stick patient labels on the bottom of the bottle **Results of possible pathogens will be telephoned as a priority.** **If patients have received previous antimicrobial treatment, clinically indicated bacteraemia should be considered even if blood culture results are negative.**	Negative results will be reported in 5 days or 14 days in special circumstances e.g. cases of infective endocarditis.
Bone Marrow	As large a sample as possible	FA PLUS (aerobic) – green top FN PLUS (anaerobic) – orange top	Use aseptic technique for collection and inoculation of bottles	5 days
CSF Culture	Min 1mL collected using aseptic technique	Sterile universal container	***Inform Laboratory by phone when sending*** **Transport to lab immediately. Do NOT send samples via the airtube system** Please mark container clearly to indicate CSF sample.	2 days

Test	Specimen Requirements	Container / Volume	Comments	Turnaround Time
Expressed Breast Milk	Min 1mL expressed milk	Sterile universal container	Culture and sensitivity testing should only be considered in the following circumstances: • No response to antibiotic treatment • Recurrent mastitis • Hospital acquired infection • Severe and unusual cases	7 days
Fluid - Ascites Suspected Spontaneous Bacterial Peritonitis (SBP)	Min 1 mL fluid And / or 10mL pre-incoculated blood cultures	Sterile universal container EDTA blood tube – purple top FA PLUS (aerobic) – green top FN PLUS (anaerobic) – orange top	***Inform Laboratory by phone*** Transport to lab soon as possible **Do NOT send samples via the airtube system.** EDTA prevents clotting and allows valid cell count.	7 days
Fluid – Continuous ambulatory peritoneal dialysis (CAPD)	10 – 50mL CAPD and / or 10mL into each bottle	Sterile universal container FA PLUS (aerobic) – green top FN PLUS (anaerobic) – orange top	**CAPD fluids >25ml must not be forwarded to Laboratory via air-tube system as 150ml containers are not suitably robust.**	7 days

Test	Specimen Requirements	Container / Volume	Comments	Turnaround Time
Fluid – Sterile Aspirate Joint. Pleural, Pericardial	Min 1mL Fluid	Sterile universal container EDTA blood tube *(prevents clotting and allows valid cell count)*	**Inform Laboratory by phone If sample from Prosthetic Joint** .	7 days
Fluid – Non-sterile Incl. - Abscess, Antral washout, Bile, Drain fluid, Pus	Min 1mL fluid	Sterile universal container	Any volume of aspirate is preferable to a swab. Recovery of anaerobes is compromised if the transport time exceeds 3hr.	7 days
Intravascular Line Tip Incl. - CVP, Hickman line, cannula	4cm length of tip Swab	Sterile universal container Blue cap	• Peripheral lines are not suitable specimens for cultures and should not normally be sent to the laboratory for testing. • Intravascular line tips should only be sent if line related sepsis is suspected and should be accompanied by peripheral blood cultures • Urinary catheter tip is not an appropriate sample and will be rejected.	7 days
Inter Uterine Contraceptive Device	IUCD	Sterile container	It is essential to state relevant clinical details	6 days

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

Test	Specimen Requirements	Container / Volume	Comments	Turnaround Time
Respiratory Culture Bronchoalveolar lavage, Bronchial washings Bronchial brushing	As large a sample as possible A few drops of sterile saline may be added	Sterile universal container	**IMPORTANT**: **A separate specimen encompass order MUST be sent for each of the following if required:** • Routine bacterial culture • Fungal studies • Mycobacterial investigations **Referral of specimens may be required.**	7 days
Respiratory Culture Sputum Endotracheal tube specimens	Min 1mL volume	Sterile universal container	• If patients are Immunocompromised, have bronchiectasis or are in ICU it must be clearly stated on the request from. • If clinical details states immunocompromised, bronchiectasis or ICU fungal cultures will be performed. • For all other circumstances fungal culture will be on request only. For patients with a history of foreign travel, where unusual mould infections are suspected, must have detailed information clearly stated on the request from. **If 3 consecitive samples is required, 3 separate requests should be generated.**	3 days

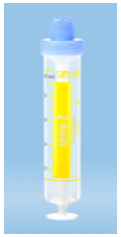
Test	Specimen Requirements	Container / Volume	Comments	Turnaround Time
Screening swab - MRSA	Swabs	Blue cap swab	• See Trust Policy **NHSCT/21/14528** • Inpatient MRSA screens are processed 24/7. • Community MRSA screens will only be processed if they are pre / post-decolonisation or pre-surgery and it is clearly stated on the request form.	3 days
	Urine	Sterile universal container or 10mL Starstedt monovette		
Screening swabs – Carriage of Group B Streptococci Maternal	Maternal low vaginal swab AND Anorectal Swab Combined maternal vaginal / rectal swab	Blue cap swab	• If ONLY a maternal low vaginal swab is received or ONLY an anorectal swab is received, the specimen will be rejected as "UNPROCESSED". • Maternal high vaginal swabs should not be collected as these have a lower sensitivity. • **It is essential to include "Group B Strep in previous pregnancy" in clinical details.**	3 days
Screening swabs – Neonatal Screen	Various sites	Blue cap swab		3 days
Seminal Fluid – Culture	Min 1mL fluid	Wide neck sterile universal container		3 days
Swab - Ear		Blue cap swab.		3 days
Swab – Eye Conjunctiva		Blue cap swabs.	Avoid contamination by skin flora or eyelid.	3 days

Test	Specimen Requirements	Container / Volume	Comments	Turnaround Time
Swab – Genital Tract Culture	Swab	Blue cap swab Black cap Charcoal swab		3 days
Swab – Genital Tract Bacterial vaginosis (Female only)	Pencil labelled air dried smear	Frosted slide sent in plastic container	Slide must be labelled with pencil. Do not apply an adhesive label to slide.	3 days
Swab - Genital Tract Trichomonas vaginalis	High vaginal swab Urethral swab	Trichomonas media	Do not refrigerate. Allow trichomonas media to reach room temperature before inoculation. Wipe away excessive amounts of discharge. Swab posterior vaginal fornices with sterile swab. Consider in chronic urethritis or sexual contact of infected female. Use separate request form. Test of cure only for those whose symptoms persist after treatment.	3 days
Swab – Mouth	Swab	Blue cap swab		3 days
Swab – Nasal	Swab	Blue cap swab		3 days
Swab – Perianal Enterobius vermicularis (Threadworm)	Mositened cotton-tipped swab	Sterile universial container	Samples are best obtained in the morning before bathing or defecation. Spread buttocks apart, and rub the moistened swab over the area around but anus, but do not insert into the anus. Place the swab in a sterile container.	3 days

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

Test	Specimen Requirements	Container / Volume	Comments	Turnaround Time
Swab – N gonorrhoeae screen (GUM) Endocervical, Urethra, Rectum, Throat	Pencil labelled air dried smear Swab	Frosted slide in plastic container Black Cap Charcoal swab	Direct microscopy only of value in male urethral specimens. Slide must be labelled with pencil. Do not apply an adhesive label to slide. HVS swab unsuitable for N gonorrhoeae culture. Insert swab 2.5cm into urethral lumen. Rotate swab and leave in place for at least 2 seconds.	3 days
Swab - Throat	Swab	Blue cap swab	• Sample posterior pharynx, tonsils and inflamed areas. • If Vincent's angina is suspected request microscopy. • If Diphtheria is suspected inform the laboratory.	3 days
Swab – Skin and Wounds Incl. - Abscess, Bites, Burns, Skin, Wounds	Site of wound must be stated	Blue cap swab	Before sampling, remove debris with sterile saline or water.	3 days
Tissue	Sterile water should be added to small samples to prevent them drying out.	Sterile container	Specimens received in formol-saline are not suitable for culture.	7 days

Test	Specimen Requirements	Container / Volume	Comments	Turnaround Time
Tissue - Bone	Multiple (4-5) intra-operative samples Min size depends on the number of investigations requested	Sterile container		7 days
Urine - Culture MSSU	10mL Urine	Sarstedt Monovette Tube (Boric acid) 	**It is essential to fill Boric acid containers to the correct level to avoid sample rejection.** 10ml Blue capped monovette tube should only be used for small volumes. **Samples received in 3.2ml yellow Sarstedt Monovette bottles will be rejected.** Female -Thoroughly clean urethral area with soap and water. Rinse area with wet gauze. While holding labia apart, begin voiding. Collect midstream portion without stopping flow of urine. Male - Clean glans with soap and water. Rinse area with wet gauze. While holding foreskin retracted,	2 days

Test	Specimen Requirements	Container / Volume	Comments	Turnaround Time
		Sarstedt Monovette Tube (Plain) 	begin voiding. Collect midstream portion without stopping flow of urine. Do not cleanse with antiseptic as bacteria may be inhibited. **For urine samples please document clinical symptoms and signs of UTI on request form to enable appropriate testing.**	
Urine - Culture CSU	See MSSU	See MSSU	Do not collect from drainage bag. Clamp the drainage tubing below the sampling port and aspirate sample with sterile needle and syringe. Unclamp. **Transient "in & out" catheterisation:-** must be clearly indicated on request form to ensure appropriate processing & reporting.	2 days
Urine - Culture Supra Pubic Aspiration (SPA)	See MSSU	See MSSU		2 days
Urine - Culture Neuropathic Bladder	See MSSU	See MSSU	Should only be attempted if there is a clinical indication for antimicrobial therapy. A catheter should be passed per urethra or stoma.	2 days

Test	Specimen Requirements	Container / Volume	Comments	Turnaround Time
Urine - Culture Ileal conduit or Urostomy	See MSSU	See MSSU	Obtained via catheter passed aseptically into the stomal opening after removal of the external appliance. Results may be difficult to interpret.	2 days
Urine - Culture Adhesive bag specimens from infants (Clean Catch Specimen)	See MSSU	See MSSU	Wash genitalia with tap water and mild detergent 3 times then dry. Do not cleanse with antiseptic Place a sterile bag over the genitalia and remove once urine is spontaneously voided. If infant fails to void within 45 minutes, remove bag, 're-prep' and apply new sterile bag. Entire sample is collected and an aliquot sent for testing	2 days
Urine - Culture Pad collection of Urine	See MSSU	See MSSU	**Note:- clean catch has been shown to be more accurate than nappy pad samples in young children** Wash the nappy area thoroughly Place pad in nappy. Avoid faecal soiling. Push the tip of syringe into pad & withdraw urine. Transfer sample to container. Alternatively insert wet fibres into syringe barrel & squeeze directly into container using syringe plunger.	2 days

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

Test	Specimen Requirements	Container / Volume	Comments	Turnaround Time
Urine –Antigen Test *Legionella pneumophilia* *Streptococcus pneumoniae*	10mL urine	Sterile universal container Sarstedt Monovette conatiner	Note: Legionella testing Only samples with the following clinical details will be tested: • From ICU patients • CURB score-65 score of 2-5 or Severe CAP • Part of a Legionella outbreak • Special risk factor, e.g. travel abroad. • Exposure to water- systems **Requests without relevant details will be sent out as Not Tested and stored for 7 days.**	2 days

Type the test name / keyword into the text search box in the toolbar
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Mycobacteria

Test	Specimen Requirements	Container / Volume	Comments	Turnaround Time
Mycobacteria - culture CSF	Min 6mL fluid	Sterile conatiner	Currently, culture remains the gold standard for laboratory diagnosis of mycobacterial disease.	Microscopy - 24hrs
Fluid – non-sterile / sterile Gastric contents Respiratory samples			Early a.m. sputum after deep cough with or without physiotherapy on 3 consecutive days. Alternatively, early morning gastric washings or laryngeal swabs.	Culture reported in 8 weeks Results of possible pathogens will be telephoned as a priority
Swabs	2 swabs	Blue cap swab		
Urine	150mL First voided specimen in the morning	150mL large sterile container	First voided specimen of urine in the morning, on 3 consecutive days. Direct microscopy is not performed on urine samples.	Culture reported in 8 weeks Results of possible pathogens will be telephoned as a priority
Mycobacteria - PCR	As for culture	As for culture	**On Microbiology Consultant Request only** Samples are sent to Northern Ireland Mycobacterial Reference Laboratory for processing. Only those samples in which mycobacteria are visualized on direct microscopy are forwarded for PCR testing. Sputum: The primary purpose of the PCR test for Mycobacteria in sputum is to ***rapidly confirm*** the presence of ***Mycobacterium tuberculosis*** complex	

Test	Specimen Requirements	Container / Volume	Comments	Turnaround Time
			which has already been seen as acid and alcohol fast bacilli (AAFB) on direct microscopy. A negative result, however, does not exclude the presence of ***Mycobacterium tuberculosis*** complex. Sputum samples contaminated with blood will not be processed. CSF: **In practice, successful diagnosis is highly compromised by inadequate material.** 2ml CSF is recommended and multiple specimens preferable. A minimum of 0.5 ml CSF is required for any PCR testing. **N.B.** Blood stained samples will not be tested	
Mycobacteria - Blood cultures, Bone marrow	Max 5mL sample	Bactec MycoF/Lytic Culture vials	Bottles are sent to Northern Ireland Mycobacterial Reference Laboratory for processing. Clinicians sending sterile site samples (e.g. blood, bone marrow) for mycobacterial culture should include the following details on the request form where relevant: • History of cardiac surgery OR	

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

Test	Specimen Requirements	Container / Volume	Comments	Turnaround Time
			• Under investigation for possible disseminated Mycobacterium chimaera infection A separate slide of bone marrow should also be sent if an auramine slide is required. MycoF/Lytic bottles are available on request from Microbiology.	

Molecular

Be aware that with all molecular testing results, **a negative/not detected result does not rule out infection**

Test	Specimen Requirements	Container / Volume	Comments	Turnaround Time
Chlamydia trachomatis **Neisseria gonorrhoeae** **Trichomonas vaginalis** **Mycoplasma genitalium** **PCR** Urine	Fill Urine between the 2 black lines at the top of the tube	cobas® PCR Urine tube	See CT/NG section at end of table for sample collection information. * NB: First catch urine samples from women may be less sensitive than endocervical swabs for detection of *C. trachomatis and N. gonorrhoeae*. Excess **contamination with faeces, blood and mucus** on CT/NG swabs may interfere with the reaction and will not be tested by the laboratory. Symptoms strongly suggestive of gonorrhoea :- Please also send a charcoal swab in transport medium for culture (endocervical, urethral, rectal or pharyngeal as appropriate) Please note Conjunctival swabs, Unspecified swabs are not validated by the manufacturer and are outside the laboratory UKAS Accreditation Scope. PCR testing for Mycoplasma genitalium and Trichomonas vaginalis is currently restricted to Genitourinary medical patient sources only Positive CT rectal samples will be forwarded for Lymphogranuloma venereum (LGV) testing. Additional LGV testing will be performed on request only.	3 days
Swabs Conjunctival, Rectal, Throat, Others	One swab broken at score line in PCR media	cobas® PCR swab tube		

Test	Specimen Requirements	Container / Volume	Comments	Turnaround Time
Enteric Pathogens Faeces	Min 1mL – Max 15mL	Blue top universal container with plastic spoon	• Samples are screened for Salmonella, Shigella, Campylobacter, Verotoxigenic E.coli, Cryptosporidium and Giardia. • Include relevant clinical history e.g. travel • Cryptosporidium and Giardia positive samples are reported on the basis of PCR screen only. • Bacterial positive screen samples are further investigated by culture methods. • Mucoid / formed samples are unsuitable for PCR testing. • Samples for parasites other than Cryptosporidium & Giardia will only be tested on request AND in the presence of appropriate clinical history.	1 days
Laboratory investigation of *Clostridioides difficile* infection (CDI) Faeces	Min 1mL – Max 15mL Diarrhoeal samples which flow to assume the shape of the container	Blue top universal container with plastic spoon	• All samples meeting the testing criteria will initially be screened by PCR for C difficile toxin gene. • Positive screen samples will be further tested for toxin production. • All patients >65years old who fulfil the criteria will routinely be tested. • Patients 2-65 years old will only be tested on request. • Testing for patients <2 years old is only on Consultant Microbiologist/Consultant Paediatrician request. • CDI testing is limited to one negative test per patient in any seven day period. • Positive toxin patient samples will not be repeated within 28 days. • Mucoid / formed samples are unsuitable for PCR testing.	16 hours

Test	Specimen Requirements	Container / Volume	Comments	Turnaround Time
MRSA – PCR Nasal swab ONLY	Swab	Red cap Copan Dual Swab	ICU patients are screened routinely. All other wards by Consultant request only.	1 day
Respiratory Virus Screen SARS-CoV-2, Flu A, Flu B Respiratory syncytical virus (RSV)	Single Nose, Throat, Combined nose/throat swab	cobas® PCR media	Testing is for inpatient samples only. Samples from Primary care should be forwarded to the Regional Virology lab for testing. This test is outside the laboratory UKAS Accreditation Scope	1 day
Sputum, Bronchoalveolar lavage	Min 5mL specimen	Sterile container	Samples are forwarded to the Regional Virology Laboratory for testing.	2 days

Type the test name / keyword into the text search box in the toolbar
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All NAATs (Nucleic Acid Amplification Tests) can be affected by interfering substances present on the specimens. Below is a list of **some** of the substances known to interfere with the PCR reaction:-

- **Mucus may give false negative** results
- **Urine** specimens stabilised in the cobas PCR media containing **>0.35% (v/v) Blood** and **Swab** specimens stabilised in the cobas PCR media containing **>5% (v/v) Blood may give false negative results.**
- **Urine** specimens stabilised in cobas PCR media containing **>1x10^6 PBMC** (peripheral blood mononuclear) **cells/ml** and swab specimens containing **> 1x10^5 PBMC cells**/ml **may give false negative results**
- Urine specimens taken from patients who have used the over-the-counter product **Replens®** (**vaginal moisturiser**) **may give false negative or invalid results**.
- **Nasal secretions** may interfere with the PCR reaction.
- **Decongestant** and substances occasionally used to relieve nasal dryness
- **Carbomer(s)** containing products have been shown to generate fasle negative and invalid results in urogenital specimens – see table below for examples:

Examples of Carbomer Containing Products

Clindamycin Phosphate Vaginal cream	Monistat 3 Vaginal Antifungal Combination Pack	Summer's Eve Feminine Deodorant Spray
CVS Tioconazole 1 (Equate tioconazole 1)	Monistat Complete Care Itch Relief Cream	VCF – Vaginal Contraceptive Foam
Equate Vagicaine Anti-Itch Cream	Norforms Suppositories	Yeast Gard Advanced
Estrace	Premarin	Azo Standard (urine only)
K-Y Ultra Gel (Replaces K-Y Silk E)	Replens Long-Lasting Vaginal Moisturizer	RepHresh Odor Eliminating Vaginal Gel
Metronidazole Vaginal Gel		

Type the test name / keyword into the text search box in the toolbar
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Chlamydia trachomatis & Neisseria gonorrhoeae Sample Collection Information

Specimen Collection:

The NAATs platform will detect both *Neisseria gonorrhoeae & Chlamydia trachomatis*. Dual NAATs can be used with a range of genital samples taken invasively and non-invasively. **Please note :- No test is 100% sensitive or specific**.

NB: Treat all samples as infectious

Recommended Specimens:

Patient Group	Specimen Type
Men	**First catch urine** in NAATs Cobas PCR Urine Sample Collection Kit is the specimen of choice. (**Urine:** MRT 230: Cobas® PCR Urine Sample Kit)
***Women not undergoing speculum examination**	First catch *urine in NAATs Cobas PCR Urine Sample Collection Kit **(Urine:** MRT 230: Cobas® PCR Urine Sample Kit)
Women undergoing speculum examination	Endocervical or vaginal swabs (in NAATs Cobas PCR Female Swab Collection Kit) is the specimen of choice. Cervical swabs – **NOT VALIDATED** (**Swab:** MRT 220: Cobas® PCR Female Swab Sample Kit)
Extra-genital Sites except Throat and Rectal swabs	Swabs may be collected for extra genital sites (as detailed below) and will be tested and reported accordingly by the laboratory. These sites are not validated by the manufacturer and are outside the laboratory UKAS Accreditation Scope.

* NB: First catch urine samples from women may be less sensitive than endocervical swabs for detection of *C. trachomatis and N. gonorrhoeae*.

ENDOCERVICAL SWAB SPECIMEN COLLECTION

WARNING: DO NOT PRE-WET SWAB IN cobas® PCR MEDIA BEFORE COLLECTION!

1. **CLEAN:** Using the woven swab, remove excess mucus from the cervical os and surrounding mucosa. **Discard the swab after cleaning**. **NOTE:** Cleaning excess mucus from the cervical os is required to ensure an adequate sample is obtained for processing.
2. **COLLECT:** To collect the specimen, hold flocked swab with the scoreline above your hand and insert into the endocervical canal. Gently rotate the swab 5 times in one direction in the endocervical canal. Do not over-rotate. Carefully withdraw the swab, avoiding any contact with the vaginal mucosa.
3. **ALIGN:** Remove the cap from the **cobas**® PCR Media Tube and lower the swab specimen into the tube until the visible scoreline on the swab shaft is aligned with the tube rim. The bud of the swab should not be submerged into the liquid prior to breaking the shaft.
4. **BREAK:** Carefully leverage the swab against the tube rim to **break the swab shaft at the scoreline.**
5. **CLOSE: Tightly** re-cap the **cobas®** PCR Media Tube. The specimen is now ready for transport. Discard the top portion of the swab.

VAGINAL SWAB SPECIMEN- CLINICIAN COLLECTION

WARNING: DO NOT PRE-WET SWAB IN cobas® PCR MEDIA BEFORE COLLECTION!

1. **COLLECT :** In one hand, hold the woven swab with the scoreline above your hand and insert the swab about 5 cm (2 inches) into the vaginal opening. Gently turn the swab for about 30 seconds while rubbing the swab against the walls of the vagina. Withdraw the swab carefully. Do not let the swab touch any surface before placing it into the collection tube.
2. **ALIGN:** Remove the cap from the **cobas®** PCR Media Tube and lower the swab specimen into the tube until the visible scoreline on the swab is aligned with the tube rim. The bud of the swab should not be submerged into the liquid prior to breaking the shaft.
3. **BREAK:** Carefully leverage the swab against the tube rim to **break the swab shaft at the scoreline.**
4. **CLOSE: Tightly** re-cap the **cobas®** PCR Media Tube. The specimen is now ready for transport. Discard the top portion of the swab.

VAGINAL SWAB SPECIMEN- SELF-COLLECTION IN A CLINICAL SETTING

WARNING: DO NOT PRE-WET SWAB IN cobas® PCR MEDIA BEFORE COLLECTION!

1. **POSITION:** In one hand, hold the woven swab with the scoreline above your hand and with the other hand separate the folds of skin around the vaginal opening (labia).
2. **COLLECT:** Insert the swab about 5 cm (2 inches) into the vaginal opening. Gently turn the swab for about 30 seconds while rubbing the swab against the wall of the vagina. Remove the swab carefully. Do NOT touch the swab to any surface before placing into the collection tube.
3. **OPEN TUBE:** While holding the swab in the same hand, remove the cap from the tube.
4. **ALIGN:** Lower the swab into the tube until the visible scoreline on the shaft is lined up with the tube rim. The bud of the swab should not be submerged into the liquid prior to breaking the shaft.
5. **BREAK:** Carefully lean the swab against the tube rim to **break the swab shaft at the scoreline**.
6. **CLOSE: Tightly** close the **cobas®** PCR Media Tube. Return the sample to the healthcare provider as instructed. Discard the top portion of the swab.

URINE SPECIMEN COLLECTION

1. **COLLECT**: Prior to sampling, the patient should not have urinated for at least one hour. Given that collection of larger volumes of urine may reduce test sensitivity, please direct patient to provide first-catch urine (approximately 10 to 50 mL of the initial urine stream) into a urine collection cup (not provided). ***NOTE: For best results, female patients should not cleanse the labial area prior to collection.***
2. **PIPETTE**: Immediately transfer the urine into the cobas PCR media tube using the provided disposable pipette. **NOTE:** If the urine specimen cannot be transferred immediately it can be stored at 2-30^{o}C for up to 24 hours.
3. **TRANSFER:** The correct volume of urine has been added when the fluid level is between the two black lines on the tube label.
4. **CAP**: Tightly recap the cobas PCR media cap.
5. **MIX**: Invert the tube 5 times to mix. The specimen is now ready for transport.

RECTAL SWAB SPECIMEN COLLECTION

WARNING: DO NOT PRE-WET SWAB IN cobas® PCR MEDIA BEFORE COLLECTION!

1. **COLLECT : Collect using the woven swab only.** To collect the specimen, hold the woven swab with the scoreline above your hand and insert the swab about 3 to 5 cm into the anal canal. Gently turn the swab for about 5-10 seconds while running the swab against the walls of the rectum. If the swab is grossly contaminated with faeces, discard and repeat the collection. Withdraw the swab carefully. Do not let the swab touch any surface before placing it into the collection tube.
2. **ALIGN**: Remove the cap from the cobas® PCR Media Tube and lower the swab specimen into the tube until the visible scoreline on the swab is aligned with the tube rim. The tip of the swab should not be submerged into the liquid prior to breaking the shaft.
3. **BREAK:** Carefully leverage the swab against the tube rim to **break the swab shaft at the scoreline.**
4. **CLOSE**: Tightly re-cap the cobas® PCR Media Tube. The specimen is now ready for transport. Discard the top portion of the swab.

THROAT SWAB SPECIMEN COLLECTION

WARNING: DO NOT PRE-WET SWAB IN cobas® PCR MEDIA BEFORE COLLECTION!

1. **COLLECT**: To collect the specimen, hold the swab with the scoreline above your hand and insert the swab into the mouth and collect the specimen from the bilaterial posterior pharynx, both tonsils and the uvula. Withdraw the swab carefully. Do not let the swab touch any surface before placing it into the collection tube.
2. **ALIGN**: Remove the cap from the cobas® PCR Media Tube and lower the swab specimen into the tube until the visible scoreline on the swab is aligned with the tube rim. The tip of the swab should not be submerged into the liquid prior to breaking the shaft.
3. **BREAK**: Carefully leverage the swab against the tube rim to **break the swab shaft at the scoreline.**
4. **CLOSE**: Tightly re-cap the cobas® PCR Media Tube. The specimen is now ready for transport. Discard the top portion of the swab.

Note:

- **Only one swab per specimen tube**
- Swabs that are not broken at the score line and hence are not the appropriate length (usually too long) **will not be tested**.
- Store the specimen at room temperature.
- Transport to the laboratory at room temperature.
- For rectal swabs avoid gross faecal contamination.

Tests sent to Referral Laboratories

Samples should be sent to the laboratory at ambient temperatures where they will be stored, and referred as appropriate.
Requests should include as much relevant clinical history as is available, in particular the date of onset of illness.
Referral facilities may not carry out tests which are accompanied by insufficient clinical information to support the relevant diagnosis
Separate samples and forms must be sent for all individual test requests.

Regionally Referred Tests

Results for regionally referred tests are issued by the testing laboratory and can be viewed on the HSC NIECR system. See site specific user manuals for specific sample requirements, turn around times etc.

Belfast Trust: BHSCT Laboratory User Manual	
Virology	
Antibiotic Assays	Tobramycin only
Atypical pneumonia	*Legionella pneumophilia* *Mycoplasma pneumoniae* *Bordatella pertussis* *Pneumocystis jiroveci/carinii*
Bordetella pertussis PCR	best used within first 2 weeks of symptom onset Recommended as the preferred test for all age groups
Extrinsic Alveolitis	
Leptospirosis	
Mycology	particularly Dermatophyte culture (Skin, Hair and Nails)
Q-fever PCR	
Quantiferon	Please use QuantiFERON®-TB Gold Plus collection set volume of blood must be within the black fill line, **any over/under filled bottles will be rejected.** Samples can be sent Monday – Thursday excluding Bank Holidays. Please note that as specimens are incubated overnight for 16hrs, they cannot be received the day prior to the Bank Holiday.
Syphilis serology	
Toxoplasmosis	
South Eastern Trust: SEHSCT Laboratory User Manual	
Helicobacter pylori	Faecal antigen testing.

UK Referred Test

The accompanying serology request form should include as much relevant clinical history as is available, especially the date of onset of illness. **All information which would support a diagnosis of the relevant disease**, must be stated on the request form as tests may not be carried out if the information required is lacking.
Results will be returned within 21 days.

Test	Specimen Requirements	Container / Volume	Reference Lab	Comments
Antifungal Drug Assays Amphotericin, Fluconazole, Fluctosine, Itraconazole, Posaconazole, Voriconazole	1-2mL Serum	Clotted blood bottle	Mycology Reference Laboratory, Bristol	Contact Consultant Microbiologist for advice prior to sample collection. Do not use gel separator tubes for azole drugs.
Antimicrobial Assay Streptomycin, Daptomycin, Linezolid, Rifampicin, Rifabutin, Levofloxacin, Cycloserine, Moxifloxacin, Aciclovir, Granciclovir, Chloramphenicol, Co-trimoxazole, Colistin	5mL Serum	Clotted blood bottle	Antimicrobial Reference Laboratory, Bristol	Please contact Consultant Microbiologist for advice prior to sample collection
Bordetella pertussis Serology	≥ 400µL serum	Clotted blood bottle	Respiratory and Vaccine Preventable Bacteria Reference Unit (RVPBRU)	NOT for immune status ≥ 2 week history of cough

Test	Specimen Requirements	Container / Volume	Reference Lab	Comments
Borrelia burgdorferi (Lyme Disease)	2mL Serum	Clotted blood bottle	Rare and Imported Pathogens Laboratory (RIPL)	
Candida Serology	1–2mL Serum	Clotted blood bottle	Mycology Reference Laboratory, Bristol	
Diptheria antibodies	Min 1mL Serum	Clotted blood bottle	Vaccine Evaluation Unit, Manchester	
Helicobacter pylori	Gastric Biopsy	Sterile saline in sterile container	Gastrointestinal Bacteria Reference Unit (GBRU)	Contact Microbiology Laboratory prior to sample collection. Samples can only be sent Monday – Thursday.
Histoplasmosis antibodies	1-2mL Serum	Clotted blood bottle	Mycology Reference Laboratory, Bristol	
Meningococcal PCR	Min 400µL blood (EDTA) Min 400µL CSF	EDTA blood bottle Sterile universal container	Meningococcal Reference Unit, Manchester	If CSF microscopy fails to identify Neisseria meningititis in a suspected case, part of the remaining specimen can, if requested be submitted for PCR investigation.

Type the test name / keyword into the text search box in the toolbar
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Test	Specimen Requirements	Container / Volume	Reference Lab	Comments
Mycology Serology Aspergillus antibodies, Aspergillus Antigens (Galactomannan), ß1-3 Glucan Antigen	1-2mL Serum	Clotted blood bottle	Mycology Reference Laboratory, Bristol	
Parasitology Serology	5mL serum	Clotted blood bottle	Hospital for Tropical Diseases, London	
Pneumococcal antibodies	Min 1mL Serum	Clotted blood bottle	Vaccine Evaluation Unit, Manchester	Vaccine antibody status ONLY
Pneumococcal PCR	Min 400µL blood (EDTA) Min 400µL CSF	EDTA blood bottle Sterile universal container	Meningococcal Reference Unit, Manchester	
Special Pathogens Dengue Fever, Haemorrhagic Fever, Rickettsia, West Nile Fever, Yellow Fever, Zika Virus	1.5mL Plasma / Serum	Clotted blood bottle EDTA blood bottle	Rare and Imported Pathogens Laboratory (RIPL)	

Test	Specimen Requirements	Container / Volume	Reference Lab	Comments
Tetanus antibodies	Min 1mL Serum	Clotted blood bottle	Vaccine Evaluation Unit, Manchester	
Tropheryma whipplei (Whipples Disease)	≥ 200µL blood	EDTA blood bottle	Great Ormond Street, London	

For tests that do not appear on the list, please refer to the Specialist and reference microbiology: laboratory tests and services guidance:

Specialist and reference microbiology: laboratory tests and services - GOV.UK (www.gov.uk)

Post-Vasectomy Seminal Analysis

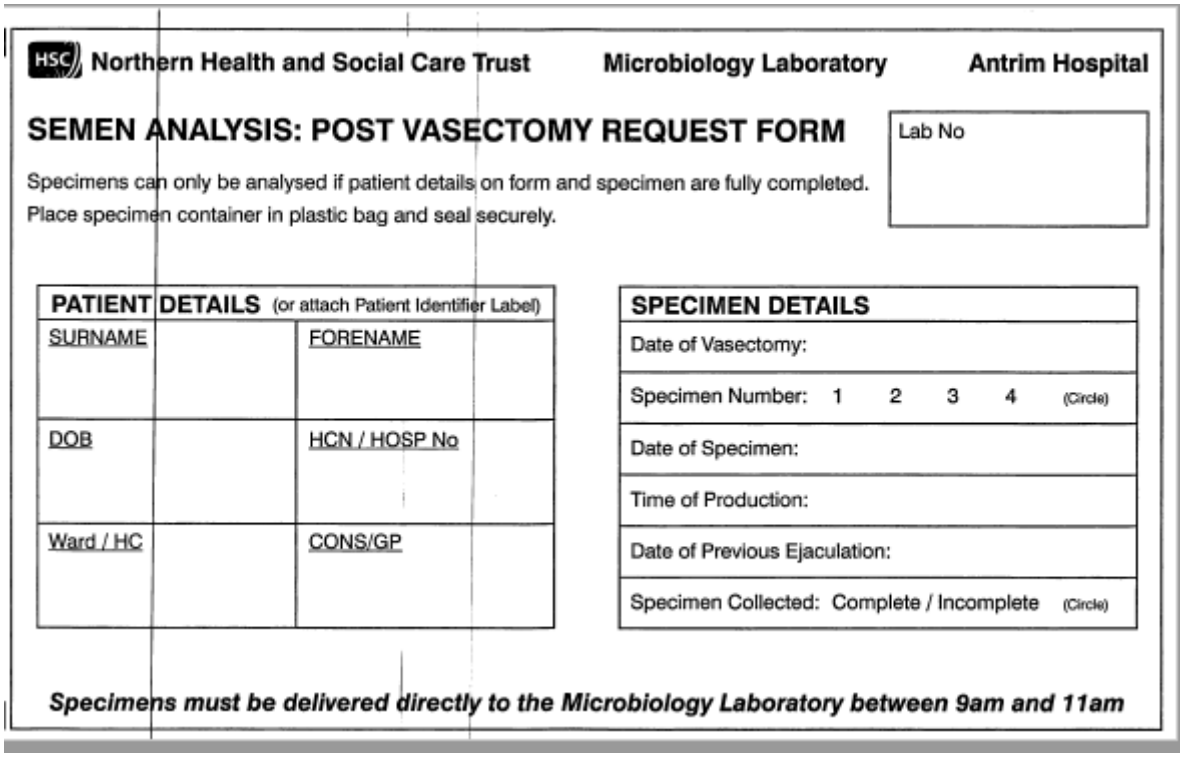
Specimens will only be processed when an appointment has been made through the Microbiology Department, Antrim Hospital. Tel 9442 4873

Following vasectomy, the patient is not immediately sterile and therefore must continue taking precautions until otherwise informed.

- Hospital vasectomy patients – an initial sample should be examined, a minimum of 3 months post-surgery. The result of the initial sample will determine if additional testing is required.
- GP federation vasectomy patients – one sample sent 7 months post-surgery.

As semen analysis is time consuming, only a limited number of specimens are processed each day, therefore it is important that appointments are kept as this time has been reserved for the test.

Specimen Request Form



HSC Northern Health and Social Care Trust | Microbiology Laboratory | Antrim Hospital

SEMEN ANALYSIS: POST VASECTOMY REQUEST FORM

Lab No

Specimens can only be analysed if patient details on form and specimen are fully completed.
Place specimen container in plastic bag and seal securely.

PATIENT DETAILS (or attach Patient Identifier Label)			
SURNAME		FORENAME	
DOB		HCN / HOSP No	
Ward / HC		CONS/GP	

SPECIMEN DETAILS
Date of Vasectomy:
Specimen Number: 1 2 3 4 (Circle)
Date of Specimen:
Time of Production:
Date of Previous Ejaculation:
Specimen Collected: Complete / Incomplete (Circle)

Specimens must be delivered directly to the Microbiology Laboratory between 9am and 11am

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

All sections of the request form should be filled in to ensure correct sample processing is performed. Any form received with incomplete details will result in the specimen not being processed.

Specimen Requirements

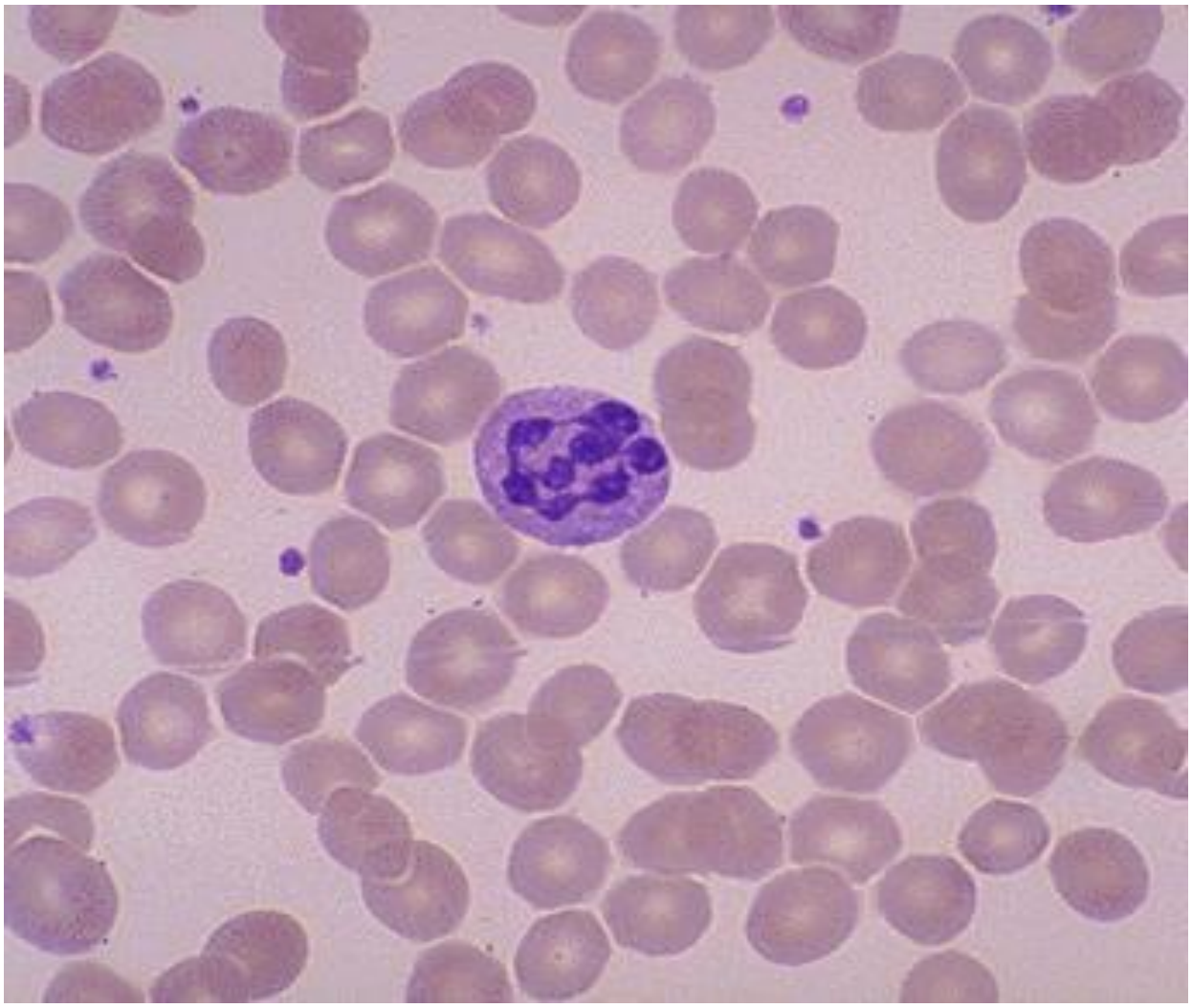
- Specimens should be obtained on the morning of examination.
- Intercourse should be avoided for 2-7 days before bringing each specimen.
- Sample is most easily produced by masturbation into the wide-necked sterile container provided. Only samples received in containers provided by the laboratory will be processed.
- Please ensure the lid of the container is secured to prevent leakage. Do not over tighten.
- **DO NOT use a condom / sheath.**
- Specimens should be delivered to the Microbiology Department in Antrim Area Laboratory between **09:00 and 11:00 on the morning of the date arranged**.
    - Initial samples should be produced less than 4hrs before arrivial.
    - Repeat samples should be produced less than 1hr before arrival.

Specimen Results

The results of the analysis will be forwarded to the GP or Consultant surgeon the following day.

If you have any queries or require further instructions, please contact the Microbiology Department, Antrim Area Laboratory, 45 Bush Road, Antrim. Tel: 9442 4873

HAEMATOLOGY & BLOOD TRANSFUSION



Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

HAEMATOLOGY AND BLOOD TRANSFUSION

Title	Name	Telephone number Ext
Consultant Haematologist	Dr S McCloskey	332186
Secretary		334765
Consultant Haematologist	Dr C McAuley	332173
Secretary		334115
Consultant Haematologist	Dr A Niblock	334849
Secretary		334115
Consultant Haematologist	Dr S McPherson	332041
Secretary		334765
Consultant Haematologist	Dr B Merron	332184
Secretary/Clinical Lead		334144
Consultant Haematologist	Dr P Windrum	332172
Secretary		334795
Haematology Head BMS	Mrs C Henry	334105
Blood Transfusion Head BMS	Miss S Hill	334174
Deputy Head/Causeway Haematology/Quality Lead	Mr A Mullan	375737
Enquiries- Haematology **Antrim** **Causeway**		334949 direct dial 94424949 375178 direct dial 70346178
Enquiries-Blood bank **Antrim** **Causeway**		 332044 375733
Enquiries- on call **Antrim** **Causeway**		**331240** **375178 or direct dial 70346178**
Haemoviligance Practioner **Antrim** **Causeway**		 334965 375740 haemovigilance@northerntrust.hscni.net

NB: During on-call periods, the BMS in Haematology also covers Blood Transfusion

Consultant Pathologist advice is available 24/7 via switchboard or on contacting the Department; advice should be available within 60 minutes of making contact. (Use of uncertainties associated with the test performed are considered when giving clinical advice)

Minimum Acceptance Criteria (MAC)-Haematology

- Mandatory MAC MUST be present on ALL sample bottle(s) / container(s) and request form to assure sample acceptance for Laboratories and LIMS.
- Desirable MAC MUST be considered by the User as part of good patient management / care.

	Mandatory	Desirable
Sample	1. Unique identifier number* 2. Patient Official first Name 3. Surname 4. Date of Birth (dd/mm/yyyy) 5. Date and Time of Sample and Collection ***The Health & Care Number must be used unless**:- a) The patient is not registered with a General Practitioner in Northern Ireland – use the local hospital numbering system. b) An emergency situation – use local hospital EMERGENCY numbering system.	1. Sex (Male/Female/Other) 2. Name of staff member taking the sample.
Request Form	1. Unique identifier number* 2. Patient Official First Name 3. Surname 4. Sex (Male/Female/Other) 5. Date of Birth (dd/mm/yyyy) 6. Date and Time of Sample Collection 7. Requester Name / Code 8. Source (Ward / Clinic /GP) 9. Investigation (test) Required ***The Health & Care Number must be used unless:-** a) The patient is not registered with a General Practitioner in Northern Ireland – use the local hospital numbering system. b) An emergency situation – use local hospital EMERGENCY numbering system. *	1. Relevant Clinical Information 2. Name of staff Member taking the sample

Type the test name / keyword into the text search box in the toolbar
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Tests and Sample Bottle Details for Haematology

The table below lists the sample type requirements for Haematology

Type the test name / keyword into the text search box in the toolbar
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TEST	SAMPLE / AMOUNT	STORAGE / CONTAINER	VIABILITY / REF. RANGES	COMMENTS
Anti-Cardiolipin Antibodies	1 x 6 ml Blood	Red Cap (Clotted sample)		RVH Immunology
Anti-Thrombin (AT) (Part of Thrombophilia Screen)	1 x 3.5 ml Blood	Blue Cap (Coagulation bottles)	70-128%	Fill to mark and mix well. Haematology – Antrim
Anti-Xa	1 x 3.5 ml Blood	Blue Cap (Coagulation bottles)		BCH Haemostasis Lab
APC – Resistance (APC-R) (Part of Thrombophilia Screen)	1 x 3.5 ml Blood	Blue Cap (Coagulation bottles)	Negative 2.6-3.5 Equivocal 2.1-2.5 Positive <2.0	Fill to mark and mix well. Haematology – Antrim
Activated Partial Thromboplastin Time APTT (Heparin Control)	1 x 3.5 ml Blood	Blue Cap (Coagulation bottles)	20.5 – 32.1 secs	Fill to mark and mix well. Test as part of coagulation screen
BCR-ABL	4 x 4 ml Blood (form available on BLL Haem user manual)	Purple Cap (FBC Bottle		BCH Haem/Oncology Lab
Blood Count FBC (inc/ automated DWCC)	*Adult* 1 x 4 ml Blood *Child* 0.5 ml Blood	Purple Cap (FBC Bottle) Paediatric Bottle Pink Cap	See Reference ranges section	Fill to mark and mix well. Fill to mark and mix well.
CALR/ MPL/ EXON 12 mutation	1 x 4 ml Blood (form available on BLL Haem user manual)	Purple Cap (FBC Bottle)		BCH Haem/Oncology Lab
Coagulation Screen (PT, APTT, TT & Fibrinogen)	*Adult* 1 x 3.5 ml Blood *Paediatric* 1 x 1.3 ml Blood	Blue Cap (Coagulation bottles) Green Cap (no gel) (Coagulation bottles)	See Reference ranges section Variable ranges for paediatrics – see reference ranges section	Fill to mark and mix well. Fill to mark and mix well.

TEST	SAMPLE / AMOUNT	STORAGE / CONTAINER	VIABILITY / REF. RANGES	COMMENTS
D-Dimer (P.E and D.V.T)	1 x 3.5 ml Blood	Blue Cap (Coagulation bottle)	<250ng/ml	Fill to mark and mix well.
ESR (Erythrocyte Sedimentation Rate)	2 ml Blood	Purple Cap (FBC bottle)	Male 2 –14mm/hr Female 3 – 20mm/hr	Fill to mark and mix well. (not processed routinely out of hours unless specifically requested)
EMA Binding (Hereditary Spherocytosis)	*Adult* 1 x 4 ml Blood *Child* 0.5 ml Blood	Purple Cap (FBC Bottle) Pink Cap Paediatric Bottle		BCH Haem/Oncology- arrange with lab in advance
Factor V Leiden	1x 4 ml Blood	Purple Cap (FBC bottle)		Fill to mark and mix well. BCH Coagulation
Factor VIII (8) Assay	1 x 3.5 ml Blood	Blue Cap (Coagulation bottle)	50-150% 0.5-1.5 iu	Fill to mark and mix well.
Factor IX (9) Assay	1 x 3.5 ml Blood	Blue Cap (Coagulation bottle)	65-150% 0.65-1.5 iu	Fill to mark and mix well.
Fibrinogen	1 x 3.5 ml Blood	Blue Cap (Coagulation bottle)	1.6 – 4.7 g/l	Fill to mark and mix well. Test as part of coagulation screen
G6PD	1 x 4 ml Blood	Purple Cap (FBC bottle)	To arrive in the laboratory before 12 noon	BCH Red Cell Lab- arrange with lab in advance
Gene rearrangements (Ig/ TCR/ IGHV)	1 x 4 ml Blood (form available on BLL Haem user manual)	Purple Cap (FBC bottle)		BCH Haem/Oncology Lab
Granulocyte Immunology	Samples dependant on clinical history (see form 3E http://tinyurl.com/h-i-forms)		To arrive in laboratory before 12 noon	H&I Diagnostics Filton,Bristol

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TEST	SAMPLE / AMOUNT	STORAGE / CONTAINER	VIABILITY / REF. RANGES	COMMENTS
Haemoglobin Electrophoresis (Hb variants eg. HbS)	1 x 4 ml Blood	Purple Cap (FBC bottle)	To arrive in the laboratory before 12 noon	BCH Red Cell Haematology
Haemoglobin A, A2, and F Thalassaemia Screen)	1 x 4 ml Blood	Purple Cap (FBC bottle)	To arrive in the laboratory before 12 noon	BCH Red Cell Haematology
HITT Screen	1 x 6 ml Blood	Red Cap (serum bottle)		BCH Haemostasis Lab HITT score required, contact Haem Antrim for forms
JAK2	1 x 4 ml Blood (form available on BLL Haem user manual)	Purple Cap (FBC Bottle)		BCH Haem/Oncology Lab
Peripheral Blood Markers	1 x 4ml Blood 1 x tray of slides	Purple Cap (FBC Bottle)	To arrive in the laboratory before noon	BCH Haem/Oncology Lab
Lupus Anticoagulant / Inhibitor	4 x 3.5 ml Blood	Blue Cap (Coagulation bottle)	To arrive in the laboratory before noon	Fill to mark and mix well. BCH Coagulation
Lymphocyte subsets (for immunodeficiency/ Ocrevus work up)	1 x 4 ml Blood	Purple Cap (FBC Bottle)	To arrive in the laboratory before noon	RVH Immunology
Malarial Parasites	1 x 4 ml Blood to coincide with fever peaks.	Purple Cap (FBC bottle)	Send urgently as sample viability is time critical	Contact Lab in advance, record full history & clinical details (including prophylaxis) on request form.
Molecular rearrangements (TP53, MYD88, MALT etc)	1 x 4 ml Blood (form available on BLL Haem user manual)	Purple Cap (FBC bottle)		BCH Haem/Oncology Lab

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TEST	SAMPLE / AMOUNT	STORAGE / CONTAINER	VIABILITY / REF. RANGES	COMMENTS
Monospot	1 x 4 ml Blood	Purple Cap (FBC bottle)		Fill to mark and mix well.
NPM1 and FLT3 (AML mutations)	1 x 4 ml Blood (form available on BLL Haem user manual)	Purple Cap (FBC bottle)		BCH Haem/Oncology Lab
Paroxysmal Nocturnal Haemoglobinuria CD59	1 x 4 ml Blood up to 24hrs	Purple Cap (FBC bottle) **Do not store in fridge**	To arrive in the laboratory before noon	BCH Haem/Oncology
Plasma Viscosity	1 x 4 ml blood	Purple Cap (FBC bottle)		Sent by taxi to Ulster Hospital Haematology
Platelet Aggregation Studies	2 x 10 mls Platelet Aggregation Studies or 5 x 3.5 ml Citrate sample (fresh samples)	**Do not store in fridge**	To arrive in the laboratory before noon	BCH Coagulation
Platelet Antibodies	Dependent on suspected condition - contact Lab.	Dependent on suspected condition - contact Lab.	To arrive in the laboratory before noon	Dependent on suspected condition - contact Lab.
Platelet derived growth factor receptor (PDGFR)	Sample numbers depends on WBC count	Purple Cap (FBC bottle)	Contact 028 95040913 for number of samples required	BCH Haem/Oncology Lab
Platelet Function Tests	1 x 3.5ml sodium citrate 1 x 4 mls EDTA (fresh samples)	Blue Cap Purple Cap		BCH Haemostasis laboratory- arrange with lab in advance
PML- RARA	1 x 4 ml Blood (form available on BLL Haem user manual)	Purple Cap (FBC bottle)		BCH Haem/Oncology Lab
Prothrombin Time (PT)	1 x 3.5 ml Blood	Blue Cap (Coagulation bottle)	PT 9.6 - 13.6s	Fill to mark and mix well. Test part of coagulation screen

TEST	SAMPLE / AMOUNT	STORAGE / CONTAINER	VIABILITY / REF. RANGES	COMMENTS
Protein C Part of Thrombophilia Screen	2 x 3.5 ml Blood	Blue Cap (Coagulation bottle)	0.65 – 1.35 iu/ml	Fill to mark and mix well. Haematology – Antrim
Protein S Part of Thrombophilia Screen	2 x 3.5 ml Blood	Blue Cap (Coagulation bottle)	Female 0.55 – 1.16 iu/ml Male 0.7- 1.3 iu/ml	Fill to mark and mix well. Haematology – Antrim
PT20210A	1 x 4ml Blood	Purple Cap (FBC bottle)		BCH Haemostasis Lab
Pyruvate kinase	1 x 4ml Blood	Purple Cap (FBC bottle)	To arrive in the laboratory before 12 noon	BCH Red Cell Lab- arrange with lab in advance
Reticulocyte Count	1 x 4 ml Blood	Purple Cap (FBC bottle)	<2.5%	Fill to mark and mix well.
Sezary cell screening	4 x 4 ml Blood (4 for BCH and 1 for RVH Histo)	Purple Cap (FBC bottle)	RVH must be arranged by contacting 07870456031.Processed only on Wed or Thurs**.**	BCH Haematology and RVH Histopathology
Sickle Screen	1 x 4ml Blood	Purple Cap (FBC bottle)	To arrive in the laboratory before 12 noon	Fill to mark and mix well.
Thrombin Clotting Time (TT)	1 x 3.5 ml Blood	Blue Cap (Coagulation bottle)	TT 11.0 – 16.4s	Fill to mark and mix well. Test as part of coagulation screen
Thrombophilia Screen (Protein C, Protein S, AT + APC-R)	4 x 3.5 ml Blood	Blue Cap (Coagulation bottle)	Batched for processing send in as early in day as possible	Fill to mark and mix well. Haematology – Antrim
Urinary Haemosiderin	10 ml urine	Plain universal container	To arrive in the laboratory before 12 noon	Haematology – Antrim
Variant CML (e8q2 for RQ-PCR)	4 x 4ml blood and accompanying form	Purple Cap (FBC bottle)	To arrive in the laboratory before 12 noon Mon-Thurs only	West Midlands Regional Genetics Lab,Birminghams Women and Childrens H

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TEST	SAMPLE / AMOUNT	STORAGE / CONTAINER	VIABILITY / REF. RANGES	COMMENTS
Von Willebrands Disease	2 x 3.5ml Blood	Blue Cap (Coagulation bottle)	To arrive in the laboratory before 12 noon	Fill to mark and mix well. BCH Coagulation
Add on tests may only be accepted within the limits of sample viability (dependent on test profile), otherwise an additional sample and form are required.				

Notes

Sample integrity:
The quality of results will be affected by sample integrity. Factors such as haemolysis, lipaemia, presence of clots in anti-coagulated samples will affect the validity of results. In some cases no results will be issued or a comment will be added to reports alerting requestor that results may be inaccurate and need repeating to confirm accuracy.

Reflex tests:
Additional reflex tests (e.g. reticulocyte count, blood film, monospot, DAT, etc) may be processed by the department guided by clinically-approved criteria.

Hazard Group 3 (Cat 3) samples:
Hazard stickers should be attached to request forms to alert staff to CAT III or suspected CAT III samples (**Identify the nature of high risk for handling / disposal purposes)**. The laboratory should be informed before blood is sent for laboratory investigations.

Specialist Haematology tests:
Will only be processed by BCH Haematology-Oncology laboratory if deemed appropriate and authorised by a Consultant Haematologist. Please state the name of the approving Consultant Haematologist and clinical information on the test form.

Note: The above referral test repertoire is not exclusive. Contact the Haematology laboratory ext 44975 for any further information or consult Belfast Link Laboratory Handbook @ https://belfasttrust.hscni.net/service/laboratory-services/

Oral Anticoagulation

Refer to the following NHSCT policies available in the Policy Library

Oral Anticoagulant Guidelines	NHSCT/12/575
Dabigatran Reversal Guidance	NHSCT/14/763
Rivaroxaban and Apixaban Reversal Guidance	NHSCT/14/764

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Thrombophilia Screening

Indicated In:

•Patients with a venous thrombosis **<40 years of age**, who have a strong first-degree family history (2 or more family members) of unprovoked venous thrombosis.

•Patients with an unprovoked venous thrombosis at an early age **(<40 years)** with no family history should be tested for antiphospholipid antibodies and lupus anticoagulant.

•Adults with skin necrosis associated with vitamin K antagonists e.g. warfarin should be tested for Protein C & Protein S deficiency **only** post vitamin K antagonist withdrawal.

•Neonates and Children with Purpura Fulminans should be tested urgently for Protein C and Protein S deficiency and discussed with Haematology Consultant as further specialist assays may be needed.

•Individuals with arterial thrombosis at a young age **(<40)** should be tested for antiphospholipid antibodies and lupus anticoagulant **only**.

•Women with history of recurrent miscarriage, pre-eclampsia before 34 wks of pregnancy, intrauterine growth retardation before 34 wks of pregnancy or intrauterine death should be screened for the presence of antiphospholipid antibodies and lupus anticoagulant **only**.

Thrombophilia screening is NOT indicated in:

•Case finding of asymptomatic relatives for the Factor V Leiden or Prothrombin Gene Mutations is not recommended.

•Case finding of asymptomatic relatives with high risk thrombophilia such as Antithrombin, Protein C and Protein S deficiency should only be considered in selected thrombosis prone families & only after the risks, benefits and limitations of testing has been discussed.

•Thrombophilia screening should not be performed in asymptomatic patients considering use of oestrogen-based contraception. If these patients have a strong first-degree family history of thrombosis (2 or more family members) then alternative contraception (*e.g.* Progesterone only pill, Progesterone depot injection / implant, intrauterine contraceptive devices) should be considered.

•Thrombophilia screening should not be performed in asymptomatic patients considering use of HRT. If these patients have a strong first-degree family history of thrombosis (2 or more family members) then use of transdermal HRT should be considered as this represents a lower thrombotic risk.

•Thrombophilia screening should not be performed in asymptomatic patients planning pregnancy. If these patients have a strong first-degree family history of thrombosis (2 or

more family members) it may be appropriate to consider 6 weeks of post-partum thromboprophylaxis but this decision should be made on clinical grounds alone.

•Women who have suffered a VTE in a previous pregnancy or with use of oestrogen-based contraception may be given thromboprophylaxis in a subsequent pregnancy. This decision should be made on clinical grounds alone.

•Unselected patients with travel – provoked venous thrombosis.

•Unselected patients presenting with a first episode of venous thrombosis.

•Unselected patients with upper limb thrombosis or intra-abdominal thrombosis.

•Patients with central venous catheter related venous thrombosis or retinal vein occlusion.

Timing of testing.
Thrombophilia results may be affected by acute thrombosis, pregnancy and oral contraceptives. Avoid testing in these situations if possible.

Warfarin affects protein C, protein S and APC resistance. Patients should be off Warfarin for **at least 2 weeks** before thrombophilia screening.

Lupus Inhibitor and Anticardiolipin Antibodies are indicated in:
Spontaneous VTE in < 50 years

Arterial occlusive events in < 50 years

Recurrent early miscarriage or intrauterine death after 20 weeks gestation

Patients with SLE - part of routine assessment

Samples and clinical details

Indication for Thrombophilia Screening or Lupus Inhibitor testing is **essential** on Request form

	Samples	Request Form
Basic screen : AT, PC, PS, FV Leiden, Prothrombin 20210	4× INR/Coag. Bottles 1× FBC bottle	Coagulation
Lupus Inhibitor:	2×INR/Coag. bottles	Coagulation - **Lupus inhibitor**
	1× Clotted bottle	Biochemistry - **Anticardiolipin antibodies**
Basic screen + Lupus Inhibitor	6× INR/Coag. Bottles 1× FBC Bottle	Coagulation - **Thrombophilia Screen and Lupus inhibitor**
	1× Clotted	Biochemistry - **Anticardiolipin antibodies**

Normal Ranges

	At birth (full term)	Day 3	Day 7	Day 14	1 month	2 months	3 – 6 months	1 yr	2 – 6 yrs	6 – 12 years	Adult Men	Adult Women
RBC (10^{12}/L)	5.0 – 7.0	4.0 – 6.6	3.9 – 6.3	3.6 – 6.2	3.0 –5.4	3.1 – 4.3	4.1 – 5.3	3.9 –5.1	4.0 – 5.2	4.0 – 5.2	4.5 – 5.5	3.8 – 4.8
Hb (g/L)	140 – 220	150 – 210	135 – 215	125 – 205	115 – 165	94 – 130	111 – 141	111 – 141	110 – 140	115 –155	130 – 170	120 –150
PCV	0.45 – 0.75	0.45 – 0.67	0.42 – 0.66	0.31 – 0.71	0.33 – 0.53	0.28 – 0.42	0.3 – 0.4	0.3 –0.38	0.34 – 0.4	0.35 – 0.45	0.40 – 0.50	0.36 – 0.46
MCV (fl)	100 -120	92 - 118	88 – 126	86 – 124	92 – 116	87 – 103	68 – 84	72 - 84	75 – 87	77 – 95	83 –101	83 – 101
MCH (pg)	31 -37	31 -37	31 – 37	31 – 37	30 – 36	27 - 33	24 – 30	25 – 29	24 – 30	25 – 33	27 – 32	27 – 32
MCHC (g/L)	300 – 360	290 – 370	280 – 380	280 – 380	290 – 370	285 – 355	300 – 360	320 – 360	310 – 370	310 – 370	315 – 345	315 – 345
Retic. (%)	2.4 – 5.7	1.25 – 5.3	1.28 – 1.59	1.39 – 1.61	0.67 – 1.11	0.97 – 1.16	0.98 – 1.89	0.77 – 1.96	0.75 – 1.92	0.75 – 1.92	1.11 – 1.81	1.2 – 2.08
WBC ($x10^9$/L)	10 - 26	7 - 23	6 – 22	6 – 22	5 - 19	5 – 15	6 – 18	6 – 16	5 – 15	5 – 13	4 – 10	4 – 10
Platelets ($x10^9$/L)	100 – 450	210 – 500	160 - 500	170 – 550	200 – 500	210 – 650	200 – 550	200 – 550	200 – 490	170 – 450	150 – 410	150 – 410
Neutrophils $x10^9$/L)	4 - 14	3 -5	3 – 6	3 – 7	3 – 9	1 – 5	1 – 6	1 - 7	1.5 – 8.0	2 – 8	2 - 7	2 - 7
Lymphocytes $x10^9$/L)	3 – 8	2 - 8	3 – 9	3 – 9	3 – 16	4 – 10	4 – 12	3.5 – 11	6 – 9	1 – 5	1 – 3	1 – 3
Monocytes $x10^9$/L)	0.5 – 2.0	0.5 - 1	0.1 – 1.7	0.1 – 1.7	0.3 – 1.0	0.4 – 1.2	0.2 – 1.2	0.2 – 1.0	0.2 – 1.0	0.2 – 1.0	0.2 – 1.0	0.2 – 1.0
Eosinophils $x10^9$/L)	0.1 - 1	0.1 – 2.0	0.1 – 0.8	0.1 – 0.9	0.2 – 1.0	0.1 – 1.0	0.1 – 1.0	0.1 – 1.0	0.1 – 1.0	0.1 – 1.0	0.02 – 0.5	0.02 – 0.5
Basophils $x10^9$/L)	0.02 – 0.1	0.02 – 0.1	0.02 – 0.1	0.02 – 0.1	0.02 – 0.1	0.02 – 0.1	0.02 – 0.1	0.02 – 0.1	0.02 – 0.1	0.02 – 0.1	0.02 – 0.1	0.02 – 0.1

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Erythrocyte Sedimentation Rate (ESR)

Test	17-50 Years	50-61 Years	61-70 Years	>70 Years
ESR (male) mm/hr	≤ 10	≤ 12	≤ 14	≤ 30
ESR (female) mm/hr	≤ 12	≤ 19	≤ 20	≤ 35

NORMAL RANGES COAGULATION (ADULT)

Prothrombin Time**	9.6- 13.6 secs
APTT	20.5-32.1 secs
Fibrinogen (Clauss)	1.6- 4.7 g/L
Thrombin Time	11.0-16.4 secs
D- Dimer	< 250 ng/mL

Note: All coagulation parameters should be reviewed when evaluating DOAC patient results.

NORMAL RANGES COAGULATION (PAEDIATRIC)

	Premature infants 30-36 weeks	1 week	1 month	6 months
PT (secs) (mean)	10 – 16.2	10.9 – 14.4	10.6 – 13.1	11.5 – 13.1
APTT(secs) (mean)	26.9 - 79.4	34.0 – 51.2	33.0 – 47.8	31.8 – 39.2
Fibrinogen g/L (mean)	1.5 – 4.2	2.3 – 3.9	2.4 – 3.9	1.8 – 3.2

Adult values for coagulation are reached by 6 months of age (BJH, 2002, 119:295-309)

Normal Ranges for Thrombophilia Screens

Protein C	0.65 – 1.35 IU (65- 135%)
Free Protein S	0.70 – 1.30 IU (75- 145%) Male 0.55 – 1.16 IU (55- 125%) Female
Antithrombin	70 – 128%
APC- R Ratio	2.6- 3.5 negative 2.1- 2.5 equivocal <2.0 Positive

Measurement Uncertainty (MU)

Depending on their relative values, measurements of a given parameter (measureand) often cannot be meaningfully compared with each other or with a clinical decision value without knowledge of their uncertainty. Measurement results are generally interpreted by comparison with other values. Such comparisons are for the purpose of either assessing whether the two values are measurably different by the procedure used, or whether they are not only measurably different but also biologically different. For both types of assessment, knowledge of the measurement uncertainty of the patient result is necessary. The value with which a patient result is compared is usually either a previous result for the same patient, or is a clinical decision value. Departmental MU data is as follows:

Parameter	Measurement Uncertainty
Hb	±4 (g/L)
PCV	±0.05
RBC	±0.26($x10^{12}$/L)
WBC	±0.4 ($x10^{9}$/L)
Platelets	±24 ($x10^{9}$/L)
Prothrombin Time (PT) secs	± 0.54
APTT (routine) secs	± 3.0
APTT (alternate) secs	± 1.11
Fibrinogen (g/l)	± 0.5
Thrombin Time (TT) secs	± 1.2
D-Dimer (ng/ml)	± 94
Factor VIII (8) %	± 26
Factor IX (9) %	± 26
Antithrombin activity (%)	± 19
Protein C activity (IU/ml)	±1.05
Free Protein S (IU/ml)- combined male and female values	± 1.25
Activated Protein C Resistance (APC-R) (Ratio)	± 0.7

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Criteria for telephoning results

Results from patients which fall outside the following range or not in keeping with established history will be telephoned to source ASAP. A repeat sample should be sought if not in keeping with patient's condition.

Full Blood Count parameters			
Parameter	Unit	Level	Comment
Hb	g/l	<70	
	g/l	>190	Excluding new born infants
White cell count			
neuts	$X10^9$/l	<0.5	
	$X10^9$/l	>50	
lymph	$X10^9$/l	>50	
platelets	$X10^9$/l	<30	
	$X10^9$/l	>1000	
PT >20.0 SECS (coagulation screen)			
APTT >50 SECS (coagulation screen)			
APTT>120 SECS (on heparin)			
FIB <1.0g/l			
Blood film			
Presence of blasts or diagnosis Suggestive of chronic myeloid leukaemia			Discuss with the covering haematologist urgently
Malaria parasites			positive
Coagulation			
INR	>5.0		For patients on warfarin

The BMS will consider various parameters prior to phoning results e.g. is previous recent result similar? and/or take into account patient's age, sex, clinical condition, and information provided on request form.

Abnormal D-dimer results are not routinely telephoned to GP health centres or DAL Doc (out of hrs GP service). If a GP requires a D-dimer result out of hours they need to provide Dal Doc with the clinical information and ask them to phone the laboratory for a result.

Haematology Laboratory Routine Turnaround Times

Test	Turnaround Time
Group and Hold	24hrs
Routine Crossmatch	14 hrs
Emergency Crossmatch	45 mins
Emergency Crossmatch (MUH,WHA Hospitals)	1.5hrs (after receipt of patient's sample)
Full Antibody Investigation	4 hrs (referral to NIBTS upto 24hrs)
Kleihauer estimation	24 hrs
Direct Antiglobulin Test	24 hrs
Cold Agglutinin Test	8 hrs
Fresh Frozen Plasma for Antrim, Causeway, MUH,WHA Hospitals	1.5 hrs (after receipt of patient's sample)
Platelets (Group Specific) for Antrim, Causeway, MUH,WHA Hospitals	2hrs (up to 8 hrs depending on availability of type)
Filtered Cells	1.5hrs (after receipt of patient's sample)

Sickle Cell Screen	48 hrs
Urinary haemosiderin	4 days
Iron Stain	4 days
Malaria Parasites (diagnosis)	48 hrs
Malaria Screening Test (Serology)	24hrs
Monospot	48 hrs
Thrombophilia Screen	2-3 weeks

	GP	Acute
Full Blood Picture	24 hrs	4 hrs
Differential	24 hrs	4 hrs
Erytrocyte Sedimentation Rate	24 hrs	4 hrs
Reticulocyte Count	24 hrs	4 hrs
Coagulation Screen	24 hrs	4 hrs
INR	24 hrs	4 hrs
D-Dimer	24 hrs	4 hrs

The above turn-around-times are for routine tests and are calculated from receipt of sample in the laboratory until the result is available on ward recall or GP links.

Emergency samples should be analysed within an hour, 90 minutes for coagulation samples. If analysis of emergency samples are likely to be delayed due to analyser or system failures the user will be informed as to the expected delay and alternatives discussed (forwarding sample to another laboratory for analysis etc.) Some specialist tests will have longer turn-around times.

If Clinicians wish to discuss the appropriateness of these published times please contact a Laboratory Consultant or BMS management staff.

Turnaround time audits are carried out annually and information will be provided on request.

Common Referral Laboratories

Belfast Link Laboratories(BLL) BCH site	Haematology dept, Belfast City Hospital Lisburn Road, Belfast, BT12 6BA 02895040987
BLL RVH site	Royal Victoria Hospital Grosvenor Road, Belfast
Northern Ireland Blood Transfusion Service (NIBTS)	Belfast City Hospital Complex Lisburn Road, Belfast, BT9 7TS
PHLS Malaria Reference Laboratory	London School Of Hygiene & Tropical Medicine Keppel Street (Gower Street) London WC1E 7HT tel. 020 79272427, 020 79272435
FMH flow cytometry:	NIBTS Belfast City Hospital Complex Lisburn Road, Belfast, BT9 7TS
Ulster Hospital	Haematology Laboratory, Ulster Hospital, Upper Newtownards Road, Dundonald. 028 90484511 ext 88532
Filton, Bristol Hospital	H&I Diagnostics Filton 500 North Bristol Park, Northway, Filton, Bristol, BS34 7QH 0117 921 7372
West Midlands Regional Genetics laboratories	Birmingham Womens and Childrens NHS Trust, Edgebaston, Birmingham B15 2TG Tel (0121)3358036

Tests referred to Reference Laboratories have a turnaround time from a few days to a few weeks depending on the type of investigation. If the results are required urgently, please ring the Laboratory.

Minimum Acceptance Criteria (MAC)-Blood Bank

- Mandatory MAC MUST be present on ALL sample bottle(s) / container(s) and request form to assure sample acceptance for Laboratories and LIMS.
- Desirable MAC MUST be considered by the User as part of good patient management / care.

	Mandatory	Desirable
Sample	1. Unique identifier number* 2. Patient Official first Name 3. Surname 4. Sex (Male/Female/Other) 5. Date of Birth (dd/mm/yyyy) 6. Date and Time of Sample and Collection 7. Signature of staff member taking the sample ***The Health & Care Number must be used unless**:- a) The patient is not registered with a General Practitioner in Northern Ireland – use the local hospital numbering system. b) An emergency situation – use local hospital EMERGENCY numbering system.	1. Full address
Request Form	1. Unique identifier number* 2. Patient Official First Name 3. Surname 4. Sex (Male/Female/Other) 5. Date of Birth (dd/mm/yyyy) 6. Date and Time of Sample Collection 7. Requester Name / Code 8. Source (Ward / Clinic /GP) 9. Investigation (test) Required 10. Signature of staff member taking the sample ***The Health & Care Number must be used unless:-** 11. The patient is not registered with a General Practitioner in Northern Ireland – use the local hospital numbering system. 12. An emergency situation – use local hospital EMERGENCY numbering system. *	1. Blood Group (if known) 2. Previous transfusion/obstetric history (including the presence of antibodies) 3. Date of most recent transfusion (if applicable) 4. Reason for Test request 5. Indication for red cell transfusion 6. Full address 7. Prophylactic anti-D administration information 8. NIBTS- Previous NIBTS number (if applicable) 9. NIBTS- For male partners the other partner's details must also be included in the relevant section.

The requirements of the NPSA SPN 14 "Right patient, right blood" competency 1 "Obtaining a venous sample for pre-transfusion testing" must be adhered to. The details on the request form and specimen container must tally with the details on the patient's wristband.

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

BLOOD BANK TESTS

TEST	SAMPLE / AMOUNT	STORAGE / CONTAINER	COMMENTS
Blood Group, Antibody Screen and Crossmatch	1 x 6 ml Blood	Pink Cap EDTA Bottle	Sample tube must be handwritten and signed.
Further Antibody investigations for NIBTS	2 x 6 ml Blood	Pink Cap EDTA Bottle	Non-urgent Group and Crossmatch samples not processed after 4pm.
Cold Agglutinins	1 x 6ml Blood	Red Cap Clotted sample	By prior arrangement with Lab - Samples sent at 37^{o}C in thermos flask before 2.00pm.
Cord Blood Group and DAT	1 x 4 ml Blood	Purple Cap EDTA Bottle	Fill to mark and mix.
Direct Antiglobulin test	1 x 4 ml Blood	Purple Cap EDTA Bottle	Fill to mark and mix.
Kleihauer	1 x 4 ml Blood	Purple Cap EDTA Bottle	Fill to mark and mix.
Suspected Haemolytic Transfusion Reaction	a) Suspected Blood Pack b) 1 x 6 mls Blood c) FBC sample d) Coag sample	 Pink Cap EDTA Purple Cap EDTA Blue Cap	Please telephone Blood Bank to arrange investigation.

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

	e) 10 ml Urine f) Biochem profile g) Blood cultures	Urine monovette (yellow) Gel samples Blood culture bottles	

BLOOD BANK Requirements

All clinical staff participating in blood transfusion processes MUST hold valid Right Patient Right Blood (RPRB) training.
For more comprehensive information regarding the Blood Transfusion process please refer to the NHSCT Blood Transfusion Manual, located in the Policy Library of the NHSCT Intranet site.

NI Hospital Transfusion Request Forms **MUST** include the minimum patient identifiers – see Regional NI Pathology MAC Policy: -

Antibody status
Previous transfusions
Obstetric history
Product requirement (including any special requirements)
Reason for transfusion / clinical details
Date/Time required

Epic lab request labels can be used on the request form and sample, these MUST be printed on demand and labelled at the patient bedside. Handwritten forms and samples are acceptable where EPIC is not available.

Samples taken specifically for referral to NIBTS, MUST have the date and time handwritten on them or they will be rejected

It is the responsibility of the person taking the specimen to hold valid Right Patient Right Blood training. This person must complete the patient identification details on the sample bottle and request form, signing both as the sample taker.

Group and Antibody Screen / Group and Hold, indicates that ABO/Rhesus D typing will be performed and that the serum has been tested for atypical antibodies i.e.: NO BLOOD IS CROSSMATCHED

Blood component / blood product request can be completed on the request form at the time of patient sampling or if Blood Bank have already received a sample, via telephone request..

Request forms and samples that do not meet the minimum criteria will be rejected and not tested. The ward will be informed of the reason for rejection, a repeat sample requested and the sample error logged. All sample / request form errors are trended and investigated by Haemovigilance Practitioners; staff who continue to make sample errors will be re-trained and re-assessed in the competency by the Haemovigilance Practitioners.

Requests for routine blood transfusion 'top-ups' should be made before 4.00pm

Please ensure that blood bottles being used have not expired.

Hazard Group 3 (Cat 3) samples
Hazard stickers should be attached to request forms to alert laboratory staff to confirmed or suspected CAT 3 samples. Inform the laboratory prior to dispatching the sample.

Crossmatch sample timings as follows, from the date and time of sampling:

Patient Category	Sample Validity
Patient transfused within last 3 months	Sample valid for 72 hours
Patient pregnant within last 3 months	Sample valid for 72 hours
Patient currently pregnant	Sample valid for 72 hours
If no patient history is available/provided	Sample valid for 72 hours
Patient transfused > 3months ago	Sample valid for 7 days
Patient pregnant > 3 months ago	Sample valid for 7 days
All other patient categories	Sample valid for 7 days

Transfusion of Blood Components (Red cells, Platelets, Fresh Frozen Plasma and Cryoprecipitate)

Only units for immediate transfusion should be ordered and removed from Blood Bank. If the transfusion is not going to commence within 30 minutes of dispatch from Blood Bank, Blood Bank must be contacted and the blood component must be returned immediately to Blood Bank to avoid wastage.
If blood has been removed from the blood fridge for longer than 30 minutes (or the coolbox seal has been broken for more than 30 minutes), the blood component may be wasted. Do not dispose of any unused blood components on the ward, always contact Blood Bank and promptly return unused components.

Once removed from temperature controlled storage, red cell transfusions must be completed within 4 hours.

Blood ordering policies should adhere closely to the Maximum Surgical Blood Ordering Schedule where appropriate – please refer to NHSCT Blood Transfusion Manual.

Paediatric Transfusion

In cases where neonates are to be transfused, the laboratory requires a sample from the infant. An additional sample from the mother may be required upon request from Blood Bank. Where an antigen/antibody incompatibility exists between mother/infant due to

maternal antibody, the blood pack for the infant will be crossmatched against the maternal sample.

Blood Products (Albumin, Anti-D, Octaplex)

These products must be stored and administered in accordance with the manufacturer's instructions in the product insert leaflet and are issued on a named patient basis. In order to minimise wastage of these products it is recommended that any excess stock / unused products should be returned to Blood Bank immediately to ensure optimum storage conditions are maintained.

Reporting of transfusion related incidents
Any adverse events in the transfusion process, including suspected transfusion reactions, must be reported to Blood Bank, Haemovigilance and on Datixweb.

Requests for autologous transfusion should be directed to NIBTS

CELLULAR AND MOLECULAR AND PATHOLOGY

Laboratory Service & Location

The Department of Cellular & Molecular Pathology resides in the *Laboratory* building within Antrim Area Hospital. The pathology department is located at the back of the laboratory building and is spread across three main areas according to speciality. The mortuary is located in the neighbouring building. All departmental areas are secured and salto passed controlled. Appointments should be made in advance where possible or directed via the laboratory main reception.

Constitutionally, the department is a consultant led service supported by a team of Biomedical Scientists (BMS), from discipline specialists to advanced practitioner level. The laboratory is assisted by a cohort of support staff all of varying grades who partake in a range of duties.

Clinical Service

The department of Cellular & Molecular Pathology offers the following clinical services:

Histopathology
Mortuary
Cytology
Immunocytochemistry (28 IHC antibodies not on UKAS accredition scope; details below)
Special Stains
Molecular (HPV Genotyping is not within UKAS scope; *contact laboratory on ext 33 2149 or 33 4866 for further information)*
Digital Pathology (not within UKAS Scope *contact laboratory on ext 33 4866 for further information*)

The laboratory currently holds UKAS accredition (customer number 8111) for the majority of test methods against ISO15189 *Medical Laboratories*. Tests not on scope are indicated.

The laboratory currently holds a HTA licence for mortuary services (License 12018).

Currently the laboratory provides 112 antibody tests with 28 of these not accredited by UKAS. See tables below

IHC Antiboides on UKAS Scope

Antibodies			
34BE12	CD31	DOG1	MSH6
AE1	CD34	ECAD	MUM1
BCAT	CD4	EMA	OCT2
BCL2	CD45	EP4	P16
BCL6	CD5	ER	P504S
BOB1	CD61	Factor VIII	P57
CA-125	CD68	GATA3	P63
CALC	CD79A	GCDFP	PAX5
CALR	CD8	Glypican 3	PAX8
CAM 5.2	CDX2	HBME1	PD1
CD10	CEA (M)	HER2	PLAP
CD117	CEA (P)	HMB45	PMS2
CD138	CHROMO	HPL	PR
CD15	CK14	Inhibin	PSA
CD19	CK19	KI67	RCC
CD1A	CK20	KPPA	S100
CD20	CK56	LMDA	SMMB
CD21	CK7	MLH1	SYN
CD23	CMV	MLNA	THYRO
CD3	CyD1	MPX	TTF1
CD30	DES	MSH2	VIM

IHC Antibodies not on UKAS Scope

Antibodies			
ALK-1	P53	CA19-9	IGD
CD56	PRAME	CALP	NSE
CD99	SACT	CD43	MCT
D240	SOX10	EBV	MESO
NPSA	TDT	GPHO	
P40	WT1	GZMB	
H PYLORI	MNF116	SATB2	
HSV1	MYOG	IGM	

Opening Hours

Core Hours:

Monday to Friday: 09.00 – 17.00 hrs
(excludes bank/public holidays and weekends)

Bank/Public Holiday Service:

The department offers a *Stand-By* service during bank and public holidays.
A Consultant Pathologist and Biomedical Scientist (BMS) will be on Stand-By to assess and handle urgent samples where required. To organise, please contact the hospital *switchboard* directly on 028 9442 4000.

Out of Hours Service:

Urgent specimens can be reported at the weekend, subject to arrangements with the On-Call Consutlant Pathologist. To organise, please contact the department directly on 028 9422 4000 extension 334184 or 334881, *before* 17.00 hrs on the Friday, or before at earliest convienance. If outside of core hours, please contact the On-Call Consultant Pathologist via the hospital *switchboard* on 028 9442 4000.

NB: Switchboard hold a telephone list of all BMS staff for emergency use.

Mortuary Hours (Antrim Area Hospital)

Core Hours, Monday to Friday 09.00 – 17.15 hrs
The mortuary is open during the core hours stated above. After 17.15 hrs a member of the mortuary team are on-call and can be contacted through via the hospital switchboard on 028 9442 4000.

Weekends (Saturday and Sunday)
The mortuary is open from 09.00 – 12.00 hrs during which time routine work is carried out. After 12.00 hrs a member of the mortuary team will remain on-call until 09.00 hrs on Monday. If required, they are contactable via the hospital switchboard on 028 9442 4000.

Bank and Public Holidays
The mortuary service offers an on-call service during bank and public holidays. A member of the mortuary team will be available during this period and should be contacted via the hospital switchboard on 028 9442 4000.

Contact Details

Departmental Staff

Contact	Telephone (external)	Telephone (internal)	Email
Gillian Stewart Head Biomedical Scientist	02894426477	336477	Gillian.Stewart@northerntrust.hscni.net
Dr Aaron Niblock Designated Individual HTA Consultant Haematologist	02894424000	334849	Aaron.Niblock@northerntrust.hscni.net
James Sampson Clinical Lead	02894424811	334811	James.Sampson@northerntrust.hscni.net
Beverley Houston Quality Lead	02894424866	334866	Beverley.Houston@northerntrust.hscni.net
Trudy Blair Discipline Lead BMS Histopathology	02894424866	334866	Trudy.Blair@northerntrust.hscni.net
General / Office Enquires	02894424488	334488	N/A
Molecular Pathology	02894424488	332078	Molecular.Pathology@northerntrust.hscni.net
Archive Enquires Diagnostic Cytology	02894424000 332028	332028	Archive.CMP@northerntrust.hscni.net
Immunohistochemistry	02894424000 33214	332149	Immuno.CMP@northerntrust.hscni.net
Dissection	02894424000 332080	332080	N/A

Medical Staff

Contact	Telephone (external)	Telephone (internal)	Email
Dr Fionnuala Hinds Consultant Pathologist	0289442 4030	334030	Fionnuala.Hinds@northerntrust.hscni.net
Dr James Sampson Consultant Pathologist	0289442 2117	334811	James.Sampson @northerntrust.hscni.net
Dr Graeme O'Hara Consultant Pathologist	0289442 4108	334108	Graeme.OHara@northerntrust.hscni.net
Dr Guillermo Porrero Consultant Pathologist	0289442 4445	224445	Guillermo.porrero@northerntrust.hscni.net
Dr Lisa Smith Speciality Doctor	0289442 4817	334817	Lisa.Smith@northerntrust.hscni.net

Urgent Requests

Please refer to section above “Opening Hours” for full details on core hours and out of hours services.

Within core hours please telephone *General Enquires* on extension number 33 4184 via the hospital switchboard or via a direct line to 028 9442 4184.

All urgent specimens should be discussed and agreed with a Consultant Pathologist before sending to the laboratory.

A reason(s) for the clinical urgency and following clinical details will be required at the time:

1. Patient’s Details

a) Full Name, DOB and Hospital No/HCN
b) Biopsy Nature
c) Referring contact name and telephone number of urgent report recipient

2. Arrange Biopsy Transport / Drop Off

(note: the specimen must be received before 17.00 hrs)

This is likely to involve:

a. Contacting laboratory porter to collect specimen, **OR**
b. Contacting and notifying hospital transport van (**note:** please check dates and times of travel to ensure specimen arrives on the correct day), **OR**
c. Arrange for a taxi (**note:** it is the sender’s responsibility to ensure the specimen arrives to the laboratory within core hours, all delays or issues with transport should be notified to the department ASAP)

3. **Clearly mark as ‘URGENT’**

a. The name and telephone number of the Consultant or report recipient must be provided on the request form
b. Efforts will be made to supply the result ASAP, likely to be the next day, depending on what was agreed by the Consultant Pathologist and requestor.

****The laboratory department is closed at the weekends****

Urgent specimens sent to the Laboratory on a Friday will not be reported until Monday morning. If a report is needed earlier for clinical management, it must be arranged with the On-Call Consultant Pathologist or Pathologist Of the Day.

Turnaround Times (TATs)

In line with RCPath guidelines, assurance indicators have replaced key performance indicators or TATs (*Key Assurance Indicators for Pathology Services, G181, November 2019*). Subsequently, the laboratory will continue to review the pathology dashboard tracker and monitor via regular auditing. Audit outcomes and pathology trends can be released to clinical teams upon request. The laboratory will continue to engage and collaborate with clinical teams to ensure service users needs are met.

As the complexity of cases increase, additional ancillary tests including immunocytochemistry and second opinions may be requested. Ancillary and specialised tests may be performed at external referral laboratories. This may result in extended reporting times. Should you have any queries, please contact the laboratory via 33 6477 or 33 4866.

Histopathology Target Reporting Time:

Specimen Nature*	Duration from Receipt to Primary Reporting
Red Flag / Priority Cases	90% within 14 days
MDM Cases	90% within 14 days
Routine Biopsy	90% within 28 days

*Please note: large tissue specimens will require extended fixation periods, this may increase laboratory processing times.

Cytopathology Target Reporting Time:

Specimen Nature	Duration from Receipt to Primary Reporting
Diagnostic Cytology	95% within 14 days

Molecular Target Reporting Time:

Request Type	Duration from Receipt to Primary Reporting
HPV Genotyping	98% within 14 days

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

Referral Laboratories

The department may require speciliased ancillary tests to be performed by an external referral laboratory. The following external laboratories undergo internal assessment by the department to ensure they are of acceptable quality. This is monitored via audit.

Referral Laboratory	Service provided
Institute of Pathology Grosvenor Road Belfast BT12 6BA	Placentae Medical Liver Tissue Samples Haematological Malignancy Reporting / Lymphoma CSF
Health Services Laboratories (HSL) Advanced Diagnostics 60 Whitfield Street London W1T 4EU	HER2 FISH
Regional Molecular Diagnostic Service (RMDS) Belfast Trust Laboratories Tower Block Belfast City Hospital 51 Lisburn Road Belfast BT9 7AB	Gastric HER2 PDL1 (lung) NGS BRCA I & II (prostate) cfDNA EGFR
Haematological Malignancy Diagnostic Service (HMDS) Level 3, Bexley Wing Leeds Teaching Hospital NHS Trust St James's University Hospital Beckett Street Leeds West Yorkshire LS9	BCL2 BCL6 MYC MALT1 TCR B and T cell clonality
North West Genomic Laboratory Hub, Centre for Genomic Medicine, St Mary's Hospital, Oxford Road Manchester	BRCA & HRD (TNBC)

Referral Laboratory	Service provided
Poundbury Cancer Institute Newborough House 3 Queen Mother Square Poundbury Dorchester Dorset	PDL1 (breast)
University Hospitals Birmingham The Molecular Pathology Diagnostic Service Clinical Laboratory Services, Level -1 Birmingham, West midlands	PDL1 (H&N; UGI) HER2 (UGI) MSI (UGI)
Exact Sciences UK Ltd (formerly Genomic Health Sciences) Genomic Health Inc. 501 Galveston Drive 94063 Redwood City California USA	Oncotype Dx Breast Cancer Assay
Molecular Haematology Laboratory C Floor Tower Block Belfast City Hospital BT9 7AB	MYD88
UKHSA Mycology Reference Laboratory National Infection Services, UKHSA South West Laboratory Science Quarter Southmead Hospital Bristol BS10 5NB	Pan-Fungal PCR
Leeds General Infirmary Department of Microbiology Old Medical School Thoresby Place Great George Street Leeds, LS1 3EX	*Mycobacterium* PCR

Referral Laboratory	Service provided
Charing Cross Hospital Trophoblastic Tumour Screening and Treatment Centre Medical Oncology Department Charing Cross Hospital Fulham Palace Road London W6 8RF	Hydatidiform Mole
Cellular Pathology Services 12 Orbital 25 Business Park Dwight Road Northwood Watford WD18 9DA UK	Histopathology Report Outsourcing (UKAS: 9997)
Source Bioscience 1 Orchard Place Nottingham Business Park Nottingham NG8 6PX	Histopathology Report Outsourcing (UKAS 9571)

Instructions for Sender / Requestor

Details on sample requirements, volumes, containers, preservation and labelling are provided below.

All tests requests should be sent using the appropriate form. Example copies of these are provided within each service area.

Factors Known to Affect Performance

Factor	Impact	Possible Cause	Solution
Crush Artefact	Distortion of Cells	Specimen damaged during removal	Care taken during excision to avoid trauma, excessive force or tearing
Drying Artefact	Cells appear to be dehydrated and shrunken	Specimen left to dry out prior to fixation and/or sample is left on absorbant material following removal	Specimen should be directly transferred to container of fixative

Heat Damage	Tissue margins distorted and cells damaged	Use of excessive cauterisation during removal	Where possible, avoid heat during removal
Chemical Damage	Inadequately fixed	Use of inappropriate fixatives, or out of date, or poor quality fixative agents	Use verification batch, within date and compliant with storage recommendations
Inadequate Volume of Fixative	Degradation of tissue, loss of tissue for adequate morphological assessment	Inappropriate container size Volume of fixative too low	Contact laboratory if container supply short Esnure adequate stock at location Ensure container contains x10 volume of fixative to specimen
Inadequate Fixation	Degradation of tissues and cells, loss of nuclear detail, inadequate or limited morphological assessment	Inappropriate container size Failure to transfer specimen immediately after removal Failure to transfer specimen immediately to the laboratory Storing specimen and fixative at low temperatures Incorrect fixative use	Ensure container contains x10 volume of fixative to specimen Ensure transport is timely Ensure correct storage conditions
Transport Delay Greatest Impact to Fresh Specimens	Degradation of tissues and cells, loss of nuclear detail, inadequate or limited morphological assessment, alternatively excessive fixation can create tissue brittleness and loss of antigenicity (ICC)	Porter/transport team not alerted Poor communication at site Laboratory not alerted Handbook guidance not followed re core hours Traffic delays	Ensure laboratory and transport team contacted in advance Ensure most appropriate transport is selected

Health & Safety

All biological samples represent a potential health hazard to healthcare staff. Please ensure that specimens are properly sealed before transportation. Syringe needles must be removed and replaced by caps, containers should not be overfilled to avoid leaking. Visibly leaking or contaminated sample containers must NOT be sent to the laboratory.

High-Risk Specimens

Specimens from patients known or suspected to contain a Hazard Group 3 (Cat 3) pathogen, for example, *Mycobacterium tuberculosis*, Hepatitis B virus or HIV, must be clearly identified with a hazard 'Hazard Group 3 (Cat 3) Pathogen' warning label affixed to both specimen container and accompanying request form. These specimens must be placed separately to all other routine samples on sending.

Urgent Specimen Requests

If an urgent result is required, please follow the information provided in the section above, titled "Urgent Requests."

Consultative Service

Advice on the interpretation of results, further investigation and management is available. Requests by clinicians for further, more complex investigations must be made within 3 days of receipt of the specimen in the laboratory.

Transport

Once the specimen has been placed in the appropriate specimen container with an accompanying request form (in separate a plastic specimen transport bag) and sealed. The specimen transport bag should then be placed into a Histology and Cytology secondary protective carrier transport bag (UN3373 compliant) and dispatched immediately to the laboratory.

Care should be taken when sending large specimen containers up to 20L.

Minimum Acceptance Criteria (MAC)

In order to identify the correct patient and issue a report back to the correct requesting source and clinician, the request must contain the minimum acceptance criteria stated.

Note: Primary care requestors will use traditional paper request forms. Secondary care requestors will use the electronic EPIC request form; these must be printed and sent to the laboratory along with the specimen.

Paper forms will be accepted from a limited number of agreed secondary care requestors, including the breast screening programme and the emergency department. Paper request form use is permitted from secondary sources during contingency (this includes all 'downtime' periods – e.g. maintenance).
The above practices apply to histology and cytology specimens.

- Mandatory MAC MUST be present on ALL sample container(s) and the corresponding request form to meet the sample acceptance for Laboratories and LIMS.
- Desirable MAC MUST be considered by the User as part of good patient management / care.

	Mandatory	Desirable
Sample	1. Unique identifier number* 2. Patient Official First Name 3. Surname 4. Date of Birth (dd/mm/yyyy) 5. Mother's Name (mortuary only) ***The Health & Care Number must be used unless**:- An emergency situation – use local hospital EMERGENCY numbering system. **For Slides: Patient Official First Name, Surname and Date of Birth written in pencil. Health & Care Number will be accepted in place of Date of Birth.	1. Sex (Male/Female/Other)
Request Form	1. Unique identifier number* 2. Patient Official First Name 3. Surname 4. Sex (Male/Female/Other) 5. Date of Birth (dd/mm/yyyy) 6. Mother's Name (mortuary only) 7. Date and Time of Sample Collection 8. Requester Name / Code 9. Source (Ward / Clinic /GP) 10. Investigation (test) Required 11. Anatomical site and specimen type 12. Clinical Information (plus gestation if EPL/POC) 13. EPL/POC Record Form 14. Body Transfer Form (mortuary only) 15. Requesting Clinician Signature ***The Health & Care Number must be used unless:-** An emergency situation – use local hospital EMERGENCY numbering system.	1. Patient History 2. Current or other relevant medication 3. Patient Address, including postcode 4. Hazard Group 3 (Cat3) Sticker, if applicable 5. Printed Name of Sample collector

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

Histopathology Specimens

Name of Test	**Histopathology Examination** Histopathology is the study of diseases of tissues which is central to diagnosis. It is fundamental in cancer diagnostics and involves the key processes: dissection, tissue processing, section preparation, HE staining, and morphological assessment. All tissue removed for diagnosis should be submitted to the laboratory for examination immediately and in 10% neutral buffered formalin to prevent autolysis and putrefaction.
Container Type	**Small Specimens Container, 60ml** Specimen containers with 60ml of 10% formalin fixative are suitable for small specimens, biopsies and smaller excision specimens. Small specimen containers are traditionally transparent, and contained a prefilled quantity of formalin for ease. **Medium Specimen Containers, 200-500ml** Specimen containers must be of suitable size i.e.: they should hold at least three times volume of fixative in ratio to the size of a specimen to ensure adequate fixation. Avoid cramming specimens into containers. Poor fixation can impact on downstream processing quality. Opaque containers should be used for products of conception/early pregnancy loss tissue. **Large Specimen Containers, 1L, 2.5L, 5L and 20L** Specimen containers must be of suitable size i.e.: they should hold at least three times volume of fixative in ratio to the size of a specimen to ensure adequate fixation. Avoid cramming specimens into containers. Poor fixation can impact on downstream processing quality. Opaque containers should be used for products of conception. (1ltr KBB000001, 2.5ltr KBB000002, 5ltr KBB000004, 20ltr KBB000004). These items are available via FPL eProcurement catalogue or via laboratory stores.

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

Preservative requirements
Tissue must be sent to the laboratory in the fixative 10% neutral buffered formalin. Do not delay placing specimens into the fixative and ensure there is adequate fixative volume. Failure to do so will impact on downstream processing quality; these are known factors to impact.

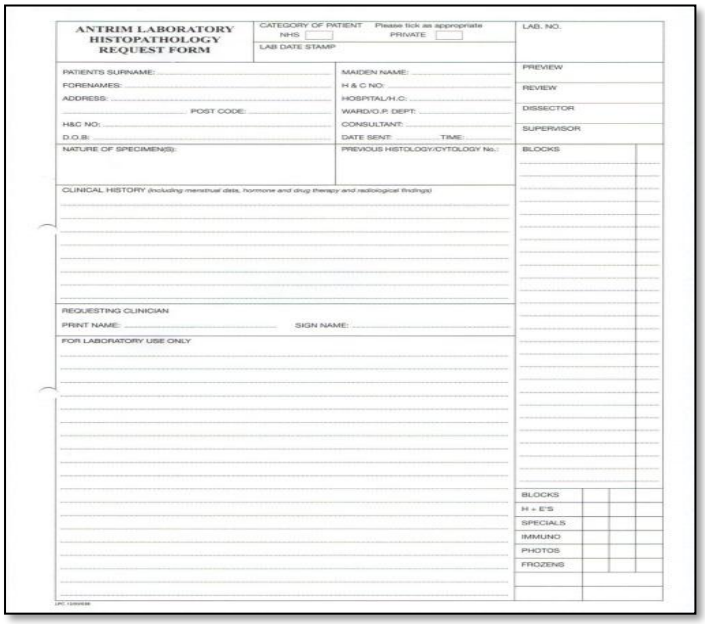
Sample Labelling

Specimens must be accompanied by an appropriate request form.
Primary Care Sources: Traditional Paper Histopathology Request Form.
Secondary Care Sources: Electronic Epic Histopathology and Diagnostic Cytology Request Form.
Please ensure the MAC mandatory requirements are adhered to in full, for all samples and request forms to avoid laboratory processing delay, or rejection.

Red Flag / Urgent / Priority Requests

Specimens must be accompanied by an appropriate request form.
Primary Care Sources: Traditional Paper Histopathology Request Form.
Secondary Care Sources: Electronic Epic Histopathology and Diagnostic Cytology Request Form.
Please ensure the MAC mandatory requirements are adhered to in full, for all samples and request forms to avoid laboratory processing delay, or rejection.

Completion of Request Form


ANTRIM LABORATORY HISTOPATHOLOGY REQUEST FORM

CATEGORY OF PATIENT Please tick as appropriate NHS PRIVATE

LAB DATE STAMP

LAB. NO.

PATIENTS SURNAME:
FORENAMES:
ADDRESS:
POST CODE:
H&C NO:
D.O.B:

MAIDEN NAME:
H & C NO:
HOSPITAL/H.C:
WARD/O.P. DEPT:
CONSULTANT:
DATE SENT: TIME:

PREVIEW
REVIEW
DISSECTOR
SUPERVISOR

NATURE OF SPECIMEN(S):
PREVIOUS HISTOLOGY/CYTOLOGY No.:
BLOCKS

CLINICAL HISTORY (including menstrual data, hormone and drug therapy and radiological findings)

REQUESTING CLINICIAN
PRINT NAME: SIGN NAME:

FOR LABORATORY USE ONLY

BLOCKS
H + E'S
SPECIALS
IMMUNO
PHOTOS
FROZENS

Traditional Paper Histopathology Request Form (Primary Care)

****MAC mandatory sample and request form requirements are outlined the section above****

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

Electronic EPIC Request Form Example (Secondary Care)

Encompass label attached here

HSC HISTOPATHOLOGY & DIAGNOSTIC CYTOLOGY REQUEST FORM

Patient Location: NT WBY DAY SURGERY UNIT

Requesting Clinician Signature:

LAB USE ONLY Lab Label Attached

Speciality	Code
U /A / R	Points
Date	Dissector
Date/Time	
Blocks	

Patient Identification
Cell Path One NT SURG
Northern Ireland
NHS/Private: NHS [1]

HCN: [redacted]
DOB: 7/10/1994
Sex: female
MRN: 800006783
Unit: NT WBY DAY SURGERY THEATRE
Room/Bed: Nt wby day surgery theatre / Wby day surg

LAB USE ONLY
Received / Checked by: /
Instructions:

Surgeon Information
Panel 1
Surgeon: Physician SURGERY, MD
Procedure: [redacted]
Laterality: Bilateral
Role: Consultant Anaesthesia General

Case Information
Date: 7/10/2024
Location: NT WBY Day Surgery Unit
Patient class: Day Case
Case classification: 7: Elective: Urgent
Theatre: DS 02
Status: Unposted
Specialty: ENT

Pre-op Diagnosis
No pre-op diagnosis codes associated with the log.

Specimens

ID	Source	Order ID	Tests	Collected At	Frz?	Priority	Sample Details	Lab Check
A	Cervical	1291683	HISTOLOGY	7/10/24 09:40		Routine	Cervical Biopsy (CXBX)	

Additional Information
Comments: CXBX TEST CASES

Transportation of Samples

Specimens should be sent to the laboratory fixed in 10% neutral buffered formalin. Samples may be sent via hospital porter, hospital transport or taxi (at the risk of the sender).

Blue specimen bags should be used to prevent drop off delay to the correct laboratory department, however clear sealed biological bags will be accepted for larger specimens.

Specimens should be transported at room temperature.

Failure of ensure adequate fixative to specimen ratio and delays in transportation are known to negatively impact on downstream processing and overall quality. The importance is of this further emphasised for large or resection specimens.

For further advice, please contact the laboratory directly on: 028 9442 4000 ext 33 4879 or ext 33 2080.

Specialist Biopsies- Temporal artery and Peripheral nerve biopsies

Name of Test	**Specialist Biopsies for Histopathological Examination:** **Temporal artery and Peripheral nerve biopsies** All removed tissue for diagnosis should be submitted to the laboratory for examination immediately.
Container Type	**Small Specimen Container, 60ml** Specimen containers with 60ml of 10% formalin fixative are suitable for small specimens, biopsies and smaller excision specimens. Small specimen containers are traditionally transparent, and contained a prefilled quantity of formalin for ease. **Preservative requirements** Routine biopsies should be sent to the laboratory fixed in 10% buffered formalin. All items listed above are available via FPL eProcurement catalogue or via laboratory stores.

Sample Collection

Temporal artery and Peripheral nerve biopsies MUST be placed on thin card in a longitudinal manner prior to fixative. This ensures specimens are fixed in a straight position which is conducive to downstream processes.

Sample Labelling

Specimens must be accompanied by an appropriate request form.
Primary Care Sources: Traditional Paper Histopathology Request Form.
Secondary Care Sources: Electronic Epic Histopathology and Diagnostic Cytology Request Form.
Please ensure the MAC mandatory requirements are adhered to in full, for all samples and request forms to avoid laboratory processing delay, or rejection.

Red Flag / Urgent / Priority Requests

Red flag cases should be clearly indicated on the request form. Paper forms should include a red flag sticker placed on the Request Form. Electronic request forms should be clearly indicated during the electronic completion steps. If stickers are not available, "**RED FLAG SPECIMEN**" or "**PRIORITY**" should be clearly written and **HIGHLIGHTED** at the top of the request form.

Specialist Biopsies – Transfer to HSCNI laboratories

There are a number of specialist biopsies are sent to the Institute of Pathology Laboratory, BHSCT including:

1. **Skin biopsies** requiring **immunofluorescence** for bullous disorders and possible Lupus Erythematosus. Contact Institute of Pathology, BHSCT, 028 961 50215.

2. **Muscle and peripheral nerve biopsies** for investigation of neuromuscular disorders. Please discuss with the neuropathology team before taking the biopsy. Contact Institute of Pathology, BHSCT, 028 961 50216.

3. **Needle kidney biopsies** for investigation of medical renal disease**.** These biopsies are usually done at BCH Renal Unit. Contact Institute of Pathology, BHSCT, 028 961 50216.

4. **Medical Liver cores** for investigations into liver disease caused by hepatitis, autoimmune disorders. Contact Institute of Pathology, BHSCT, 028 961 50216.

Note: If in doubt please check with the laboratory before submitting taking the biopsy. It is imperative to avoid delay for specialist biopsy material.
Note: Please refer to BHSCT laboratory manual: *Cellular-Pathology-User-Manual (1).pdf*

Early Pregnancy Loss Tissues (EPL)

Name of Test	Routine Early Pregnancy Loss Tissue / Products of Conception (EPL / POC)
	EPL/POC tissues are routinely sent to the pathology department. All POC tissue must be accompanied by the standard regional record form, “Early Pregnancy Loss – Record of Burial or Cremation Arrangements Form”, along with the standard Histopathology Request Form. The EPL Record Form details the patient’s wishes regarding subsequent handling and burial. This form applies where any Fetus present is below 12-week size (<6cm crown rump). By law, the laboratory must follow the patient’s choices in this area, therefore any early miscarriage cases not accompanied by this record form will be returned to the source.

	Note: If pathological examination is required on a fetus >12 week's size and above, or greater than 6cm crown rump length, the fetus and pregnancy tissues should be sent to the Department of Paediatric Pathology RVH via the Antrim Mortuary with the relevant completed documentation, "Consent form for a hospital post mortem examination of a baby." Note: If medical genetics is required, please refer to section below.
Container Type	Opaque (white) histopathology specimen container, 500ml with a spill and leak proof lid. Specimen containers must be of suitable size i.e.: they should hold at least three times volume of fixative in ratio to the size of a specimen to ensure adequate fixation. Avoid cramming specimens into containers. Poor fixation can impact on downstream processing quality. Opaque containers should be used for products of conception/early pregnancy loss tissue. Caes requiring medical genetics should refer to details below.

Sample Labelling

Specimens must be accompanied by an appropriate request form.
Primary Care Sources: Traditional Paper Histopathology Request Form.
Secondary Care Sources: Electronic Epic Histopathology and Diagnostic Cytology Request Form.
Please ensure the MAC mandatory requirements are adhered to in full, for all samples and request forms to avoid laboratory processing delay, or rejection.

Red Flag / Urgent / Priority Requests

Red flag cases should be clearly indicated on the request form. Paper forms should include a red flag sticker placed on the Request Form. Electronic request forms should be clearly indicated during the electronic completion steps. If stickers are not available, "**RED FLAG SPECIMEN**" or "**PRIORITY**" should be clearly written and **HIGHLIGHTED** at the top of the request form.

An "Early Pregnancy Loss – Record of Burial or Cremation Arrangements Form" must be **submitted together** with the Histolopathology Request Form.

****MAC mandatory sample and request form requirements are outlined the section above****

****Gestation details must also be supplied****

Completion of Request Form

Refer to: Histopathology Request Form (see section above)

Refer to: HSC Early Pregnancy Loss 2ppEDIT (hscni.net)

Transportation of Samples

Specimens should be sent to the laboratory fixed in 10% neutral buffered formalin. Samples may be sent via hospital porter, hospital transport or taxi (at the risk of the sender).

Specimens should be transported at room temperature.

Blue specimen bags should be used to prevent drop off delay to the correct laboratory department, however clear sealed biological bags will be accepted for larger specimens.

Failure of ensure adequate fixative to specimen ratio and delays in transportation are known to negatively impact on downstream processing and overall quality. The importance is of this further emphasised for large or resection specimens.

For further advice, please contact the laboratory directly on: 028 9442 4000 ext 33 4879 or ext 33 2080.

Specialist Medical Genetic Testing - Recurrent Miscarriage

On occasion, recurrent miscarriage tissue may be transferred for medical genetics testing at BHSCT.

In line with the Royal College of Obstetricians and Gynaecologists Green-Top Guideline No.17 (2011) "The investigation and treatment of couples with recurrent first-trimester and second trimester miscarriage", the preferred testing strategy is by the genetic analysis of products of conception (POC) using molecular techniques to detect chromosome imbalance in the third or subsequent consecutive miscarriage. Parental testing is now advised only when an unbalanced structural chromosomal abnormality is found in the POC. Full POC samples must be sent to the referring hospital's

pathology laboratory, which will then send appropriate tissue samples to the Regional Cytogenetics laboratory.

Forms Required:

a) **Electronic EPIC Request Form** (see above)

b) **DOH Regional Early Pregnancy Loss Record of Burial Form** (see above)

c) **Medical Genetics Request Form**, R21 From available on EPIC (please refer to BHSCT Laboratory Handbook for additional information that may be relevant to the request).

If you have further queries, please contact the NHSCT Bereavement Officer via hospital switchboard on 028 9442 4000.

Container Required:

Opaque (white) histopathology specimen container, 500ml with a spill and leak proof lid.

Do **NOT** use formalin fixative. Specimens should be sent dry or in a small volume of saline if the tissue needs to be stored refridgerated overnight.

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

Transport of Samples:

1. Telephone the laboratory in advance to alert them of the sample for referral via extension 33 2080.

   Note: core operating hours Monday-Friday 09:00-17:00 hrs.

2. Contact hospital porters and request urgent transport directly to department. The specimen MUST arrive to the laboratory within the stated core operating hours.

3. If the tissue does not arrive within core operating hours of the department (Monday to Friday 09:00 - 17:00), the specimen will be placed in the fridge and held for transport.

   Note: If the specimen is to be stored refrigerated it should be keep moist with a small amount of sterile saline.

4. Transport to the department immediately. Ensure specimen is delivered within core hours. It is the responsibility of the sender to make sure the specimen is transported in accordance with this procedure.

Diagnostic Cytology Pathology

Diagnostic cytology is the study of individual cells, and is recognised a branch of pathology in aid of diagnosing disease and involves the key processes: slide preparation, staining and morphological assessment. The table below outlines the sample nature and requirements for Diagnostic Cytology.

Test	Sample Volume	Storage / Container	Comments
Common Bile Duct Brushings	Distal 5-10cm of the disposable brush with wire stem cut.	Hologic Thinprep Preservcyt non-cervical cytology (21ml preservcyt)	*Do not re-sheath brush.*
Sputum	Three specimens should be collected on consecutive days in the early morning. This must be a deep cough specimen.	Universal clear plastic aseptically manufactured 30ml screw cap with label (order code: kbc000009) Universal clear plastic aseptically manufactured 60ml screwcap with label (order code: kbc000124)	No preservative required. Send fresh. Note: salivary sample will not suffice. Note: collection should take place before patient has eaten or brushed teeth.

Bronchial washings, Trap Sputa, Bronchoalveolar Lavage*	Maximum of 25mls collected per container.	Universal clear plastic aseptically manufactured 30ml screw cap with label (order code: kbc000009)	No preservative required. Send fresh.
Bronchial Brushings*	Distal 5-10cm of the disposable brush with wire stem cut.	Hologic Thinprep Preservcyt non-cervical cytology (21ml preservcyt)	*Do not re-sheath brush.*
Serous Effusions	Submit as much Pleural, Peritoneal or Pericardial effusion from the patient as possible. Volumes of under 50 ml may be unreliable for detection of malignancy.	Universal clear plastic aseptically manufactured 30ml screw cap with label (order code: kbc000009) Universal clear plastic aseptically manufactured 60ml screwcap with label (order code: kbc000124) Universal aseptically manufactured 150ml or 250ml screwcap with label container (order code: kbc000005 (150ml; order code kbc000236 250ml) Universal urine container 2.5L with label (order code: kbc000004)	Examination of larger volumes of fluid greatly enhances the specificity and sensitivity of this test. No preservative required. Send fresh. Do NOT use drainage bags Do NOT send specimen in sharps or burn bins (these will not be opened by laboratory staff)

Fluid Specimens (Cyst or Other) See below for *Joint Fluids* See below for *CSF* See below for *Urine*	Submit as much fluid from the patient as possible. Examination of larger volumes of fluid greatly enhances the specificity and sensitivity of this test.	Universal clear plastic aseptically manufactured 60ml screwcap with label (order code: kbc000124) Universal aseptically manufactured 150ml or 250ml screwcap with label container (order code: kbc000005 (150ml; order code kbc000236 250ml)	No preservative required. Send fresh. Do NOT spilt specimens in smaller containers. Do NOT use drainage bags Do NOT send specimen in sharps or burn bins (these will not be opened by laboratory staff)
Joint Fluids	Submit a minimum of 1ml of synovial fluid. Examination of larger volumes of fluid greatly enhances the specificity and sensitivity of this test.	Fluids requiring crystal analysis must be sent in 1.3mL container (Lithium heparin bullet bottle).	No preservative required. Send fresh. Do NOT spilt specimens in smaller containers. Do NOT use drainage bags Do NOT send specimen in sharps or burn bins (these will not be opened by laboratory staff)

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

Cerebrospinal Fluids	Submit a minimum of 1ml of fluid.	Universal clear plastic aseptically manufactured 30ml screw cap with label (order code: kbc000009)	Contact MUST be made to the laboratory to alert in advance of transport
Urine	Three specimens should be collected on consecutive days (send daily) Do NOT use first daily urine passing. Full stream mid-morning urine is preferred.	Universal clear plastic aseptically manufactured 60ml screwcap with label (order code: kbc000124) Universal aseptically manufactured 150ml or 250ml screwcap with label container (order code: kbc000005 (150ml; order code kbc000236 250ml) Universal urine container 2.5L with label (order code: kbc000004)	No preservative required. Send fresh. Do NOT use other urine specimen containers (those with boric acid etc)
Breast Fine Needle Aspirations	Microscope slides (labelled with three unique patient identifier) and fixation type should be detailed. The laboratory prefers 4 air dried slides.	Cytology fixative. Slides should be sent in slide mailers.	Ensure air dried slides are completely dry. Slides shold be waved vigorously to ensure rapid drying.

	Remaining material should be flushed into Hologic ThinPrep PreservCyt vial.		
Fine Needle Aspirations (lymph node, thyroid, salivary gland or other palpabable masses)	Microscope slides (labelled with three unique patient identifier) and fixation type should be detailed. The laboratory prefers 3 air dried slides and 3 wet fixed slides. Wet fixed slides should be immersed in cytology fixative. Remaining material should be flushed into Hologic ThinPrep PreservCyt vial.	22 guage needle and 10ml syringe are traditionally used to obtain specimen. Cytology fixative. Slides should be sent in slide mailers.	If the aspirate is scanty, the preparation of the air-dried smears should take preference Rapid fixation of the cellular sample is crucial for wet fixed smears. Ensure air dried slides are completely dry. Slides shold be waved vigorously to ensure rapid drying.

***Respiratory Specimens - Requests for Pneumocystis analysis**

This test will only be provided by the Regional Virology Laboratory in Belfast.
If this test is required with a specimen for cytological investigation, cytology will be undertaken and the residue sample sent to the Regional Virology Laboratory.
If any clinical advice is required in relation to Pneumoncystis jirovecii this can be sought from the Duty Virologist.

Sample Labelling

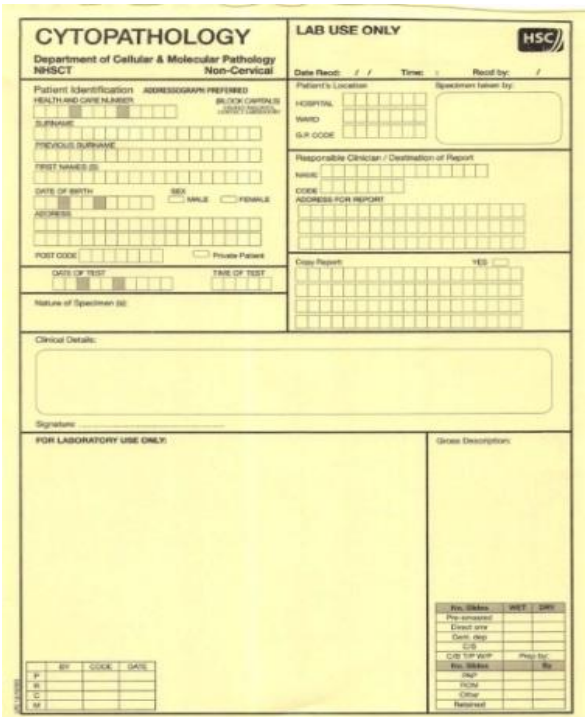
Specimens must be accompanied by an appropriate request form.
Primary Care Sources: Traditional Paper Diagnostic Cytology Request Form.
Secondary Care Sources: Electronic Epic Histopathology and Diagnostic Cytology Request Form; this must be printed and sent to the laboratory along with the specimen.
Note: Traditional Paper Diagnostic Cytology Forms (yellow) and Breast Screening Forms (pink) will continue to be used for Breast Screening Programme patients only.

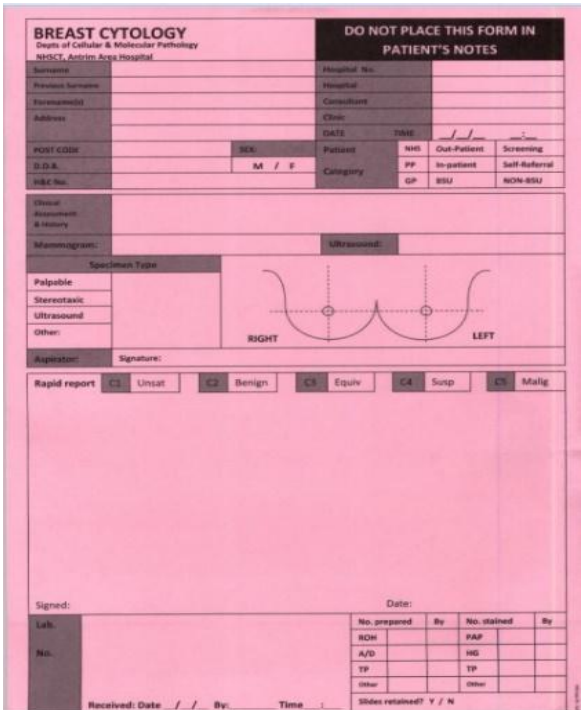
Note: Paper request form use is permitted from secondary sources during contingency (this includes all 'downtime' periods – e.g. maintenance).

Please ensure the MAC mandatory requirements are adhered to in full, for all samples and request forms to avoid laboratory processing delay, or rejection.

Completion of Request Form

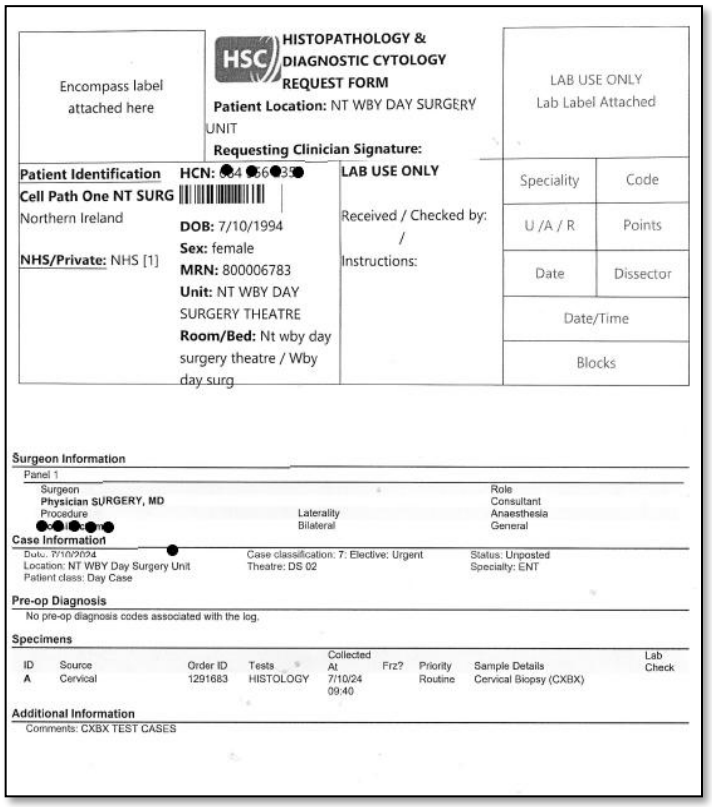
Traditional Paper Diagnostic Cytology Request Form (left, yellow) and Breast Screening Cytology Request Form (right, pink). *Primary Care and Breast Screening Programme Patients Only.*





Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

Electronic EPIC Request Form Example (Secondary Care)



Encompass label attached here

HISTOPATHOLOGY & DIAGNOSTIC CYTOLOGY REQUEST FORM

Patient Location: NT WBY DAY SURGERY UNIT

Requesting Clinician Signature:

LAB USE ONLY
Lab Label Attached

Patient Identification
Cell Path One NT SURG
Northern Ireland
NHS/Private: NHS [1]

HCN: [redacted]
DOB: 7/10/1994
Sex: female
MRN: 800006783
Unit: NT WBY DAY SURGERY THEATRE
Room/Bed: Nt wby day surgery theatre / Wby day surg

LAB USE ONLY
Received / Checked by: /
Instructions:

Speciality	Code
U /A / R	Points
Date	Dissector
Date/Time	
Blocks	

Surgeon Information
Panel 1
Surgeon: **Physician SURGERY, MD** | Role: Consultant Anaesthesia General
Procedure: [redacted] | Laterality: Bilateral

Case Information
Date: 7/10/2024 | Case classification: 7: Elective: Urgent | Status: Unposted
Location: NT WBY Day Surgery Unit | Theatre: DS 02 | Specialty: ENT
Patient class: Day Case

Pre-op Diagnosis
No pre-op diagnosis codes associated with the log.

Specimens

ID	Source	Order ID	Tests	Collected At	Frz?	Priority	Sample Details	Lab Check
A	Cervical	1291683	HISTOLOGY	7/10/24 09:40		Routine	Cervical Biopsy (CXBX)	

Additional Information
Comments: CXBX TEST CASES

****MAC mandatory sample and request form requirements are outlined the section above****

****Note: Accompanying slides must detail 3 patient identifiers****

Transportation of Samples

All specimens should be transported to the laboratory immediately. This is of particular importance for CSF and fresh specimens.

Samples may be sent via hospital porter, hospital transport or taxi (at the risk of the sender).

Specimens should be transported at room temperature.

Blue specimen bags should be used to prevent drop off delay to the correct laboratory department, however clear sealed biological bags will be accepted for larger specimens.

For further advice, please contact the laboratory directly on: 028 9442 4000 ext 33 4879 or ext 33 2028.

Molecular Pathology

Name of Test	**HPV Genotyping** (not on UKAS scope)
Samples Required	The Seegene Allplex™ HPV28 Detection kit is a multiplex RT-PCR assay that enables simultaneous amplification and detection of target nucleic acids of 19 high-risk HPV types (16, 18, 26, 31, 33, 35, 39, 45, 51, 52, 53, 56, 58, 59, 66, 68, 69, 73, 82) and 9 low-risk HPV types (6, 11, 40, 42, 43, 44, 54, 61, 70) as well as an Internal Control (IC). The assay is CE-IVD approved for use in cervical specimens and self-collected vaginal specimens, and has been internally verified for the detection of HPV in liquid based cervical (LBC) samples (ThinPrep) and formalin fixed paraffin embedded (FFPE) tissue of gynaecological and non-gynaecological origin.
Primary sample volume	**Liquid Based Cytology** A minimum of 1ml of PreservCyt Solution is required to complete the testing. Where possible, a stained slide should also be provided to facilitate pathological review of the sample prior to testing. **Formalin Fixed Paraffin Embedded Tissue, or Cell Block** – Send Block with representative tissue for testing. If a specific area of interest within the tissue is required for be tested, please submit an H&E slide with the area of interest marked on the stained slides with a marker pen. Use the letter “T” to indicate the area to be tested.

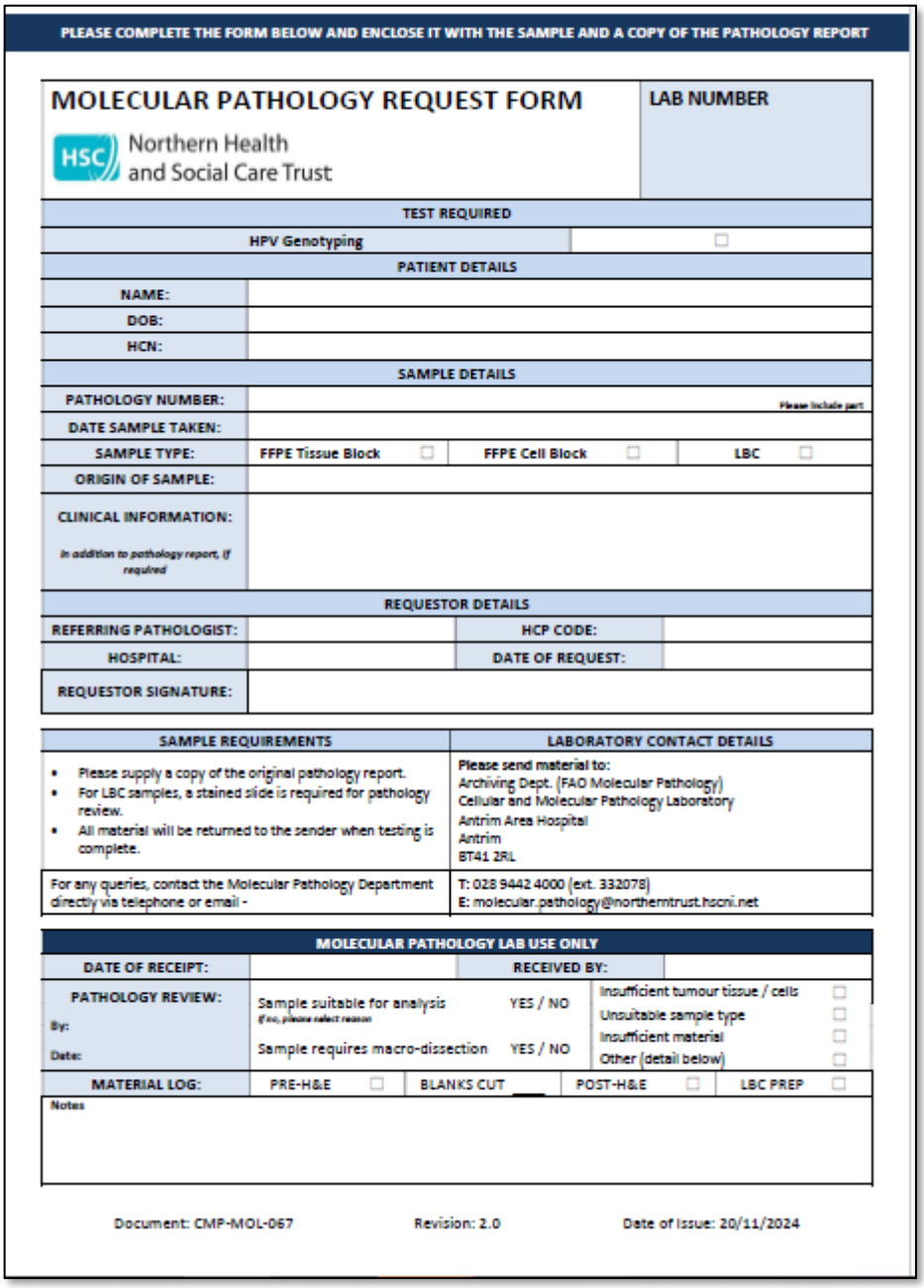
Sample Collection

Not applicable. This test is an ancillary molecular test.

Sample Labelling

Specimens must be accompanied by a Molecular Pathology Request Form; traditional paper request (see below). Please ensure the MAC is applied to all samples and request form to avoid rejection.

Completion of Request Form



PLEASE COMPLETE THE FORM BELOW AND ENCLOSE IT WITH THE SAMPLE AND A COPY OF THE PATHOLOGY REPORT

MOLECULAR PATHOLOGY REQUEST FORM

Northern Health and Social Care Trust

LAB NUMBER

TEST REQUIRED	
HPV Genotyping	☐

PATIENT DETAILS	
NAME:	
DOB:	
HCN:	

SAMPLE DETAILS			
PATHOLOGY NUMBER:	Please include part		
DATE SAMPLE TAKEN:			
SAMPLE TYPE:	FFPE Tissue Block ☐	FFPE Cell Block ☐	LBC ☐
ORIGIN OF SAMPLE:			
CLINICAL INFORMATION: *In addition to pathology report, if required*			

REQUESTOR DETAILS			
REFERRING PATHOLOGIST:		HCP CODE:	
HOSPITAL:		DATE OF REQUEST:	
REQUESTOR SIGNATURE:			

SAMPLE REQUIREMENTS	LABORATORY CONTACT DETAILS
• Please supply a copy of the original pathology report. • For LBC samples, a stained slide is required for pathology review. • All material will be returned to the sender when testing is complete.	Please send material to: Archiving Dept. (FAO Molecular Pathology) Cellular and Molecular Pathology Laboratory Antrim Area Hospital Antrim BT41 2RL
For any queries, contact the Molecular Pathology Department directly via telephone or email -	T: 028 9442 4000 (ext. 332078) E: molecular.pathology@northerntrust.hscni.net

MOLECULAR PATHOLOGY LAB USE ONLY

DATE OF RECEIPT:		RECEIVED BY:	
PATHOLOGY REVIEW: By: Date:	Sample suitable for analysis (if no, please select reason) YES / NO		Insufficient tumour tissue / cells ☐ Unsuitable sample type ☐ Insufficient material ☐ Other (detail below) ☐
	Sample requires macro-dissection YES / NO		

MATERIAL LOG:	PRE-H&E ☐	BLANKS CUT ___	POST-H&E ☐	LBC PREP ☐

Notes

Document: CMP-MOL-067 Revision: 2.0 Date of Issue: 20/11/2024

****MAC mandatory sample and request form requirements are outlined the section above****

Transportation of Samples

All specimens, FFPE tissue or Cell Blocks should be transported to the laboratory immediately.

Samples may be sent via hospital porter, hospital transport or taxi (at the risk of the sender).

Specimens should be transported at room temperature.

For further advice, please contact the laboratory directly on: 028 9442 4000 ext 33 4879 or ext 33 2080.

Combined Haematological Reporting Service (CHRS)

Name of Test	**Haematological Malignancy Referral** CHRS resides within the molecular laboratory of the department to manage the provision of equipment and reagents to Laurel House. This is a Haematology Oncology Outpatient's Unit located within Antrim Area Hospital (AAH). CHRS oversees the handling and processing of all bone marrow specimens once received into the laboratory. As part of the investigation of patients with a known or suspected haematological disorder, it is often necessary to perform a Bone Marrow Aspirate (BMA) and trephine biopsy procedure. It may also be necessary to take a peripheral blood (PB) sample. All onward referrals relating to the CHRS specimen are overseen by the molecular team.
Primary Sample Volume	**Bone Marrow Aspirate**: 1. **Smeared Air-Dried Slides** The first pull of 0.5-1ml aspirate should be used to produce bone marrow aspirate slides. These are smeared onto pink frosted glass slides and labelled with two unique patient identifiers.

2. **Fresh Bone Marrow Aspirate**
   At least 2-3ml should be aliquoted into the following containers and mixed by inverting. Send immediately to the laboratory.

   Aliquot 1- "Cytogenetics" labelled container containing cytogenetics media.
   Aliquot 2- "Flow" labelled container containing flow cytometry media.

Bone Marrow Trephine:
The biopsy should be immediately placed into a 60ml container of 10% formalin fixative suitable for small specimens. Small specimen containers are traditionally transparent, and contained a prefilled quantity of formalin for ease.

Care should be taken to limit the exposure of formalin to the operator, only remove lid when placing biopsy in container and immediately close and seal lid. Do not breathe in the formalin vapour.

Peripheral Blood:
If required, peripheral blood should be drawn directly into an EDTA blood collection tube with PURPLE lid. **Peripheral blood is usually only requested in the case of suspected MPN.**

Container Type	Specified Above.

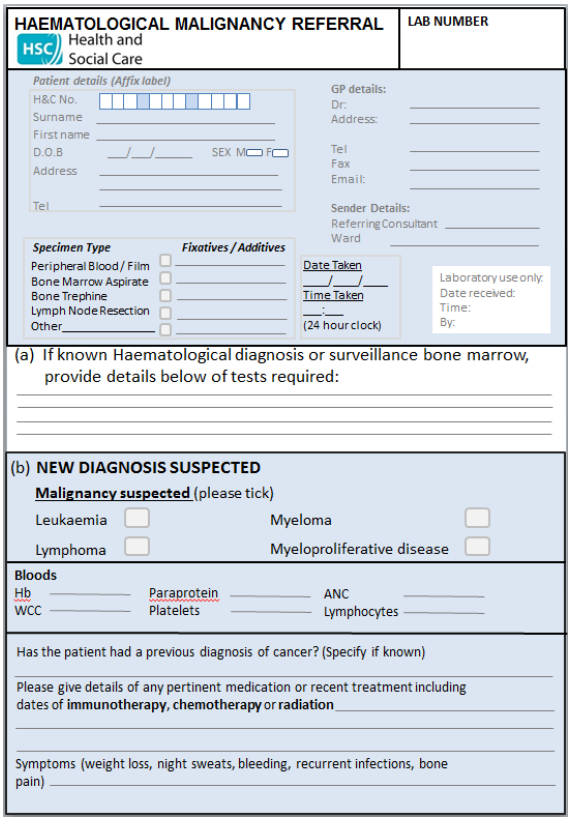
Sample Collection

Molecular will provide sampling packs and send ahead of agreed scheduling days. These will contain a guidance poster (see attached copy below) for reference. Please note, cytogenetics and flow cytometry media are not provided within these packs as they must remain refrigerated during storage and prior to sample taking. These must be requested in addition to the packs. Please contact the laboratory on extension 33 2078.

Sample Labelling

Specimens must be accompanied by a Haematological Malignancy Referral (see below).Please ensure the MAC mandatory requirements are adhered to in full, for all samples and request forms to avoid rejection.

Completion of Requestion Form



HAEMATOLOGICAL MALIGNANCY REFERRAL
HSC Health and Social Care
LAB NUMBER

Patient details (Affix label)
H&C No.
Surname
First name
D.O.B ___/___/_____ SEX M F
Address
Tel

GP details:
Dr:
Address:
Tel
Fax
Email:

Sender Details:
Referring Consultant
Ward

Specimen Type	*Fixatives / Additives*
Peripheral Blood / Film	
Bone Marrow Aspirate	
Bone Trephine	
Lymph Node Resection	
Other	

Date Taken ___/___/___
Time Taken ___:___ (24 hour clock)

Laboratory use only:
Date received:
Time:
By:

(a) If known Haematological diagnosis or surveillance bone marrow, provide details below of tests required:

(b) **NEW DIAGNOSIS SUSPECTED**
Malignancy suspected (please tick)
Leukaemia ☐ Myeloma ☐
Lymphoma ☐ Myeloproliferative disease ☐

Bloods
Hb ___ Paraprotein ___ ANC ___
WCC ___ Platelets ___ Lymphocytes ___

Has the patient had a previous diagnosis of cancer? (Specify if known)

Please give details of any pertinent medication or recent treatment including dates of **immunotherapy**, **chemotherapy** or **radiation**

Symptoms (weight loss, night sweats, bleeding, recurrent infections, bone pain)

****MAC mandatory sample and request form requirements are outlined the section above****

Transportation of Samples

All specimens should be transported to the laboratory immediately. Ensure samples are sealed and secured.

Samples may be sent via hospital porter or left at molecular reception by the Haematology team.

Specimens should be transported at room temperature.

For further advice, please contact the laboratory directly on: 028 9442 4000 ext 33 2078 or 33 2080.

Email the Molecular Pathology department with a list of samples for testing before transporting at:- molecular.pathology@northerntrust.hscni.net

CHRS Guidance Poster

Laboratory User Guidelines : Investigation of Haematological Disorders – Bone Marrow

As part of the investigation of patients with a known or suspected haematological disorder, it is often necessary to perform a Bone Marrow Aspirate (BMA) and trephine biopsy procedure. It may also be necessary to take a peripheral blood (PB) sample.

Combined Haematological Reporting Service Sampling Bag Contents

Laboratory User Guidelines (this document)
Haematological Malignancies Referral Request Form
16 blank slides in slide trays
1 x 11g needle
1 x 15g needle
1 x HistoPot for Bone Marrow Trephine

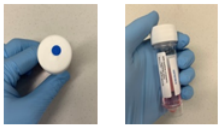
Combined Haematological Reporting Service Required but NOT INCLUDED in Sampling Bag

1 x BM Cytogenetics Transport Media (white lid with blue sticker)
1 x BM Flow Transport Media (white lid with red sticker)
1 x EDTA tube for PB if required (purple capped) with specimen bag

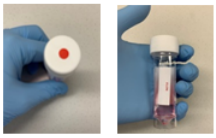
Bone Marrow Aspirate

Smeared Air-Dried Slides: the first pull of 0.5-1ml of aspirate should be used to produce bone marrow aspirate slides. These are prepared at the patient's bedside using pink frosted glass slides and labelled with two unique identifying pieces of information. Slides should be sent to the laboratory in plastic slide mailers.

Fresh Bone Marrow Aspirate: At least 2-3ml should be aliquoted into the following containers and mixed by inverting. **Send immediately to the laboratory.**



Aliquot 1: white lid & blue sticker pink cytogenetics transport media.



Aliquot 2: white lid & red sticker pink flow cytometry transport media.

Bone Marrow Trephine

Biopsies should be immediately placed into a HistoPot of 10% buffered formalin.
Care should be taken to limit the exposure of Formalin to the operator, only remove lid when placing biopsy in container and immediately close and seal lid. Do not breathe in the formalin vapour.

Peripheral Blood

If required, peripheral blood should be drawn directly into an EDTA blood collection tube. Peripheral blood is usually only requested in the case of suspected MPN.

IMPORTANT INFORMATION:
Specimens must be accompanied by a Haematological Malignancies request booklet. Please take time to fill the form in properly and check all specimens are labelled with two unique identifiers (Surname **AND** DOB **OR** Health and Care Number). Please provide extra addressographs for laboratory use.
Use Laboratory transport network to transport the specimen **immediately to the Cellular and Molecular Pathology Laboratory**, Antrim Hospital Laboratory.
As bone marrow specimens are fresh, please follow local H&S protocols for safe handling.
For advice please telephone the laboratory on 332078 or email molecular.pathology@northerntrust.hscni.net

CMP-MOL-081 V1.0

Type the test name / keyword into the text search box in the toolbar
Only valid on date of print

Mortuary

Service Area	Mortuary

Mortuary

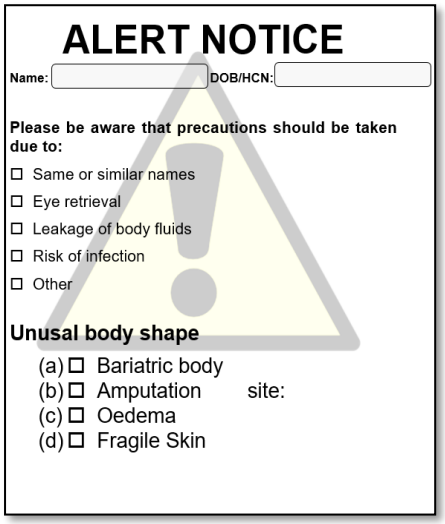
The primary function of the mortuary is to store the deceased until they are released for burial or cremation. The mortuary may also release bodies to the BHSCT and Coroner's Service where required.
The mortuary does not offer post-mortem services. Babies >24 weeks or infants will be transferred to BHSCT for onward referral to Alder Hey Children's Hospital, Liverpool. EPL <12 weeks (<6cm crown rump) will be examined on site, all tissues and foetus' >12 weeks are referred to BHSCT.

Appropriate documentation must be completed online via NIECR and EPIC at ward level. Failure to do so, can delay body release. Bodies must be sent with a completed body transfer form.

For reference, please refer to:

Death in an Acute Setting | NHSCT Staffnet

Body Preparation


ALERT NOTICE

Name: DOB/HCN:

Please be aware that precautions should be taken due to:

- ☐ Same or similar names
- ☐ Eye retrieval
- ☐ Leakage of body fluids
- ☐ Risk of infection
- ☐ Other

Unusual body shape

(a) ☐ Bariatric body
(b) ☐ Amputation site:
(c) ☐ Oedema
(d) ☐ Fragile Skin

Infected or leaking bodies must be placed in a body bag. PPE should be worn at all times. Risk of infection should be communicated by ward staff to the mortuary team. COVID-19 infected bodies should be contained in a body bag. Alert notices should be used (see below). These notices should also alert staff to similar or same names.

Transportation of the Deceased

All deceased should be transported to the mortuary as soon as possible. A transportation trolley for standard bodies should be used. Bariatric bodies should be transferred on the bariatric bed from the ward.

Infants transfer following a separate process. Please liaise with ward team and bereavement co-ordinator, extension 33 4992.

For further advice, please contact the laboratory directly on: 028 9442 4000 ext 33 4549.