Primary Specimen Collection Manual (Pathology User Manual)

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1 Introduction

This manual is designed to give an overall view of the services provided by the Department of Pathology and Laboratory Medicine. This manual is intended for users of the pathology service both within the hospital, and those from outside agencies. In January 2018, the National Maternity Hospital (NMH) implemented the Maternal Newborn–Clinical Management System (MN-CMS). This replaced the existing paper patient health record with an electronic Powerchart for obstetric and neonatal patients. This was further extended for all gynaecological patients in September 2019.

1.1 The Quality Policy of the Pathology Laboratory at the National Maternity Hospital

The Department of Pathology and Laboratory Medicine is committed to promoting and providing the highest quality diagnostic and consultative services for all its users. The department is committed to the implementation of the National Maternity Hospital mission statement.

The quality policy is implemented by the following means:

1) Implementation of a quality management system, the purpose of which is to review and continuously improve the quality of the services provided.
2) Setting quality objectives and plans to implement the quality policy and ensure it is appropriate to the purpose of the hospital.
3) Ensuring that all staff are familiar with the quality policy through publication of the quality manual to ensure user satisfaction.
4) Treating health and safety as a prime focus for both staff and visitors.
5) Upholding professional values and good professional practice.
6) Complying with all environmental legislation.

The department will comply with the standards set by International Standard ISO 15189, AML-BB, EU Directive 2002/98/EC, HIQA and INAB for the services and tests defined in the quality manual and is committed to:

1) Staff recruitment, training and development at all levels to provide an effective and efficient service to its users.
2) Providing and managing resources to ensure that laboratory examinations are processed to produce the highest quality results possible and fit for intended use.
3) Reporting results in ways, which are timely, confidential, accurate and are supported by clinical advice and interpretation when required.
4) Implementation of internal quality control, external quality assessment, audit and assessment of user satisfaction to continuously improve the quality of the service.
5) The safe testing, distribution and transfusion of blood and blood components.
6) Providing a service for patients that is free from discrimination

1.2 Guide to Using this Manual

A controlled up to date electronic version of this manual is available hospital wide in Q-Pulse software. Any printed copies are uncontrolled documents.

1.2.1 Using the “Table of Contents” for Navigation

One can navigate to any part of this document by holding down the CTRL key while also left clicking with the mouse in the appropriate area of the table of contents at pages 1-4 of this document.

1.3 Pathology Department Telephone Numbers

Insert (01) 637 before extension number for direct access from outside the hospital.

Figure 1: General Pathology Telephone Numbers

1.3.1 General Pathology	Contact Name	Phone/ Bleep
Director of Pathology and Consultant Pathologist	Dr Susan Knowles	Contact on mobile phone through hospital switch or ext. 3578
Laboratory Manager	Damian Lally	Ext: 3313 (Diverts to mobile if no answer)
Laboratory Administration	Edel Connolly	Ext: 3531
Quality Manager	Laura Kennedy	Ext: 3187
Information Systems Scientists	Andrew O'Keeffe Donal Noonan	Ext: 3383
Point of Care Scientist	Sarah Brady	0867969647
Specimen Reception/ Specimen Dispatch	Mariela Zalduendo	Ext:3178/3545 Fax: 01 6373410
Medical Scientist Emergency On-Call	Rotational	Mobile: 086 385 3277* **Current primary contact source*

Figure 2: Anatomic Pathology Telephone Numbers

1.3.2 Anatomic Pathology	← [CTRL + Click on link to go to dept. details]	Phone/ Bleep
Consultant Pathologists	Dr Eoghan Mooney Dr Paul Downey Dr Catherine Connolly Dr David Gibbons	Ext: 3181 Ext: 3135 Ext: 4089 Ext: 3531
Chief Medical Scientist	Paula Whyte	Ext:3263
Senior / Specialist Medical Scientist	Declan Ryan David Mahon Constance Young	Ext: 3180
Routine Laboratory		Ext: 3531/3180
Senior Pathology Technician	John Long	Ext: 3531
Reports/Administration	Edel Connolly	Ext: 3531
Pathology Registrar	Rotational	Ext: 3252

Figure 3: Biochemistry Telephone Numbers

1.3.3 Biochemistry	← [CTRL + Click on link to go to dept. details]	Phone/ Bleep
Consultant Clinical Chemist	Prof. Carel Le Roux	Contact on mobile phone through hospital switch or ext. 3490
Chief Medical Scientist	Catherine Doughty	Ext: 3546
Senior Medical Scientist	Philip Clarke	Ext: 3546
Routine Laboratory		Ext: 3546
Emergency On Call	Medical Scientist On Call	Mobile: 086 385 3277* **Current primary contact source*

Figure 4: Blood Transfusion Telephone Numbers

1.3.4 Blood Transfusion	← [CTRL + Click on link to go to dept. details]	Phone/ Bleep
Consultant Haematologist	Dr Joan Fitzgerald	**Routine**: 01 2213125 Ext: 3382(SVUH) **Emergency**: On Call Haematology Consultant (Speed Dial) 17301(SVUH)
Chief Medical Scientist	Aoife Reynolds	Ext: 3547
Senior Medical Scientists	Donal Noonan Christine Clifford	Ext: 3547
Routine Laboratory		Ext: 3547
Emergency On Call	Medical Scientist On Call	Mobile: 086 385 3277* **Current primary contact source*
Major Haemorrhage Emergency Phone		Ext: 3584 Diverts to emergency mobile out of hours
Haemovigilance Officer	Bridget Carew	Ext: 3569 Bleep: 095

Figure 5: Haematology Telephone Numbers

1.3.5 Haematology	← [CTRL + Click on link to go to dept. details]	Phone/ Bleep
Consultant Haematologist	Dr Joan Fitzgerald	**Routine**: 01 2213125 Ext: 3382(SVUH) **Emergency***: On Call Haematology Consultant (Speed Dial) 17301(SVUH)
Chief Medical Scientist	Sinead O'Brien	Ext: 3548
Senior Medical Scientist	Paul Keenan	Ext: 3548
Routine Laboratory		Ext: 3548
Emergency On Call	Medical Scientist On Call	Mobile: 086 385 3277* **Current primary contact source*

Figure 6: Microbiology Telephone Numbers

1.3.6 Microbiology	← [CTRL + Click on link to go to dept. details]	Phone/ Bleep
Consultant Microbiologist	Dr Susan Knowles	Ext: 3578 or Contact on mobile phone through hospital switch
Chief Medical Scientist	Anya Curry	Ext: 3179/3533
Specialist Medical Scientist	Gráinne O'Dea	Ext: 3179/2004
Surveillance Scientist	Carol O'Connor	Ext: 3179/3533
Senior Medical Scientist	Gwen Connolly	Ext: 3179/3533
Microbiology Office		Ext: 3179
Routine Laboratory		Ext: 3533
Molecular Microbiology		Ext: 2004
Emergency On Call	Medical Scientist On Call	Mobile: 086 385 3277* **Current primary contact source*
Virology Dispatch		Ext: 3178
Virology Results		Ext: 3178/3179/3533
Microbiology Specialist Registrar	Rotational	Ext 2049 / bleep 315

1.4 Location of Pathology Departments

Figure 7: Department Location

Department	Location	POD Station
Anatomic Pathology	Above the outpatient clinic in the main hospital building.	**11**
Biochemistry	Blood Sciences laboratory on the ground floor in the new wing of the hospital.	**12**
Blood Transfusion	Blood Sciences laboratory on the ground floor in the new wing of the hospital	**12**
Haematology	Blood Sciences laboratory on the ground floor in the new wing of the hospital	**12**
Microbiology	The Microbiology Laboratory is located in the basement of the new wing of the hospital	**13**
Specimen Reception	Ground floor of the new wing of the hospital. Beside Blood Sciences laboratory	**12**

1.5 Pathology Department Opening Hours

Figure 8: Department Hours

Department/Activity	Opening Hours
Routine Service	
Monday to Friday <u>All Departments</u> with the exception of <u>*Anatomic Pathology*</u>	08:00 - 18:00
Anatomic Pathology Monday to Friday	08.00 – 17.00
Saturday (Biochemistry, Blood Transfusion, Haematology and Microbiology)	09:30 -13:00 A reduced service is provided on Saturday (Specimens should reach the laboratory before 12.00)
Emergency out of hours' service *(Biochemistry, Blood Transfusion, Haematology and Microbiology only)*	(On Call emergency diagnostic service) **Pod Station 12**
Monday to Thursday	18:00 – 08:00 the following day
Friday	18:00 – 09:30 Saturday
Saturday	13:00 –09:30 Sunday
Sunday and Bank Holiday:	09:30 – 08:00 the following day
Sunday of Bank Holiday Weekend	09:30 – 09:30 the following day

1.6 Advisory Services

Advisory services and clinical advice are available at Consultant level 24 hours a day, seven days a week via 'on site' Consultants or through telephone support either from the 'in house' Consultants or via agreed support.

Memoranda of understanding have been agreed between the Consultants in the Department of Pathology and Laboratory Medicine and Consultant colleagues.

Frequency of requesting examinations is a clinical decision and can be discussed at Consultant level (*see section 1.3 for contact details).*

1.7 Requesting Tests

The requesting clinician can order a test(s)or blood product(s)either by using a request form and labelling the sample container, or by ordering electronically on MN-CMS and attaching the generated barcode label to the sample. MN-CMS is used for all patients of NMH. In the event that the MN-CMS system is unavailable or it is not possible to make a request through MN-CMS, staff can revert to use of paper request forms. The requesting clinician must complete the appropriate request in full, including clinical details. The personal information received is treated as confidential in line with the hospital policy on personal information.

1.7.1 Transgender patients

When ordering laboratory tests for transgender patients, please inform the lab if the patient's gender is recorded in the 'sex' field in MN-CMS instead of the sex at birth.

In the clinical details section, enter the following:

Transgender patient. Sex at birth [M/F]. Gender [M/F]

This will allow the lab to assign the appropriate ranges for the tests requested and select the appropriate blood for transfusion.

It is the responsibility of the requesting clinician and person collecting patient specimens to ensure that the request is correctly completed, the sample is taken from the correct patient and that the correct label is attached.

1.7.2 Routine Requests

For routine examination of specimens:

- Fill out the required fields on appropriate request form (either paper or electronic).
  Note: Anatomic Pathology require the electronic printed requisition form.
- Attach addressograph label to paper request form (if used).
- Take specimen into correct container.
- Label specimen correctly using MN-CMS generated label or manually.
- Transport to laboratory via: Pneumatic chute POD system (except for **all** Anatomic Pathology specimens, and some specific specimens, see departmental tables in sections 13-19 for exceptions); direct delivery; porter's collection.

1.7.3 Urgent Requests during Routine Hours

- Urgent specimens should be clearly marked by writing or selecting 'Urgent' on the request form.
- Telephone the appropriate laboratory (*for correct extension numbers see section 1.3*). Specimens may not be processed as urgent unless laboratory staff have been alerted by telephone.
- When the specimen arrives into the laboratory, it is brought to the attention of the medical scientistand processed in rapid mode according to local policies available in individual departments.

1.7.4 Pathology On-Call Services

The Out of Hours service is reserved for **non-deferrable** analysis of specimens. The service should meet the clinical need for safe patient care. The necessity to take a sample prior to instituting treatment does not always imply that the result is required urgently. Before requesting a test to be analysed 'Out of Hours', a clinician should consider:

- Will the result, whether high, low or normal affect my diagnosis?
- Will the result, if available early, affect treatment?

For more information on the services provided Out of Hours, please see PP-CS-LM-24, the procedure for Laboratory Out of Hours Service and WI-CS-LM-28 Laboratory Contact Out of Hours

1.7.4.1 Scientist On-Call

The emergency 'Out of Hours' service is multidisciplinary covering the Biochemistry**,** Haematology, Blood Transfusion and Microbiology departments. The medical scientists providing the 'Out of Hours' service are 'On Call' and have already completed a full day's work prior to starting On Call. There are two medical scientists covering the 'Out of Hours' service at all times. The medical scientists 'On Call' cover all laboratories rather than the department in which they are based during the day. While extensive training and competency assurance is in place, scientists cannot be expected to know the answers to all questions clinicians may have. Clinical advice is available 24/7 through telephone contact with Consultants. It is essential that requests are restricted to emergency samples only. Where demand is high, processing of samples will be prioritised and/or processed in batches. Scientist must be contacted out of hours to alert them to urgent samples. Specimens may not be processed as urgent unless laboratory staff have been alerted by telephone.

1.7.4.2 Accessing the Service

The On-Call medical scientist requires notification of emergencies via on-call mobile. Please note that the mobile is the current primary contact point. **Send samples to Pod Station 12** (some specific specimens cannot be sent through the POD, see departmental tables in sections 13-19 for exceptions).

- **Mobile 086 3853277**

1.7.4.3 Tests Available 'On-Call'

The tests outlined below are available 'Out of Hours'. Please note the contents of the comment section for specific requirements.

Figure 9: Tests 'On-Call'

Department / Test 'On Call'	Comments
Blood Transfusion	
Group and Coombs Paediatric	Available when bilirubin is raised or result is required for blood or product issue. When cord bloods were not received and the mother is RhD Neg and may require Anti-D urgently. When a maternal antibody is present and cord bloods are not available for testing i.e. Maternal antibody first identified postnatal/transfer baby
Blood Group and Antibody screen	Request must be on the crossmatch request form. LF-BTR-XREQ Rev 3 or request form printed from MN-CMS. Out of hours Type and Screen samples will only be processed for patients with the following clinical details: 1. Crossmatch request or request for the provision of Blood Products. 2. Unbooked or 1st time presentation. 3. Ectopic. 4. Placenta Previa. 5. Placenta Accreta. 6. Known immune antibody. 7. Transfusion reaction investigation. 8. For patients where blood products may be required e.g. PPH/Emergency LSCS and there is not a valid sample available.
Provision of Blood Products	In accordance with MBOS and Major Haemorrhage pathway or by specific request. Please note that the Blood Bank must be informed when patients with known immune antibodies are admitted to allow adequate time to source suitable blood products.
Please note on Sundays and Bank Holidays one batch of cord blood samples and Anti-D requests will be processed each morning for all samples received in the laboratory before 09.30 AM.	
Cord Blood	Not available except for the presence of maternal antibodies, where DCT is then urgent, or when approaching 72hrs postnatal.
Prophylactic Anti-D Ig Issue	Issued up to 10pm if patient is not being admitted. Issued in response to suspected sensitizing event if approaching 72 hours or if there is an uncertainty about the patient's commitment to return, IUD. Sample for group and screen must be drawn prior to request.
Transfusion Reaction Investigation	Limited testing can be made available based on the transfusion reaction type and the intention to continue to transfuse.
Biochemistry	
Note: PN bloods must be in the laboratory by 08:00 AM, results will be available by 09:30 AM. They should not be drawn before 07:00 AM.	
Albumin	
Alkaline Phosphatase (ALP)	
Amylase	
Aspartate Transaminase (AST)	
Alanine Transaminase (ALT)	
Bilirubin-Direct	
Bilirubin-Total	
Calcium	
Chloride	

Department / Test 'On Call'	Comments
Creatine Kinase (CK)	
Creatinine	
C Reactive Protein (CRP)	
CSF : Glucose + Protein	
Glucose	
Gentamicin	Sunday and Bank Holiday Monday mornings
Lactate Dehydrogenase (LDH)	
Magnesium	
Osmolality (plasma + urine)	
Phosphate - inorganic	
Potassium	
Sodium	
Total Bile Acids	
Total Protein	
Triglycerides	
Urate	
Urea	
Urinary Protein: Creatinine ratio	
Hypoglycaemic Screen	Call the laboratory. See Hypoglycaemic Workup request form RF-CS-BIO-41, available on Q-Pulse for details of all samples required.
Haematology	
Coagulation Screen	Specific factor assays available by Consultant request
FBC	Low platelet counts reviewed for clumping in accordance with protocol. Urgent film review available in accordance with protocol.
Blood Film	Available by Consultant request if urgent
Microbiology	
NMH and RVEEH	
Blood Culture	Incubating bottles and processing of positive bottles; culture, Film Array and Gram stain
MSU	Microscopy and culture upon request.
Sars-CoV-2 / Flu A/B / RSV (GeneXpert)	On-call testing for symptomatic patients only (NMH and RVEEH).
NMH Only	
CSF	Cell count, Gram stain and culture
Paediatric urines	Microscopy and Culture
Pregnancy Test	POCT available in Casualty, OPD and Unit 4; manual hCG available as per policy
Rapid GBS (GeneXpert)	Monday – Friday: 1 run at 22.00 Saturday: 1 run at 22.00 Sunday/Bank Holiday: 2 runs per day at 12:30, 22.00
RVEEH Only	
Vitreous/Aqueous Tap in Paed Blood Culture	Incubating bottles and processing of positive bottles for culture, Film Array and Gram stain
Corneal Scrapings	Incubation of inoculated plates for bacterial and fungal culture
Neisseria gonorrhoeae culture	Incubation of inoculated plates

Department / Test 'On Call'	Comments
Virology	
Varicella	Samples will be sent out @ 09:30 AM the following morning with the courier. Please phone the laboratory to inform them of the urgent sample. On occasion, if approaching 10 days' post exposure event, the sample may be sent out before the next day.
Urgent Booking Bloods (HIV, HEP B, HEP C)	For patients in labour only
Occupational Blood Exposure	Please phone the laboratory to inform them of urgent sample. Samples will only be processed up to 22.00 by the NVRL out of hours with approval by the NVRL medical team. Samples will not be analysed if status of source is known.

1.7.5 Verbal Request Policy by Department

Figure 10: Telephone Request Policy

Department	Policy
Anatomic Pathology (Histology)	Anatomic Pathology will not accept telephoned requests as all requests must be accompanied by the appropriate request form.
Biochemistry	Routine specimens are retained in the Biochemistry laboratory for up to 5 days, refrigerated at 2-6˚C. Analyses of additional tests are subject to specimen integrity and analyte stability. Add on facility only available for routine Biochemistry samples up to 24 hours from sample draw. Telephone requests for additional analyses are accepted from clinicians but must be followed up with the appropriate add on request form.
Blood Transfusion	Urgent requests can be made by phone but should be followed up with the appropriate request. Request for crossmatch can only be accepted if the inpatient Type & Screen sample is <72 hrs old and initialled as drawn and checked against armband.
Haematology	Haematology and coagulation specimens are usually kept for one week at 2-6˚C after processing. Blood films are usually kept for 1 month after review or held at the request of the Chief/Consultant Haematologist. Analyses of additional tests are subject to stability of analyte. Refer to Section 7.3 regarding time restraints from time of sampling to time of testing. If a further test is required on a specimen that is already in the laboratory which falls within the necessary time limit for retrospective testing, requests for additional analyses are accepted from clinicians but should be followed up with the appropriate add on request form.
Microbiology	Additional tests can be requested by telephone provided specimen and request have already been received by the laboratory. Telephone requests are accepted from clinicians, but should be followed up with the appropriate request form or as add on test through MN-CMS.

1.7.6 Routine Cut Off Times for Specimen Acceptance/Processing

Figure 11: Specimen 'Cut off Times'

Laboratory Discipline/Location	Receipt of Specimen	Routine 'Cut Off' Time for Same Day Processing
Anatomic Pathology		See Specimen Requirements in Figure 16
Biochemistry	For same day processing	Mon – Fri:16:30hrs Sat: 12:00hrs
Blood Transfusion	For same day processing	Mon – Fri: 15:00hrs Sat: 12:00hrs
	Specimens from patients for elective surgery	Mon – Fri: 16:00hrs on the last normal working day prior to the scheduled surgery
	Specimens from patients with PSE Anti-D Ig requests	Mon – Fri: 16:00hrs Sat: 12:00hrs Anti-D Ig requests outside these cut off times will be available at 11:00 AM Mon-Fri and 14:00 Sat and Sun the following day providing the patient does not have immune antibodies.
Haematology	For same day processing	Mon – Fri: 16:30 hrs Sat: 12:00hrs Routine specimens arriving after the cut off times may not be analysed until the next routine working day.
	Specimens for: Malaria, IM, sickle cell, Kleihauer and blood films for same day service.	Mon – Fri: 13:00hrs Sat: 12:00hrs Routine specimens arriving after the cut off times may not be analysed until the next routine working day.
Specimens for Haematology Referral		Specimens which reach the lab by 12:00hrs Mon – Fri will be referred on the same day. Routine referrals for St Vincent's: before 15:00hrs. Coagulation referrals that arrive after 15:00hrs are not guaranteed processing unless by prior arrangement.
Microbiology	For routine processing	Mon – Fri: 17:45hrs Sat: 12:00hrs
	C.S.F. specimens	Mon – Fri:16:30hrs, for full processing by Microbiology scientific staff.
Specimen Reception	Receipt of Specimens	Mon – Fri only:17.00hrs
	Specimen Dispatch	Mon – Fri only:12:00hrs

1.7.7 Critical results phoning policy

Critical results are phoned as per LP-GEN-TELREP.
See departmental data for information on what results are phoned.
Results are phoned to the clinical area and given to a member of the clinical area / team.
Where the result is critically abnormal and contact cannot be made with the clinical area a member of the clinical team is contacted.
The 1st and 2nd 'On Call' for the relevant area are bleeped.
If there is no response, the ADOM is contacted and the result relayed.

If there is no response from the Clinicians, the clinical area is contacted again, the result is relayed with a request that it is given to the clinical team.

1.7.8 Special considerations for results

For the test results which may have serious implications for the patient, consent to report the result(s) to the requesting clinician(s) is implied within the agreement to take the sample and order the test. This includes an expectation that the requesting clinician/team will provide adequate counselling when conveying the result to the patient.

1.7.9 Availability of information

The laboratory will make relevant information available to any other health service provider at the request of the patient or the request of a healthcare provider acting on their behalf

1.7.10 Release of information

It is not routine for the laboratory to release confidential information on patients. There are occasions when the release of patient information into the public domain is required by law or authorized by contractual arrangements. Examples of this would be the National Cancer Control programme, the national Cancer Registry Ireland or surveillance information on infectious diseases.
Consent to release this information is achieved when the patient signs a GDPR form. If information outside these scenarios is required to be released, the disclosure to patient's policy (PP-OG-GEN-17) will be followed.

Notifiable Diseases:
List of Notifiable Diseases - Health Protection Surveillance Centre

NCRI
National Cancer Registry Ireland | Essential information on cancer in Ireland

NCC
National Cancer Control Programme - HSE.ie

1.7.11 Open Disclosure

Where appropriate, patients, service users, and any other relevant individuals are informed of incidents that have resulted, or could have resulted, in patient harm. Records are maintained of the actions taken to mitigate such harm. The hospital open disclosure policy PP-OG-CRG-1 is followed. Open disclosure is incorporated into the hospital's Feedback Management Policy (PP-CS-QTY-6).

2 Patient Identification and Consent

2.1 Patient dignity and Respect

The laboratory is committed to ensuring that all patients, specimens, and human remains are treated with due care, dignity, and respect throughout the specimen collection and handling process.

2.2 Patient Consent

Please refer to the hospital guidelines for obtaining patient consent before taking primary specimens.
PP-CS-GEN-3 (Guidelines for obtaining patient consent)
CG-MO-13 (Refusal of Blood/Blood products guideline)

2.2.1 Anatomical Pathology Patient Information and Consent

Patient information leaflets are given to the patients before consent is sought for post mortem. Post mortem consent forms may only be signed by medical staff who have attended the laboratory induction programme. Consent for post mortems is only required for in house cases not coroner's cases. All other patient information supplied by appropriate hospital department.

2.3 Clinical Procedure for Patient Identification

Positively identify the patient by requesting verbal confirmation of surname, forename and date of birth. Verify that the details provided match those indicated on the hospital ID band for in-patients. Check this name and date of birth matches the details on the laboratory request in the Electronic Health Record (EHR) request or request form. When the phlebotomist/clinician is satisfied that the patient has been fully and correctly identified, they can proceed to take the blood sample. Special vigilance is required for neonatal patients; as verbal confirmation of identity is not possible.

Details for labelling should be taken from the patient's wristband if worn. This applies for all inpatients and for all specimens taken for Blood Transfusion. Confirm demographic details verbally with adult patients. High risk patients must be marked with a red sticker.

Verify that the patient meets pre-examination requirements e.g. fasting status, medication status (time of last dose, cessation), sample collection at predetermined time etc. Note: please refer to the hospital guideline for positively identifying patients before taking primary specimens, PP-OG-CRR-2.

2.3.1 Neonates, Unconscious Patients and Patients Unable to Identify Themselves

This includes adult patients who are undergoing general anaesthesia, unconscious, confused patients or patients whose first language is not English and neonates.

- Verify that the details provided match that indicated on the hospital ID band, forename, surname, unique hospital number, date of birth and gender in the case of an infant.
- Baby is sufficient as a forename for infant patients i.e. Baby Murphy.
- For twins or triplets, the forename may be Twin 1, Triplet 2 etc.
- This information must be identical with the information on the request and specimen tube sent to laboratory.

2.3.2 Identification of Foetus

In order to uniquely identify a foetus, and link it to the mother the following is laboratory policy:

- Use the mother's demographics for surname and address.
- Record the forename as "Foetus of" in front of the mother's forename.
- Where more than one pregnancy is recorded in a given year add the suffix B. e.g. Foetus 2009 B etc.
- Where more than one foetus is present in a pregnancy the forename should be Foetus Twin 1, Twin 2 etc. e.g. Foetus Twin 1 2009, Foetus Triplet 2 2009.

- The hospital number must be left blank for completion when the baby is born. As for patients without a hospital number the 1st line of the mother's address acts as a mandatory identifier.
- For intra-uterine transfusions (IUT), the date of birth is changed to the date of the IUT, and the sex is changed from F to Unknown.
- Reports should be filed in the mother's chart.
- When the foetus is delivered, the baby is registered on the PAS system and assigned a hospital number, and the previous IUT Winpath record is updated.

2.3.3 Urgent Specimen from a "Moribund" (Unidentified) Patient

In the occasional event of an urgent specimen from a "moribund" patient, where identity cannot be confirmed, the following essential information must be provided on both request form and specimen:

a) Allocated identifier e.g. "Jane Doe"
b) Gender (Sex)
c) Date of specimen
d) Unique hospital number obtained from PAS system is essential on their identification arm band for positive patient identification.

3 Safety

The hospital safety statement, NMH Safety Statement, is available on Q-Pulse as PP-GS-HS-1. The laboratory uses standard precautions when handling all patient specimens.

3.1 General Safety Guidelines

- Always use approved specimen collection containers and ensure lids are securely closed.
- Observe standard precautions when taking patient specimens.
- Always dispose of sharps appropriately and according to the NMH Safety Statement.
- Specimens must be placed in approved biohazard bag with request form placed separately in the sleeve provided as appropriate.
- Do not place specimen and form together in the same pouch of the biohazard bag.
- Always supply clinical information including known infection risk with each request.

Specific instructions on specimen transport are outlined in Section 6 of this document. Model rules to ensure staff safety during specimen transport are outlined in Section 6.2.2. Any spills must be dealt with in accordance with NMH Health and Safety Statement as well as the procedure for dealing with biological spills, LP-GEN-BIOSPILL, located in Q-Pulse.

3.2 Venepuncture Procedure / Collection of Specimens

1) Wear appropriate PPE.
2) Observe the hospital consent policy.
3) Reassure the patient and briefly explain the tests being taken. Ensure patient is comfortably seated and relaxed.
4) Ensure patients identification details are checked and correct, in line with NMH Positive Patient Identification Policy.
5) Select the **correct** specimen tubes. See SI-NOT-GEN1 and SI-NOT-GEN2 for Order of Draw charts on Q-Pulse
6) Always use sample collection tubes, swabs etc. that are in date. Specimens taken into expired collection tubes / containers may render the specimen unsuitable. Specimen tubes must **NOT** be pre-labelled.
7) Rest limb on pillow or arm support and identify vein (in ante cubital fossa) for phlebotomy procedure.

8) Apply tourniquet and cleanse patient's skin with a sterile skin wipe.
9) Inform the patient when you are about to venepuncture (described as a scratch).
10) Anchor vein if necessary and insert needle with bevel facing up.
11) Hold the vacutainer needle holder securely to allow change of tubes and collect required specimens. **Please note**: Samples for Blood Culture investigation must be drawn first to avoid contamination. See SI-NOT-GEN1 and SI-NOT-GEN2 for Order of Draw charts on Q-Pulse.
12) When all specimens are collected, release tourniquet and withdraw needle smoothly and carefully.
13) Apply cotton wool to puncture site and ask patient to apply pressure for about 2 minutes keeping arm straight. This helps avoid bruising/haematoma.
14) Push safety guard over needle to render safe and dispose of used needle immediately into sharps bin. All waste is disposed of in accordance with PP-GS-HS-1 NMH Safety statement.
15) Proceed to label the tube at the patient bedside.

The above procedure is designed for adult patients. For neonatal patients, the same general principles apply. Paediatric blood collection tubes are available.

To summarise, complete the procedure with each patient:

1) Check patient identification.
2) Complete request.
3) Venepuncture – collect specimens.
4) Label specimens correctly
5) Check specimens post collection to confirm Positive Patient Identification (PPID) and labelling are correct.
6) For all Blood Transfusion specimens, ensure that the specimen is initialled to confirm that the above checks have been performed, if the sample is hand labelled.
7) Place specimens in designated bag.
8) Arrange for transport to laboratory.

Universal precautions should be observed when handling all pathological material. It is the responsibility of the requesting clinician to ensure that specimens which pose an infection risk to staff are clearly identified by a red sticker attached to the request form.

For Microbiology, do not put liquid based specimens in the same specimen bag as dry specimens, e.g. a urine specimen in with a swab. Liquid specimens can leak, rendering the other specimen in the bag unsuitable for analysis due to contamination.

For patient preparation for samples other than venepuncture, refer to relevant clinical care guidelines and relevant departmental data.

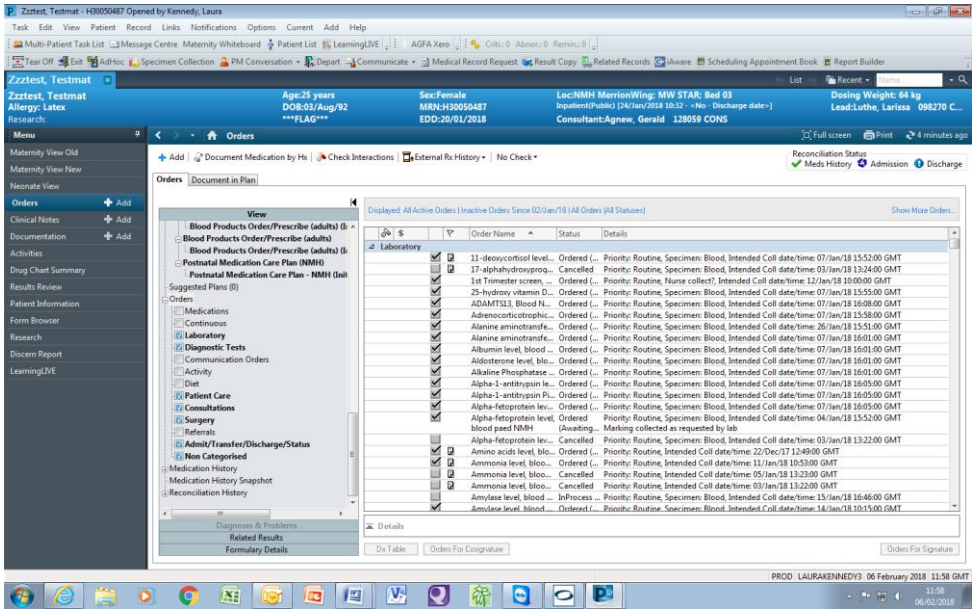
4 Requesting Tests on MN-CMS

4.1 Electronic Requests MN-CMS

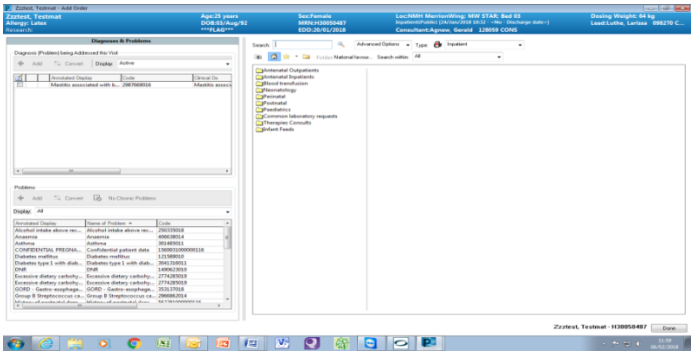
For obstetric, new born and gynaecological patients, requests are placed via the orders module of the electronic chart MN-CMS.

4.2 How to Order Tests via the PowerChart

- All tests are ordered in the Orders tab on the left hand side.
- You can order a test by clicking on +Add in either of the places below

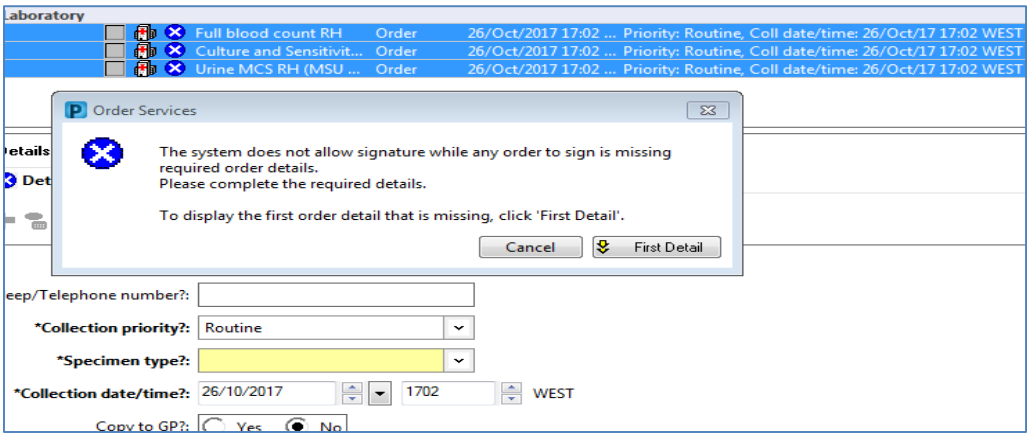


- Laboratory tests can be ordered using the search function. Type the name of the test required (see below for name of tests in each department) i.e. type FBC or Full Blood Count or using the folders option. Refer to Appendix 3 for the Microbiology orders list.
- You don't always have to type in the full name as Millennium will filter as you type. Many of the NMH tests will have a suffix 'N' - This is to differentiate a test performed in the NMH from a test performed elsewhere if a patient is transferred.

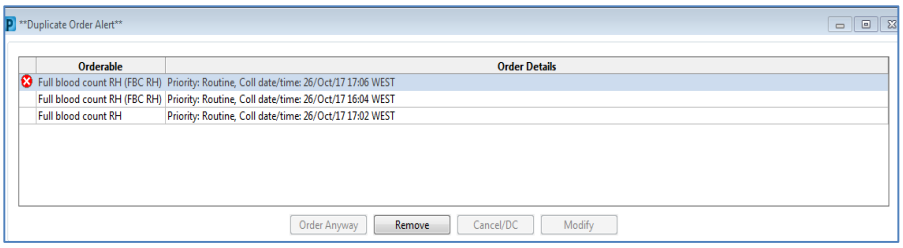


- Special requirements:
  - If a test has any special requirements e.g. an external request form or frozen sample, a pop up alert will alert the user.
  - Click Ok to continue.
  - This can be viewed subsequently by clicking on the document icon in the orders list.

- Click 'Done' when **all** relevant tests have been selected. Failure to do so will mean that the tests were not saved for processing.
- Fill in the relevant clinical details appropriately. The laboratory will have to ring you for further information if not completed properly.
  - For Sars-CoV-2 requests, it is **mandatory** to supply the patient's telephone number as per HSE and Public Health requirements. Please enter the phone number in the clinical details field.
- Please note all yellow fields / fields with ***** are mandatory.
- Put in your bleep etc. if you wish to be informed of any critical results.
- Collection priority – **Routine or Urgent** are the most common options for in-patients.
- Specimen type should default unless there are several options i.e. CSF, Blood etc.
- Collection date and time should automatically fill in. Adjust if necessary.
- If you get the pop-up message below, it means that some of the tests require additional details.
- Click on **First Detail** to bring you to the next mandatory field.



- If a test has already been ordered on the patient, then an alert box will appear (see below). This is telling you that an FBC has **already been ordered** for this patient within a predefined period dependant on the test in question. For some tests this may be a few hours and for others it could be days or even weeks. This is to reduce the number of inappropriate tests being repeated.



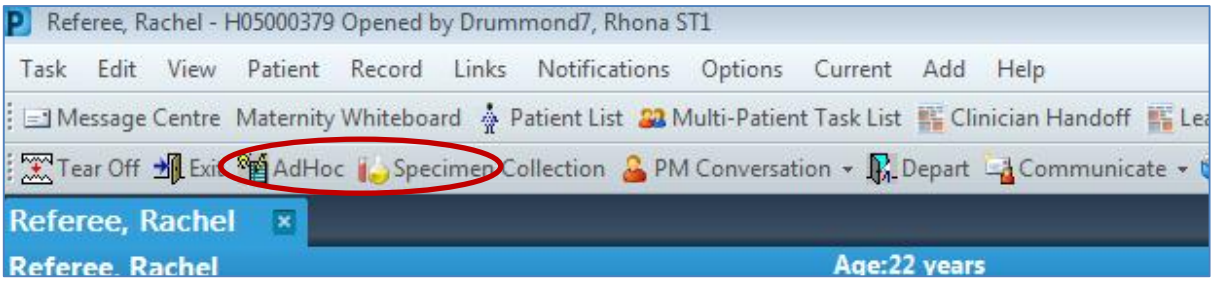
- For some tests you can select '**order anyway'** if you know this has been ordered already but you want a repeat sample.
- For other tests, such as genetic tests, you will not be allowed to re-order the test as there is no clinical reason to do the test more than once. In this instance you will be asked to remove the request as it is a duplicate order.
- When all the tests have been ordered and all the required clinical details have been filled in, click 'sign'. This will pull all tests in together and will only request the amount of tubes necessary to process what has been requested.

4.2.1 Genetic Requests

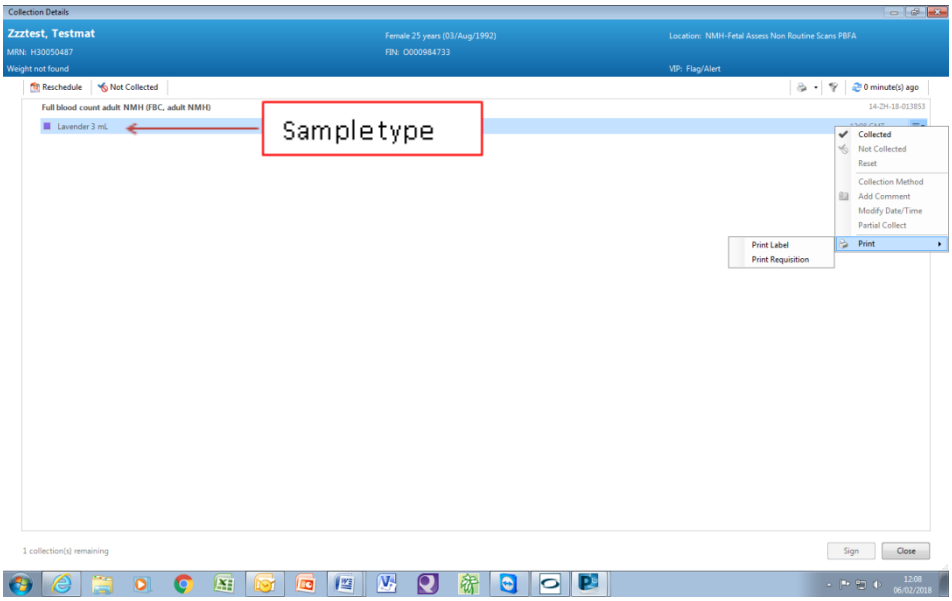
Requests for genetic analysis can be placed electronically. The referral laboratory specific request form must be completed in addition to the electronic request. Please ensure correct consent has been obtained.

4.3 Specimen Collection MN-CMS

- Once you have ordered the tests then it is very important to tell the system that you are taking the sample. Select **Specimen Collection** on the top menu.



- **You should then scan the patient ID band**. Failure to scan the ID band for an inpatient will result in the test being rejected by the laboratory.
  - **For in-patients, the option to override the barcode scan has been removed.**
  - For out-patients, if the patient does not have an ID band then you can select Unable to Scan barcode on the bottom left of the screen.
- A list of all tests requested on the patient will appear. Please note that some of these may not be relevant so please take note of the date and time of the samples on the right hand side. Only select the ones you wish to take.
- If you no longer wish to take a sample or are unable to take the sample, you must remove it from this list by clicking on the sample and selecting **'not collected'** and then stating why it is not being collected.
- The type of sample bottle required is also displayed on the left hand side. The volume is the volume of the sample container and not the volume of sample required. This will also print on the label.
- **To collect a sample, you must print the label -** Right click on the sample type and select 'Print Label'.
- Print the labels after you have taken the samples.
- Please label the samples correctly, see Section 4.5.
- Check **ALL** samples post phlebotomy. Confirm samples have been labelled correctly; all patient demographics are present and confirm PPID between the patient and the labelled specimen.
- **Mark the samples as collected.**
  - Failure to mark samples collected prevents the request being sent to the laboratory.
- **Any duplicate MN-CMS requests printed in error must be discarded.**



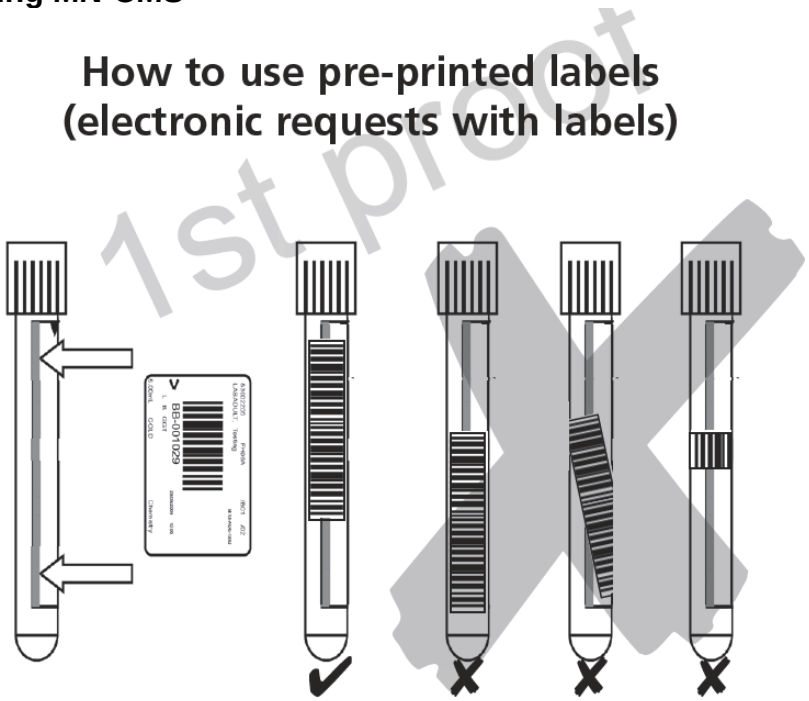
4.4 Requests with No Specimen Collection

- Some requests do not require specimen collection. These tests require the printing of an A4 paper requisition, and include:
  - Blood Products
  - Blood Collection
  - Add On tests

Unless a printed requisition is sent to the laboratory, no request has been received.

- Complete the order as in Sections 4.2 and 4.3 above.
- The order is marked collected when signed.
- Right click on the order.
- Print the A4 requisition and send to the laboratory.

4.5 Specimen Labelling MN-CMS



- MN-CMS labels must be printed on-demand/directly before sample phlebotomy and labelling. This must take place with the patient in-situ.
- **A general rule of thumb is to cover the paper label already on the sample tube/swab etc. Do not cover existing barcodes on Blood Cultures**.
- Following application of an MN-CMS label, review the labelled sample to ensure the entire MN-CMS label is legible, the correct MN-CMS request has been placed on the correct sample type (as prompted by MN-CMS), the MN-CMS label orientation is satisfactory (see above), and that the date and time of sample collection are correct.
    - **NB: Confirm that the patient demographics on the MN-CMS label applied to the sample match the demographics of the patient on whom the sample has just been collected from. Compare the labelled sample with patient wristband OR verbally confirm PPID if the patient is not an in-patient.**
- It is very important that you now change the status of the sample **to collected** and press sign. It is only after the sample is changed **to collected** that the request goes across to the laboratory information system. The laboratory cannot process any samples that have not been collected in MN-CMS, as the request will not transmit to the laboratory information system.
- If the status of the sample is **'Ordered (Awaiting Collection)'** then you have not collected the sample in MN-CMS. The laboratory does not know that this sample has been ordered.
- The status of the sample will now change from **'Ordered'** to **Ordered (Collected**). This means that the sample has been taken but the laboratory has not yet formally received the sample. When the laboratory formally receives the sample, the status changes from '**Ordered (Collected)** to **In Process (Collected**). This means the laboratory has received the sample.
- **'Discontinued'** means that someone has chosen not to take the sample for the reason that is documented when the sample is cancelled.
- See Section 5.2.2 below for the minimum specimen acceptance criteria for MN-CMS requests.
- As a general rule, **samples bearing duplicate printed labels are considered unsuitable and will be rejected**.
  An exception may apply in specific clinical circumstances (e.g. neonatal cases) where two samples are required. In these cases:
  This deviation from standard labelling practice must only occur following prior notification to, and agreement with, the laboratory.
    - Apply the **MN-CMS printed label to one sample only**.
    - The **second sample must be hand-labelled** with the patient's full identifiers.
    - Clearly indicate that **two samples have been taken for the same patient**.
    - The laboratory will review both samples and **process them in accordance with local procedures**.

4.6 Specimen Labelling in the Event of MN-CMS Printer Failure

If a MN-CMS printer fails to print successfully the **first time** from the MN-CMS cart you are using at the patient bedside - **STOP. DO NOT send the MN-CMS request to any other label printer.** Complete the following steps:

- Perform PPID as per NMH PPID Policy, PP-OG-CRR-2.
- Manually label the specimen at the patient bedside from the patients' wristband (in-patients)/MN-CMS EHR with the **patient name**, **hospital number**, **date of birth, date and time of sample phlebotomy and signature of the sample taker.**
- **NOTE: Samples for Blood Transfusion MUST be handwritten**.
- Print the requisition for the sample from MN-CMS to an A4 printer located in your clinical area.
- Check the specimen. Confirm that it is labelled correctly and correct PPID between sample/EHR/patient.

- Confirm sample collection by clicking the Collect Icon on MN-CMS EHR.
- The A4 requisition is then retrieved. You must crosscheck the patient identifiers on printed form against the patient handwritten identifiers on the sample tube.
- Check the date and time of the order on the A4 requisition form to ensure you have printed the correct order.
- Transfer the sample and form to the laboratory together.

If unable to perform the above process successfully, the sample collector **must** revert to filling in a manual request form (refer to section 5 below).

This protocol applies for all samples where label printing at the patient's side is not possible. Failure to adhere to this policy will be reported to Clinical Governance.

Follow Up: Unused MN-CMS requests may print when printer failures are resolved. It is essential that these redundant labels are discarded. The fault with the MN-CMS printer **must** be reported to the ward manager and IT Department at extension 7999. Clinical areas are advised keep a record all printer failures.

4.7 Processing Samples 'Not Collected' on MN-CMS

If a sample is received in the laboratory that has not been collected on MN-CMS (no information comes onto WinPath from MN-CMS), the following process applies:

1) The date and time of receipt will be added to the specimen. This is to ensure that the correct date and time of receipt is entered on WinPath when laboratory staff are able to book the specimen in.
2) The clinical area will be contacted requesting sample collection. If the area confirms that the sample is collected, the laboratory will contact IT to see if there is a problem with MN-CMS/WinPath.
3) If sample collection is not possible, the laboratory will request an A4 MN-CMS requisition for the test, or a written request form from the clinical area. The request form should contain the name and registration number of the requester.
4) The sample will be analysed, and then later booked into WinPath when collected on MN-CMS/when a completed request form has been received. The result will be authorised with the addition of the following comment: 'No valid request received, subsequently collected in MN-CMS following informing the clinical area'.
5) With the exception of certain non-repeatable samples, if the sample is not collected within 24 hours, it will be rejected with the addition of the comment 'No valid request received, please repeat'.

5 Requesting Tests: Paper Request

Paper based requests are used for patients in the event of MN-CMS failure, and in external clinics without access to MN-CMS label printers.

5.1 Consultant or Pathology Request Forms

The Pathology Department has a suite of controlled request forms which should be used to request investigations. The forms are department specific and are outlined in figure 10 below. Departmental forms may be obtained ordering from the staff intranet, in the NMH website, completing the "Pathology Supplies requisition" form and the current version of each departments' forms are stored on Q-Pulse. Please use the document number from figure 10 below or contact the relevant department for further information. External GPs that require sample bottles or forms can contact the Specimen Reception Department.

Dedicated request forms are available for use in external clinics without access to MN-CMS label printers. These requests **must** contain the valid registration number (either MCRN or NMBI) of the requesting clinician in order for them to be booked into Winpath.

Figure 10: Pathology Request Forms

Department	Form	Document
Anatomical Pathology	Gender determination request form	RF-CS-AP-58
	Coroner's Notification Form Organ Disposition Education and Research	RF-CS-AP-46
	Consent for Post Mortem (in house)	EXT-CS-AP-64
	Histopathology Request Form	LF-AP-SURGREQ
	Placenta Histopathology Triage Form	LF-AP-PLACREQ
Blood Transfusion	Crossmatch Request Form, used for all inpatient requests	LF-BTR-XREQ
	Group and Antibodies/ Group and Coombs Request Form	LF-BTR-GCREQ
	Cord Blood (Group and Coombs) Request Form	LF-BTR-CRREQ
	IBTS Fetal RhD Screen Referral Form	EXT-CS-BT-134
Biochemistry	Biochemistry Request Form	LF-BIO-REQ
Haematology	Haematology Request Form	LF-HAE-REQ
Microbiology	Microbiology Request Form	LF-MIC-REQ
	Microbiology Request Form from RVEEH	RF-CS-MIC-78
	Microbiology External Clinics Request Form	RF-CS-LM-148
External Referral	Serology Request Form	RF-CS-SR-2
	Blood Sciences External Clinics Request Form	RF-CS-LM-147
	RVEEH Serology Request Form	RF-CS-SR-4
	TDL Genetics Request Form	EXT-CS-SR-1
	St. James's Hospital Consent Form for Diagnostic Genetic Testing	EXT-CS-HAE-262
	SJH Request Form for Thrombophilia Screens and Lupus Anticoagulant Screen and Consent Form	EXT-CS-HAE-151
	Synovis G6PD Referral Form	EXT-CS-HAE-188
	Heparin Induced Thrombocytopenia Request Form	EXT-CS-HAE-152
	Maternal Serum Screening Test Form, Cambridge IBTS BT345 Request for Red Cell Immunohaematology Investigation NHIRL BT255-6 Request Form for Histocompatibility and Immunogenetics Investigation Request for Foetal Genotyping IBGRL NHSBT Non Invasive Prenatal Screening Request Form	EXT-CS-SR-4 EXT-CS-BT-136 EXT-CS-BT-145 EXT-CS-BT-115

5.2 Labelling the Primary Specimen and Filling in the Request Form

5.2.1 Request Form

Please complete all sections of request forms in a fully legible manner:

a) **Patients forename and surname**
b) **Hospital number**
c) Location/contact details of the patient. Date of birth (or gestational age)
d) Patient's sex
e) Destination for report
f) Clinician
g) Specimen type
h) Anatomic site of origin
i) **Examination requested**

j) Clinical information/history/relevant therapy
k) Date and time of specimen collection
l) Date and time of sample receipt (laboratory only)

A, B, C and J are essential requirements. In the event that the patient has no NMH hospital number, the date of birth becomes an essential identifier.

Large addressograph labels may be used for patient identification on the request form.

For microbiology, specimen type or site, clinical details, antibiotic therapy details (including allergies) are required on the request form in order to process the specimens correctly. Failure to provide such information can affect testing of sample (resulting in reduced or incorrect testing of sample).

For Blood Transfusion samples, if no hospital number is available, the 1st line of the patient's address must be present on the specimen, in addition to the patient's forename, surname and date of birth, for the specimen to be accepted.

5.2.2 Primary Specimen

5.2.2.1 Labelling of Primary Specimens

It is essential that all specimens are labelled with a minimum of three identifiers for Blood Transfusion, and two identifiers for other departments, in a legible manner on the specimen container. Always use sample collection tubes, swabs etc. that are in date. Blood taken into expired collection tubes may render the specimen unsuitable. Specimen tubes must **not** be pre-labelled. The following identifiers should be placed on the specimen:

a) **Patients forename and surname**
b) **Hospital number**
c) **Date of birth (or gestational age for MN-CMS requests)**
d) Destination for report
e) Date and time of specimen collection
f) **Identity of specimen collector**
g) Collection time
h) **Specimen type (for MN-CMS requests)**
i) **Examination requested (for MN-CMS requests)**
j) **Initials of Specimen Collector (for non MN-CMS requests)**

A and B are essential requirements for all laboratory departments. A, B, C, F and J are essential requirements for Blood Transfusion. In the event that the patient has no NMH hospital number, the date of birth becomes an essential identifier.

For Blood Transfusion samples, if no hospital number is available, the 1st line of the patient's address must be present on the specimen, in addition to the patient's forename, surname and date of birth, for the specimen to be accepted.

All specimens for Blood Transfusion and Kleihauer testing must be hand written unless ordered via MN-CMS.

Specimens for other laboratories should be labelled with small addressograph labels. Where no addressograph labels are available, clear handwritten labelling is accepted.
Samples with duplicate labels will be rejected unless they meet the criteria described in 4.5 above.

5.2.3 Labelling Criteria for Community/GP Blood Transfusion Samples

The Blood Transfusion laboratory will accept samples for Blood Group and RhD status from GPs and community based services like the Irish Family Planning Association for women within the NMH catchment area (South Dublin, Wicklow and Kildare) who are seeking termination of pregnancy. The purpose of this blood group is to identify women who are RhD Negative and who will require prophylactic Anti-D as part of her termination of pregnancy treatment.

Samples for blood group will be accepted from GP/community care provided they meet all of the criteria below. Where the samples and request forms do not conform to these requirements testing will not be possible.

Specimen	Request Form
EDTA collection tube	Details of the GP, full address and health mail email address
Sample label (must be handwritten and signed by the person taking the sample)	Clinical details: Gestation is most important. Please indicate if history of Anti-D administration within last 3 months
Patient full name	Patient full name
Date of birth	Date of birth
1st line of address	Complete address
sample collection date and time	sample collection date and time

6 Storage and Transport of Specimens

6.1 Pre-Analytical Specimen Storage

- Ideally all specimens should be transported to the laboratory in a timely manner.
- Where this is not possible, for example in an out of hours' situation, samples may be stored in a fridge. Specimens should be transported to the laboratory at the earliest possible time. See departmental sections for sample stability. **Do not store the following sample types in the fridge:** PCR**,** routine biochemistry, coagulation, blood cultures, CSF samples, inoculated plates, surgical and placental specimens, Blood Transfusion samples for the Foetal RHD screen, and specimens in formal saline – Keep all at room temperature.
- Coagulation specimens must be sent to the laboratory ASAP as they are stable for only 4 hours.
- Bacterial culture of *Neisseria gonorrhoea* - Samples must be brought to the laboratory immediately and staff notified. **Processed during routine hours only.**
- Urine samples for Chlamydia/Gonorrhoea testing **must** be delivered to the laboratory within 24 hours.
- Fresh tissue specimens must be refrigerated until they can be delivered to the laboratory.
- Body for post mortem must be refrigerated.
- Blood samples for HIV, Hepatitis B and C for PCR and/or viral load, CMV PCR Parvovirus PCR or Zika virus PCR must be separated and frozen within 24hours of sample collection.
- Any EDTA sample received for NVRL, check with the requesting unit if for PCR (in case EDTA sample taken in error). If so, spin, separate and freeze. EDTA samples are generally for PCR.
- The majority of specimens for Microbiology are stable for up to 3 days once stored at 4˚C. Some exceptions apply for particular specimens and/or tests as per Section 17.

6.2 Specimen Transport

During the process of transporting patient specimens to the laboratory it is essential that specimens are transported safely and efficiently in order to:

- Ensure safe custody and integrity of the specimen which must reach the laboratory in proper condition.
- Specimens must be transported within a timeframe appropriate to the nature of the requested examinations and the laboratory discipline concerned. See individual departments for specific time frames.
- Specimens must be transported within a temperature interval specified for sample collection and handling and with the correct preservatives to ensure the integrity of the samples. Specimens received in the laboratory that do not conform to these criteria will be rejected, see Section 3.
- Ensure the safety of staff transporting specimens.
- Ensure the safety of other staff, patients and members of the public.
- The pneumatic transport system (POD), if appropriate to the specimen type, is the preferred method of delivery of specimens to the laboratory.
- Blood culture bottles are plastic and may be transported via the POD.
- Specimens for Sars-CoV-2 must **NOT** be transported in the POD, deliver by hand, due to an infection control risk if the specimens should leak in the POD.
- **CSF samples must not be sent via the POD system, deliver to the laboratory by hand.**
- **Histology specimens must not be sent via the POD system, deliver to the laboratory by hand.**
- The transporter of the sample should inform the lab immediately of any compromise to the sample so that the lab can raise a non-conformance and perform a risk assessment if required.

Please follow the following guidelines:

- Use approved specimen bags which must be sealed.
- When a paper request form accompanies the specimen, place this in the separate pouch of the specimen bag, or attach to the bag. Do not place them in the bag with the specimen.
- Use approved specimen collection containers.
- Use the POD specimen transport system where available and appropriate to specimen type.
- Use the specimen transport boxes (closed) where appropriate.
- Do not try to carry multiple specimens by hand.
- Do not leave specimens in other locations in route to the laboratory.
- If there is a doubt about any aspect of specimen transport, please contact the appropriate department for advice.
- Do not transport broken or leaking specimens.

6.2.1 Delivery of Biological Specimens from 'Off Site' Clinics

Transport of biological specimens by public road must be in compliance with the current ADR transport regulations. It is the responsibility of the consignor to comply with these regulations. This standard is to safeguard the drivers of vehicles carrying diagnostic specimens on the road between sites and provides protection to passengers and / or the emergency services in the event that the vehicle is involved in a road traffic accident.
Samples should be transported within ambient temperature range (2°C – 28°C). Samples should be transported directly to the Laboratory in a timely fashion from the point of collection. Samples should not be stored overnight in the transport vehicle.

Emergency Response in the Case of an accident or leakage from the package

If leakage is observed or a package is damaged as a result of an accident, contact the Laboratory in the National Maternity Hospital for advice via (01 6373178 or 086 3853277 out of hours). Do not touch the package. If emergency responders have arrived on scene, please advise them of the presence of UN3373 materials.

As soon as is practical, clean up as follows:

1. Wear gloves and protective clothing, including face and eye protection if indicated.
2. Cover any visible spillage with a cloth or paper towels to contain it.
3. Pour an appropriate disinfectant over the cloth or paper towels and the immediate surrounding area (5% bleach solutions are generally appropriate, and quaternary ammonium disinfectants may also be used).
4. Apply the disinfectant concentrically beginning at the outer margin of the spill area, working towards the centre.
5. After about 30 min, clear away the materials. Place the damaged package in a leak proof container e.g. yellow sack and remove to a controlled lab area to see if the samples can be salvaged. If there is broken glass or other sharps are involved, use a dustpan or a piece of stiff cardboard to collect the materials and deposit them into a puncture-resistant container for disposal (sharps bin).
6. Clean and disinfect the area of the spillage (if necessary, repeat steps 2–5).
7. Dispose of contaminated materials into a leak-proof, puncture-resistant waste disposal container.

6.2.2 Specimen Transport: Anatomic Pathology

6.2.2.1 Surgical Samples

- The laboratory porter collects samples twice daily from the Gynae Clinic.
- The theatre porter delivers samples to the laboratory twice daily, at 10:00 AM and 15:30, and samples are signed for in the theatre day book.
- Samples delivered otherwise must be brought to the department by the requesting department.
- A drop off box for Histology specimens is also available in the main reception area, for use during the routine hours and out of hours.
- Samples must **not** be sent via the POD.
- When possible place sample in plastic biohazard bag.
- All urgent requests must be clearly marked by ticking the priority box on the request forms and must include the relevant clinical details.
- Frozen sections must be arranged in advance with the Pathologist.
- All samples must be in adequate amounts of formalin. Exceptions to this are, suspected cases of molar pregnancy and POC's of recurrent (i.e. 3rd or subsequent) miscarriage, which are sent up dry up until 17:00hrs Monday to Friday. All specimens after this time must be placed in fixative.

6.2.2.2 Placental Samples

- An electronic order must be completed and sent to the laboratory with the specimen.
- The laboratory porter collects samples from the delivery ward in the morning.
- The theatre porter delivers the placental samples to the laboratory twice daily, 10:00 AM and 15:30, and these are signed for in the theatre day book.
- All placentas from normal deliveries are examined by a midwife in the delivery ward. If there is no abnormality of pregnancy, labour, the placenta itself, or the immediate post-natal period, the midwife places the labelled full placenta in the placenta storage fridge located in the

delivery ward. These placentas are kept for a period of seven days. Where a clinician is requesting a placenta be processed they must check that there is an electronic order for the placenta in Cerner (this confirms we have the placenta). They may then send a placenta triage form with details of the request to the laboratory. Where there is no electronic order, one must be created and the placenta sample retrieved from delivery and sent with the order form to the laboratory. All placenta requests must be made using the mother's hospital chart.

- The placenta is retrived by the laboratory porter.
- The full placentas of all multiple pregnancies are submitted to the laboratory.
- Placentae for gross examination are placed in black bags, tied, labelled and placed in a biohazard bag. A placental triage form should be completed and sent with the specimen. Microscopic examination is based on findings of gross examination.
- Placentae from all high risk or sero-positive patients are placed in a suitable container filled with formalin and marked with a red hazard sticker. A placental triage form should be completed and sent with the specimen. Microscopic examination is based on findings of gross examination.

6.2.3 Post Mortem

- Body must be placed in the mortuary fridge.
- Original forms must be sent to the laboratory.

6.3 Transport of Potentially High Infectious Risk Specimens

For patients at risk of haemorrhagic fever: The pneumatic transport system must NOT be used. Please contact the laboratory for specimen containment and transport boxes.

6.3.1 Model Rules for Laboratory Porters and All Who Deliver Specimens to the Laboratory

Refer to the Hospital Safety Statement. This policy applies to all porters working in the laboratory and to the porters and care assistants who deliver specimens to the laboratory. Some of the work carried out by laboratory/hospital porters and care assistants in the hospital may involve accidental contact with material that could be infectious. However, wherever they might be working they should observe the following guidelines:

a) Cover any cuts or grazes on your hands with a waterproof dressing.
b) Carry all specimens in the trays and boxes provided, not in your hands or pockets.
c) Touch specimen containers as little as possible. If you do touch them, wash your hands as soon as practicable afterwards.
d) Always wash your hands before meal breaks and at the end of duty.
e) If a specimen leaks into a tray or box, tell the laboratory reception staff and ask them to make it safe.
f) If you drop and break a specimen, do not touch it or try to clear up the mess. Stay with the specimen to prevent other people touching it and send someone to the laboratory for help. If you spill the specimen onto your overall, remove it at once and then wash your hands and put on a clean overall. Report the accident to your supervisor as soon as possible.
g) Handle specimen containers gently at all times.
h) Take care when carrying waste or rubbish from the laboratory as there may be broken glass or needles. If you find these tell your supervisor. Special "sharp" containers are provided for glass, syringes and needles – these must be handled carefully as leakage or penetration by sharp objects can occur.
i) All waste must be handled in accordance with all hospital health and safety policies.

6.4 Specimen Location Delivery Instructions

Figure 12: Specimen Location Delivery Instructions

Location	Instruction
Blood Sciences Laboratory (Routine) Biochemistry, Blood Transfusion, Haematology and Specimen Reception	*Via pod to Station 12
Blood Sciences Laboratory **(Urgent/On Call)** Biochemistry, Blood Transfusion and Haematology	*Via pod to Station 12.Phone laboratory for urgent requests
Microbiology Routine and Urgent (during routine hours only) (Except for CSF's, Sars-CoV-2)	*Via pod to Station 13. Telephone 3533 if sending urgent samples
Microbiology: Blood Culture	*Via pod to Station 12
Microbiology: CSF's	Do not use the POD to deliver CSF specimens to laboratory, deliver by hand, see Section 6. Porter delivery (see Section 6.3.1)
Microbiology: Sars-CoV-2	Do not use the POD to deliver Sars-CoV-2 specimens to laboratory, deliver by hand, see Section 6.2.
Microbiology On-Call	*Via pod to Station 12 or delivery by hand to the Blood Sciences laboratory
Anatomic Pathology(Histology) Frozen sections Placental Specimens: Post Mortem	Do not use the POD to deliver Histology specimens to lab. See Section 6.2.2. Must be arranged in advance with the Pathologist. Porter delivery (see Section 6.3.1) Body must be placed in the mortuary fridge. Forms must be sent to the laboratory.

**If the pod system is not working deliver specimens directly to the appropriate area. See Figure 7: Department Location above.*

7 Specimen Acceptance Requirements

7.1 Laboratory Criteria for Specimen Acceptance

Specimens and request forms must be labelled/filled in as per section 4 and 5 of this document. See below for the rejection of specimens that do not meet the required criteria.
The laboratory will communicate with clinicians to clarify user request when required.

7.2 Laboratory Criteria for Rejection of Specimens

Specimens that conform to the reasons listed below will be automatically rejected and will not be processed by the laboratory. A record of the specimen will be made in the Laboratory Information System (LIS) and the reason for its rejection noted. A report will be sent to the clinical area. Where specimens originate from 'in patients', the requester if known or the unit may be contacted and a repeat specimen requested.

7.2.1 Reasons for Rejecting a Specimen

- Specimen received unlabelled.
- Specimen incorrectly labelled.
- Request form unlabelled.
- Electronic request not completed, as per section 4.7.
- Specimen and form do not contain minimum essential identifiers.
- Specimen and form do not contain the same essential identifiers.
- Specimen that has leaked extensively.
- Incorrect type of specimen.
- Incorrect volume of specimen.
- Specimen clotted inappropriately.
- Haemolysed specimens.
- Specimens received too old for analysis.
- Specimens taken into expired collection containers.
- Blood Transfusion specimens will be rejected if there is not an exact match between the essential identifiers on request and specimen.
- Blood Transfusion specimens with addressograph labels on specimens will be rejected.
- All non-MN-CMS specimens for Blood Transfusion and Kleihauer must be hand written.
- Specimens will be rejected if the essential requirements are missing from the primary specimen.

Special Considerations:

- Blood Transfusion specimens require date of birth (or gestational age) in addition to the full name and hospital number. Non MN-CMS Blood Transfusion samples must be signed by the collector.
- For Blood Transfusion samples, if no hospital number is available, the 1st line of the patient's address must be present on the specimen, in addition to the patient's forename, surname and date of birth, for the specimen to be accepted.
- Anatomical Pathology and Microbiology specimens must be labelled on the body of the container and not on the lid.
- Consent is mandatory for all paediatric genetic samples referred. The consent form must be completed and signed by one parent or legal guardian and by the consultant responsible for the patient's care.
- For post mortem examination, the body should be identified by means of wrist or leg band.

7.2.2 Factors that May Affect the Performance of the Test/Interpretation of Results

- Incorrect volume of specimen.
- Specimen clotted inappropriately.
- Haemolysed/ Lipaemic/ Icteric specimens.
- Specimens received too old for analysis.

7.2.3 Exceptions to Rejecting a Specimen

In exceptional circumstances, where there are problems with patient/sample identification, sample instability due to delay in transport/inappropriate container/insufficient sample volume, incorrect storage or handling temperature, or where the sample is clinically critical or irreplaceable e.g. in the case of surgical specimens in Anatomical Pathology, CSF's, amniotic fluid, CVS, pus from an abscess excised in theatre or other specimens (other than blood), the laboratory can choose to process the sample where both clinician and laboratory staff, following discussion, are confident regarding the identity of the specimen. In this case, the final report should indicate the nature of the problem and where applicable that caution is required when interpreting the result.

Corrections to labelling errors must be clear and unambiguous. Incorrect information must be indicated with a clear strikethrough. The correction must indicate the name of the clinical staff member contacted and bear their signature. It must be counter signed and dated by the laboratory staff member. A Pathology Specimen Non-Conformance Form, RF-CS-LM-20, must be completed and a comment entered in the report to alert the clinicians to the error. This comment states:

> Specimen non-conformance **enter details**. Exemption form completed, please interpret with caution as there is potential risk and impact to patient outcome by accepting this sample

All samples with corrected labelling errors accepted for analysis are recorded as non-conformities and are subject to specific review.

The paper request forms are stored for three months in the laboratory and are then shredded. An exception to this is for Blood Transfusion and genetic request forms, where the request form is scanned and stored for 30 years. Anatomical Pathology request forms are stored for 30 years. Electronic requests are stored permanently in the patient chart.

7.3 Sample Receipt

Authorised laboratory personnel will evaluate the specimens to ensure that they meet the relevant acceptance criteria. This includes considering the stability of the analyte in a primary sample, the time between sample collection and performing the examination. MN-CMS samples are 'booked in' to the LIS on receipt into the laboratory using the unique bar coded number on the sample. The request date field in the LIS is the date and time the sample was received into the laboratory. In the event of MN-CMS printer failure – samples requested using MN-CMS are "booked in" to the LIS on receipt into the laboratory using the unique bar coded accession number on the A4 MN-CMS requisition. This unique accession number is then applied to the manually labelled specimen in the laboratory. Samples with request forms received in the laboratory have the date and time of receipt recorded on the request form. Specimens are then labelled with a unique laboratory accession number; they are then recorded in the LIS linking the unique laboratory accession number to the patient's details provided on the request form.

7.4 Secondary Sampling of Primary Specimen

If separation of the primary sample into a secondary container is required for any reason all portions of the primary sample must be an unequivocally traceable to the primary sample. This is achieved by ensuring all sample containers are labelled with the patient's unique laboratory accession number.

8 Reports

8.1 Reporting of Results within the Hospital

Results, once authorised, are available electronically in MN-CMS or Winpath Ward Enquiry (LIS). Hard copy reports are issued as required on the day of test report release. Laboratory management shares responsibility with the requester for ensuring reports are received by the appropriate individuals within an agreed time interval, depending on the test requested. This is facilitated by the requester providing the necessary details on the request form, including clinical details. All clinicians have been alerted to this requirement via SI-MEM-LM-146.

8.1.1 MN-CMS Reports

Reports are filed directly to the patient chart. In addition, a message is received to the 'Inbox' of the clinician placing the request and to the location pool message centre of the patient's current, or last known, location. Review of results is via an endorsement process. Results are reviewed and accepted by the reviewing clinician or are forwarded directly to the 'Inbox' of a Consultant or other designated clinician for action.

Reports for external clinics will file directly to the patient's MN-CMS chart. In order for a message to be sent to the inbox of the clinician requesting the test, the test request form must have been labelled with the valid registration number (wither MCRN or NMBI) of the requesting clinician. In the event the requesting clinician's registration number has not been provided, it is the responsibility of the requesting clinician to review the report in the patient's MN-CMS chart directly. Please note hardcopy reports are also issued to external clinics as standard (see section 8.3 below).

8.2 Winpath Ward Enquiry

In general, results once authorised are available electronically on the ward PC's, within 20 minutes from time authorised. These results are accessed via Winpath Ward Enquiry. The entry of area logon and password provides access.

8.2.1 Paper Reports

Hardcopy reports are issued as required for requests received on paper request forms. These are delivered to the identified unit, or if none is given, to medical records twice daily (Monday to Friday) by the laboratory porter. Results are reviewed and accepted by the reviewing clinician or are referred to a Consultant or other designated clinician for action. No request should be processed without a named clinician being indicated.

8.3 Reports for External Locations

Hard copy reports are issued as required on the day of test report release. Reports for locations outside the hospital will be posted on the day of reporting if results are available before 15:00hrs Monday to Friday.

8.4 Telephoned Reports

- In general results are telephoned when:
  - There is a comment on the request form requesting results to be telephoned.
  - The results fall within established alert or critical intervals, as defined by procedure.
  - The result deviates significantly from previous results.
  - Urgent action by clinical staff is required.
  - It is necessary to notify the requester that testing will be delayed, where it may compromise patient care.

- All telephoned results must be recorded in the LIS. Details recorded must include date and time of phoned report, staff member notified, and the results conveyed. Also any difficulties in notifying staff of results by telephone should be recorded.
- All telephoned reports shall be followed by a final report.
- While departments have internal criteria stipulating which reports should ideally be phoned to clinical staff, it remains the responsibility of the clinician who ordered the test to follow up and act upon its result.
- It is the policy of the Anatomic Pathology department not to give results over the telephone. A preliminary report may be phoned to a clinician by the department's medical staff.
- It is the policy of the Blood Transfusion department not to give blood group results over the telephone. Urgent Anti-D quantitation results are phoned to Foetal Assessment when a telephoned result is received from the IBTS. This is recorded in Winpath.
- It is not usually necessary to phone abnormal results when the:
  - Result is consistent with previous results on the patient.
  - Result is not unexpected.
- Results delivered by telephone should only be delivered to clinicians. They are not communicated directly to the patient.
- Once the result has been telephoned to the clinician, it is the clinicians responsibility to act upon the result as required.

8.5 Critical results from a referral laboratory

- Critical results are defined as:
  - significantly abnormal results based on your defined phoning criteria
  - significant unexpected results /findings
  - a notification that there will be a significant delay in a turnaround time for a test that could affect patient care

Critical tests are communicated to the referring laboratory by telephone within an appropriate timeframe to manage patient care effectively.

Please see section 1.3 above for contact details for each laboratory

8.6 Faxed Reports

Results should not be faxed from the laboratory. Faxing of results should be limited, and requests for same should be routed through a Consultant Pathologist or the Chief/Senior Medical Scientist. However, as per hospital policy, outlined in PP-OG-GEN-19, in certain circumstances it may be acceptable to transmit confidential personal data and sensitive personal data by fax as follows:

- **Medical Emergency**: Where a delay would cause harm to a patient/client or employee or the potential risk to a patient/client or employee is greater harm than the risk of disclosure of their personal information.
- In the case where a referring/transfer hospital needs a result where time would not allow for it to be posted, it is acceptable for it to be faxed. Blood group results would fall under this category.

8.7 Urgent Reports

Requests marked urgent or priority are processed as a priority according to the protocol in each department. The laboratory must be contacted by phone when sending urgent sample. Where appropriate such results are brought to the immediate attention of the requesting clinician or staff in the clinical area.

8.8 Supplemental Reports

Where additional information regarding a request comes to light which necessitates an additional report, a supplemental report is issued.

8.9 Amended Reports

Where it is discovered that the original report issued is incorrect or contains false information, a revised or amended report is issued. The original report and the correct report are retained on Winpath. The original copy in the patient's chart is marked as incorrect and the new amended report clearly outlines that it is a deviation from the original. For MN-CMS results, the amended report will have **'c'** beside any results which have been corrected. The clinician should be aware when accessing patient results to interpret any corrected results with caution. Where a report has been amended the clinical area will be notified directly. The revised report shows the time and date of the change and the name of the person responsible for amendment, as per the laboratory procedure for Result Recall or Amendment, MP-GEN-RECALL.

8.10 Corrected report

A corrected report is a report issued to correct a typographical error which does not influence the interpretation of the report. For example: Minor patient demographic update required, typographical error in a laboratory interpretation comment/recommendation. The change in the corrected report should not change the clinical interpretation of the report or have an impact on patient care.

8.11 Copy Reports

There is a facility in every department to print copy reports to additional clinicians/locations as requested. Such request may occur at sample login or additional reports may be requested post authorisation and release of primary report. All additional reports issued after the primary report are marked 'Copy'. Copy reports are not issued in MN-CMS.

8.12 Delayed Results

In the event where a delay in examination results could compromise patient care each individual department will communicate this to the clinical area. This should be done by telephoning the clinical area and recording the call in the telephone log of the patient concerned. Where the issue affects a number of clinical areas/patients, a non-conformance should be raised in Q-Pulse. The call should be recorded as part of the immediate action.

8.13 Uncertainty of Measurement

The measurement uncertainty components are those associated with the actual measurement process, starting with presentation of the sample to the measurement procedure and ending with the output of the measured value or test results. Sources that contribute to uncertainty may include sampling, specimen preparation, portion selection, calibrators, reference materials, input quantities, equipment, environment, specimen condition and operator skill. The laboratory must define the performance requirements for the measurement uncertainty of each measurement procedure. This is a key step in deciding whether a test is fit for purpose.

All laboratory investigations are subject to uncertainty of measurement. Please take this into consideration when interpreting results. Each department has a document listing the uncertainties calculated for its tests. For further information on performance specifications or indicators of uncertainty of measurement for internal tests, please contact the individual laboratory department if required.

8.14 Reference Ranges

Results are compared with the Biological Reference Interval where appropriate. These ranges should be matched for age, sex, ethnicity and pregnancy where appropriate and possible. Reference ranges and alert ranges for investigation may be published for use by laboratory and clinical staff. Where results fall within accepted reference ranges, and such a result is consistent with the clinical details provided, it may be authorised. In any situation where the quoted range may not apply, a comment to this effect is included on the report.
Clinicians should be aware of the potential impact of gender-affirming therapy on laboratory tests and that 'sex' is used to assign biological sex reference ranges
(Sex – Sex at birth; Gender – One's own identification as male, female or other)

Please contact individual department for further information on reference ranges.

8.15 Accredited and Non-Accredited Test Reporting

The NMH is an INAB accredited testing laboratory (Reg. no. 240MT), for accredited tests please see: https://inab.ie/Directory-of-Accredited-Bodies/Laboratory-Accreditation/Medical-Testing/The-National-Maternity-Hospital.html. Tests that are not accredited by INAB are identified on reports.

a. The following text will be appended in the footer of all hardcopy printed reports for Haematology, Biochemistry and Microbiology, where accredited activities are being reported*: 'An INAB accredited testing laboratory Reg No 240MT. Excludes tests performed in referral laboratories'.*
b. The following text will be appended in the footer of all hardcopy printed reports for Blood transfusion, where accredited activities are being reported: '*An INAB accredited testing laboratory Reg. No 240MT. Excludes tests performed in referral laboratories. ®Denotes tests performed in a non INAB accredited referral laboratory'.*
c. The following note will be added to the body of each Histology hard copy printed report and electronic report: *'The NMH is an INAB accredited testing laboratory. Registration number 240MT. This covers testing carried out in this facility. For histology this excludes C9; Adipophilin; GATA 3; Alcian Blue; Grocotts; Alcian Blue/PAS; ZN; Reticulin; Elastin VG; MSB; Van Gieson; PAX8 and SARS CoV-2'.*
d. The following text will be visible on Blood Transfusion, Haematology, Biochemistry and Microbiology electronic reports for where accredited activities are being reported: '*The NMH is an INAB accredited testing laboratory (Reg.No. 240MT). Tests performed in referral laboratories are excluded from this scope'.*

8.16 Pre-Authorised Results

All results leaving the laboratory have been validated and/or reviewed by a qualified medical scientist or Consultant. Pre-authorised results contain the electronic signature COMP, they are deemed authorised under the authority of the Consultant in charge of the department based on predefined criteria. Such results do not constitute clinical advice.

8.17 Reports on Results from Referral Laboratories

Results from referral laboratories may be received electronically via MediBridge or by hardcopy.

- MediBridge results are attributed to the referral laboratory and authorised from Winpath. They are available in MN-CMS and on Winpath Ward Enquiry.
- Hardcopy results, where received, from referral laboratories are issued to the requesting clinician.
- Eurofins results are also returned on CDx portal.
- Numeric results may be entered into the LIS for ease of access. Where this occurs they are flagged as originating from a referral laboratory. They are available in MN-CMS and on Winpath Ward Enquiry.

- For text based results in the case of the MN-CMS, the returned report is scanned and attached to the patient's record. A message is sent to the requesting clinician.
- The results from referral laboratories when(re)printed on NMH paper are authorised by COMP as outlined in Section 8.13 above.
- The name of the referral laboratory is indicated in the body of the report, along with identification of the tests performed by the referral laboratory. The referral/back up laboratory report number is recorded internally on WinPath for reference.

8.18 Incomplete list review

Laboratories review incomplete sample lists periodically to ensure samples are reported within their stability limits and within agreed turnaround times.

9 Post Analytical Storage, Retention and Disposal

Please refer to MP-GEN-CLINCON, the laboratory procedure for Control of Clinical Material. All clinical specimens are disposed of according to PP-EF-ENV-17.

9.1 Anatomical Pathology

- Surgical specimens are held for four weeks post reporting.
- Surgical specimens that are all embedded are held for one-week post reporting.
- Blocks and slides are retained for 30 years.
- Placental specimens are held for 12 months.
- Post mortems are held as per consent.

9.2 Blood Sciences

Blood and urine specimens are usually kept for up to one week at 2-6˚C after processing. Haematology and coagulation specimens are kept for one week at room temperature.

9.3 Microbiology

- All CSFs and vitreous/aqueous taps are stored at 4°C for 1 month.
- All positive blood culture bottles are stored at 35°C, aerobically until complete (usually 5 days unless prolonged incubation or terminal sub-culture requested by Consultant Microbiologist).
- Urine samples are stored at 4°C for minimum of 2 days.
- All negative Sars-CoV-2 specimens are stored for 2 days. All positives/aliquot of are stored at -80˚C for a minimum of 3 months.
- All positive Influenzas are stored at 4°C for up to 1 week.
- All other specimens are stored at room temperature for 1 week.

9.4 Specimen Reception and Dispatch

- Samples sent to the NVRL or other external laboratory and not retained in specimen reception.
- All antenatal booking blood specimens are stored frozen for 2 years in the NVRL in accordance with NVRL policy.
- Primary blood specimens that have been separated and a secondary sample sent for referral are stored at room temperature for seven days.
- Primary urine specimens that have been separated and a secondary sample sent for referral are stored at room temperature for seven days.

10 Policy on Protection of Personal Information

The Department of Pathology and Laboratory Medicine follows the hospital policy on data protection. The scope of this policy is to ensure that the obligations in dealing with personal data by the organisation comply with the requirements of the relevant Irish legislation, namely the Irish Data Act 2018, and the General Data Protection Regulation GDPR 2018. The NMH must comply with the data protection principles set out in the relevant legislation. This policy applies to all personal data collected, processed and stored by the NMH in relation to its staff, service users and service providers. The NMH makes no distinction between the rights of data subjects who are employees and patients, all are treated equally under this policy.

11 Complaints Procedure

The Department of Pathology and Laboratory Medicine follows the hospital policy on Data Protection, PP-OG-GEN-17 and the Feedback management policy PP-OG-QTY-6.
All complaints written or verbal will be accepted by the Department of Pathology and Laboratory Medicine, and will be handled as outlined below.

Compliments and Complaints can be given through the following form:
NMH_Patient_Feedback_Form

11.1 Monitoring User Complaints

All complaints, verbal or written, are recorded in the CA/PA module of Q-Pulse. This ensures the complaint is received, substantiated, investigated and actions in response to the complaint are decided. Corrective actions or opportunities for improvement are documented within the module. Complaints are dealt with in the first instance by the Head of Department, or depending on the seriousness of the issue by the QMT.
The laboratory receiving the complaint is responsible for gathering all necessary information to determine if the complaint is substantiated. Clinical Governance is made aware of written complaints to ensure compliance with hospital policy.

11.2 Feedback and Suggestions in relation to laboratory tests or results

The Department of Pathology And Laboratory Medicine welcomes feedback and suggestions from patients and users of the service. Patients who have queries or feedback in relation to selection of tests or examination methods or interpretation of results should discuss in the first instance with their requesting clinician. The requesting clinician will be able to advise and follow up with the laboratory if required.

12 Anatomical Pathology (Histology) Department

12.1 Anatomical Pathology Tests

Please contact the Histology Laboratory if information on specimen stabilities are required.

Figure 13: Anatomical Pathology Tests

Test/Assay Name	Specimen Type/Requirements	Turnaround Time
Perinatal Post Mortem Examination	Foetus/Infant body	8 Weeks
Tissue Processing and staining	Fresh and fixed tissue	N/A
Frozen Sections	Fresh tissue	N/A
Placentae	Fresh tissue for gross examination. Fixed tissue for high risk patients and placentae sampled in the delivery unit	8 Weeks
Non Gynae Cytology	Fixed specimen	6 Days

12.2 Anatomical Pathology Specimen Requirements

Figure 14: Anatomical Pathology Specimen Requirements

Specimen Type and/or Source	Container	Procedure	Accreditation Status	Turnaround Time
Embryo or Foetus	**Container appropriate to size (no fixative)**	**Transfer to Mortuary Fridge**	Not Accredited	N/A
<u>Theatre</u> **Major Specimens e.g. Uterus, Ovarian cysts, etc.**	**1 or 2 litre white**	**Immerse in Formalin** (sufficient to cover specimen) Transfer to Anatomical Pathology.	Accredited	8 Days
Molar Tissue **POC's from cases of recurrent (i.e. 3rd or subsequent miscarriage)**	**1litre white**	**09.30 AM – 17:00hrs**Transfer **FRESH** to Anatomical Pathology as soon as possible. **Other times store in fridge and transfer to Anatomical Pathology as soon as possible.** **Please note samples stored in Formalin are not suitable for Cytogenetic Testing.**	Accredited	8 Days (Cytogenetic Testing 4-6 Weeks)
Minor Specimens e.g. POC's, Curetting's, Fallopian tubes, polyps etc.	**90ml or 1 or 2 litre white**	Immerse in formalin and transfer to Histology.	Accredited	5 Days
Placentae (For examination in laboratory)	**Black plastic bag inside large Biohazard bag**	Transfer **FRESH** to Histology. If delayed store @ 2-4^0 C. (For the purposes of labelling the black plastic bag is the container)	Accredited	8 Weeks
Placentae (High risk)	**2 litre white**	Immerse in Formalin and attach red sticker to both form and container before transfer to Histology.	Accredited	8 Weeks
Placentae (Delivery Ward)	**Black plastic bag inside large Biohazard bag**	Store @ 2-4^{0}C. and transfer to pathology if required otherwise dispose after 7 days.	Accredited	8 Weeks
<u>Foetal Assessment</u> **Products of Conception**	**90-500ml container**	Immerse in Formalin and transfer to Anatomical Pathology (not generally referred for cytogenetics	Accredited	5 Days

Specimen Type and/or Source	Container	Procedure	Accreditation Status	Turnaround Time
		testing).		
<u>Gynae Clinic/ Rooms</u> **Lletz, Cervical and other Biopsies** **Pipelle**	**40 ml prefilled Formalin container** **Place Pipelle in Tissue Tek yellow mesh biopsy cassette**	Transfer to Anatomical Pathology Immerse in Formalin in a 40ml prefilled container and transfer to Histology	Accredited	**Cervical Biopsies:** 80% reported within 4 weeks **Other Biopsies:** 5 Days **Lletz:** 5-7 Days

If the specimen is not listed here please contact anatomical pathology on Ext: 3180 for information.

- **N.B.: PLEASE DO NOT USE THE POD TO DELIVER SPECIMENS TO ANATOMICAL PATHOLOGY.**
- **All samples must be in adequate amounts of Formalin. Exceptions to this are, suspected cases of molar pregnancy and POC's of recurrent (i.e. 3rd or subsequent) miscarriage which are sent up dry up until 17:00hrs Monday to Friday. All specimens after this time must be placed in fixative.**

Turnaround time is calculated on the basis of NMH data for 2012-2013 where applicable, and is the number of working days by which 90% of specimens are reported.

13 Biochemistry Department

13.1 Tests and Specimen Requirements

See Figure 11 for routine cut off times. Urgent specimens are accepted at any time. Specimens from adults are drawn into specific Greiner Vacutainers with appropriate additives as outlined below. Specimens from neonates are drawn into specific Sarstedt micro tubes with appropriate additives as outlined below.
See SI-NOT-GEN1 and SI-NOT-GEN2 for Order of Draw charts on Q-Pulse

13.2 Stability of Routine Biochemistry Tests

Routine biochemistry samples may be analysed up to 12 hours.
Please contact the Biochemistry Laboratory if information on sample stabilities are required.

Figure 15: Routine Biochemistry Tests

Test/Profile	Adult: Cap Additive (Vol)	Paediatric: Cap Additive (Vol)	Turnaround Times	Special Requirements	Accreditation Status
Albumin	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited
Alkaline phosphatase	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited
ALT	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited
Amylase	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited
AST	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited
Bilirubin-Direct	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited
Bilirubin-Total	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited
Calcium	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited
Chloride	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited
CK	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited
Creatinine (Enzymatic)	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited
CRP	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited
Total Bile Acids	**Heparin 4ml**		Same Day Urgent 4 hours		Accredited
Gentamicin-Trough	**Heparin 4ml**	**Heparin 0.6ml**	24 Hrs		Accredited
Gentamicin-Peak	**Heparin 4ml**	**Heparin 0.6ml**	24 Hrs		Accredited
Glucose	**Fluoride 2ml**	**Fluoride 0.6ml**	Same Day Urgent 4 hours	See Figure 18 for information	Accredited
LDH	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited
Magnesium	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited
Osmolality (Plasma)	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited
Phosphate	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited

Test/Profile	Adult: Cap Additive (Vol)	Paediatric: Cap Additive (Vol)	Turnaround Times	Special Requirements	Accreditation Status
Potassium	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited
Sodium	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited
Total Protein	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited
Triglyceride	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours	Fasting	Accredited
Urea	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited
Uric Acid	**Heparin 4ml**	**Heparin 0.6ml**	Same Day Urgent 4 hours		Accredited
Anti Mullerian Hormone	**Plain 7ml**		3 Days	Mon – Fri Biotin may cause some concentration dependent negative interference in this assay if high dose supplements are taken. If this is suspected, a repeat request 8 plus hours off Biotin is recommended in the first instance.	Accredited
CA 125	**Plain 7ml**		3 Days	Mon – Fri Biotin may cause some concentration dependent negative interference in this assay if high dose supplements are taken. If this is suspected, a repeat request 8 plus hours off Biotin is recommended in the first instance.	Accredited
Free bHCG and PAPP-A	**Plain 7ml**		3 Days	Clinical details must include gestation. Samples are only suitable for analysis between 10 weeks 0 days and 13 weeks 6 days.	Accredited
sFlt-1/PlGF ratio	**Plain 7ml**		3 Days	Sample to be taken > 20 weeks. Note: The current NICE Guideline (DG23) only recommends the use of the ratio as a rule out (short term) for PE.	Accredited
HCG	**Heparin 4ml**		48Hrs	Mon – Fri except by special request. Sat a.m. only if sample received in lab before 11.30a.m. Biotin may cause some concentration dependent negative interference in this assay if high dose supplements are taken. If this is suspected, a repeat request 8 plus hours off Biotin	Accredited

Test/Profile	Adult: Cap Additive (Vol)	Paediatric: Cap Additive (Vol)	Turnaround Times	Special Requirements	Accreditation Status
				is recommended in the first instance.	
Oestradiol	**Plain 7ml**		48Hrs	Mon – Fri except by special request. The Oestradiol assay used in the NMH should NOT be used when monitoring Oestradiol levels in patients being treated with fulvestrant. Biotin may cause some concentration dependent positive interference in this assay if high dose supplements are taken. If this is suspected, a repeat request 8 plus hours off Biotin is recommended in the first instance.	Accredited
Progesterone	**Heparin 4ml**		3 Days	Mon – Fri Biotin may cause some concentration dependent positive interference in this assay if high dose supplements are taken. If this is suspected, a repeat request 8 plus hours off Biotin is recommended in the first instance.	Accredited
Free T4 (FT4)	**Plain 7 ml**	**Heparin 0.6ml**	3 Days	Mon – Fri Biotin may cause some concentration dependent positive interference in this assay if high dose supplements are taken. If this is suspected, a repeat request 8 plus hours off Biotin is recommended in the first instance.	Accredited
TSH	**Plain 7 ml**	**Heparin 0.6ml**	3 Days	Mon – Fri Biotin may cause some concentration dependent negative interference in this assay if high dose supplements are taken. If this is suspected, a repeat request 8 plus hours off Biotin is recommended in the first instance.	Accredited
Ferritin	**Plain 7 ml**		3 Days	Mon – Fri Biotin may cause some concentration dependent negative interference in this assay if high dose supplements are taken. If this is suspected, a repeat request 8 plus hours off Biotin is recommended in the first instance.	Accredited

Figure 16 : Routine Biochemistry Profiles

Profile	Adult: Cap Additive (Vol)	Paediatric: Cap Additive (Vol)	Tests Included
UE	**Heparin 4ml**	**Heparin 0.6ml**	Sodium, Potassium, Chloride, Urea, Creatinine
PN	**Heparin 4ml**	**Heparin 0.6ml**	UE, Calcium, Magnesium, Phosphate, Triglyceride, Albumin, Corrected Calcium
SBR	**Heparin 4ml**	**Heparin 0.6ml**	Bilirubin Direct, Bilirubin Total
LFT	**Heparin 4ml**	**Heparin 0.6ml**	Total Protein, Albumin, AST, ALT, ALP, SBR
PET	**Heparin 4ml**	**Heparin 0.6ml**	UE, LFT, Urate
REC	**Heparin 4ml**	**Heparin 0.6ml**	UE, Calcium, Magnesium, Phosphate, Urate, Total Protein, Albumin, AST, ALT, ALP, SBR, Corrected Calcium
GBL	**Heparin 4ml**	**Heparin 0.6ml**	Calcium, Magnesium, Phosphate, Albumin, ALP, Corrected Calcium, Sodium, Potassium, Chloride, Urea, Creatinine
CAL	**Heparin 4ml**	**Heparin 0.6ml**	Calcium, Albumin, Corrected Calcium
U8	**Heparin 4ml**	**Heparin 0.6ml**	UE, Calcium, Magnesium, Phosphate, Albumin, Corrected Calcium
U81	**Heparin 4ml**	**Heparin 0.6ml**	UE, Calcium, Magnesium, Phosphate, Albumin, Corrected Calcium, SBR
CSFB	**Plain 2ml**	**Plain 2ml** Note: Where only a fluoride specimen is received this can be analysed for CSF Glucose only.	CSF Glucose
	Plain 2ml	**Plain 2ml**	CSF Protein

Figure 17: Glucose Testing

All adult samples should be drawn into grey topped fluoride oxalate tubes

Glucose Test/Profile	Special Requirements	Accreditation Status
Fasting	Fasting 12 hours.	Accredited
Random	No dietary restriction.	Accredited
Post Prandial	2 hours following a meal.	Accredited
Antenatal Oral Glucose Tolerance Test (4 Specimens)	Duration: 3 hours. 1. Fasting glucose (Fasting 12 hours) Then glucose administration, 2. Specimen taken 1-hour post glucose administration 3. Specimen taken 2 hours post glucose administration. 4. Specimen taken 3 hours post glucose administration.	Accredited
Postnatal Oral Glucose Tolerance Test (2 Specimens)	1. Fasting glucose (Fasting 12 hours) Then glucose administration, 2. Specimen taken 2 hours post glucose administration.	Accredited

Gestational Diabetes Screen (2 specimens)	1. Fasting glucose (Fasting 12 hours) 2. Specimen taken 1 hour post glucose administration.	Accredited
Blood glucose series (5 specimens)	Times entered as per specimen/request form.	Accredited
Glucose Challenge Test (1 specimen)	1-hour post glucose administration.	Accredited

Figure 18: Urine Biochemistry Tests

Urine Test/ Profile	Container	Additive	Turnaround Times	Special Requirements	Accreditation Status
Creatinine	**Spot Universal or 24 hr Urine**	None	Same Day	*If for Creatinine Clearance, the Plasma for Creatinine determination must be taken during the 24hr period of urine collection	Accredited
Protein	**Spot Universal or 24 hr Urine**	None	Same Day		Accredited
Protein: Creatinine Ratio	**Spot Universal**	None	Same Day		Accredited
Osmolality (Urine)	**Spot Universal**	None	Same Day		Accredited
Potassium	**Spot Universal or 24 hr Urine**	None	Same Day		Accredited
Sodium	**Spot Universal or 24 hr Urine**	None	Same Day		Accredited
Chloride	**Spot Universal or 24 hr Urine**	None	Same Day		Accredited

Figure 19: CSF Biochemistry Tests

CSF Test/Profile	Container	Turnaround Times	Special Requirements	Accreditation Status
CSF Glucose	**Plain** Note: When only a fluoride specimen is received this can be analysed for CSF Glucose only.	Same Day		Accredited
CSF Protein	**Plain**	Same Day		Accredited

13.3 Specialised Biochemical Investigations

These investigations are referred to external centres. Turnaround times, where quoted, reflect specialist nature and referral laboratory response time. For further information, contact specimen reception at Ext: 3178 for sample requirements and Biochemistry at Ext:3546 for result enquires

Figure 20: Specialised Biochemical Investigations

Biotin may cause interference in some of our referral tests. If such interference is suspected, please contact the Biochemistry laboratory for a list of susceptible tests.

*Test codes marked with an asterisk are orderable through the patients' EHR - Cerner Powerchart.

Test	Code	Adult	Paed	TAT	Special Requirements	Referral Centre

Test	Code	Adult	Paed	TAT	Special Requirements	Referral Centre
7-Dehydrocholesterol	**7DEH**	Heparin 4ml	Heparin 1.3ml	3 weeks	Protect from light at all times. Separate into 2° tube. And freeze at -20 Diagnosis of Smith-Lemli-Opitz syndrome	Camilla Scott , Chemical Pathology, Sheffield Children's Hospital [7], Western Bank, Sheffield S10 2TH, UK Tel: 00441142717305 (or 7306)
11- Deoxycortisol	**11DE**	Plain 7ml			Store at 2-8°C. In neonates the sample should be taken at least 48 hours post birth.	Steroid Laboratory, Kings College Hospital, Denmark Hill, London. SE5 9RS. Telephone: 00442077374000 or 0044207346445
17 OH Progesterone (Paed)	**OHPP***		Serum or Heparin accepted	14 days	Ensure neonates are at least 48hrs old as baby will have mothers OHPP present and a false result will be obtained. Assay is run every 2nd Wednesday at 10.30am. Early morning specimens. Separate sample and store in fridge. **If sample received over weekend separate and freeze.**	Biochemistry Dept, OLCH Crumlin [1] Tel : 01 4096427
17 OH Progesterone (Adult)	**OHP***	Plain 7ml		5 days	Spin to separate from cells. Stable on gel. Separate sample and store in fridge if not sent on the same day. **If sample received over weekend separate and freeze.**	Biochemistry Dept, St James Hospital [3] Tel: 01 4162918
Angiotensin Converting Enzyme (ACE)	**ACE***	Plain 7ml			Spin to separate from cells. Stable on gel.	Biochemistry Dept, St James Hospital [3] Tel: 01 4162918
Acetylcholine Receptor Antibodies / MuSK antibodies	**ACRA**	Plain 7ml	**Plain 2ml**	3 days	Spin and separate sample and fridge within4 – 8hrs of blood draw.	Protein Reference Unit [5] Sheffield Northern General Hospital +44 114 2715552
ACTH	**ACTH***	EDTA 3ml	EDTA 1.3ml		Separate immediately and freeze.	Biochemistry Dept, The Mater Hospital, Tel: 01 8032383
AcylCarnitine (Total, Free + Acyl)	**CARN***		Heparin 1.3ml	3 weeks	Separate sample and fridge. Stable in the fridge over the weekend.	Camilla Scott, Chemical Pathology, Sheffield Children's Hospital [7], Western Bank, Sheffield S10 2TH, England Tel; 00441142717305 (or 7306)
AcylCarnitine (Free + Interpretive comment)	**ACAT***		Guthrie Card		Air dry for 2 hrs, avoid heat and humidity. Acylcarnitines profiling is always accompanied by urine for organic acids.	Metabolic Department Temple Street Tel: 01 8784724

Test	Code	Adult	Paed	TAT	Special Requirements	Referral Centre
Alcohol	**ALC**	Fluoride Oxalate		5 days	Preferably Fluoride oxalate sample but serum acceptable. Send primary specimen. No need to separate adult samples.	Biochemistry Dept, Beaumont Hospital (9) Tel: 01 8092668
Aldolase	**ALDO**	Plain 7ml	**Plain 2ml**		Spin to separate from cells. Stable on gel.	Eurofins Biomnis (11) Tel: 01 2958545
Aldosterone	**ALD***	EDTA 3ml	**Plain 2m**	1 week	Spin to separate from cells. Separate and freeze within 4 hours. Indicate patient's posture *If renin is also requested please separate into two aliquots for freezing.	Eurofins Biomnis (11) Tel: 01 2958545
Alkaline Phosphatase Isoenzymes	**ALPI**	Plain 7ml	**Plain 2ml**		Spin to separate from cells. Stable on gel.	Imperial College Healthcare NHS Trust 8th Floor Medical Oncology, Laboratory Block, Charing Cross Hospital, Fulham Palace Road London W6 8RF
Alpha 1 Anti-Trypsin	**AATV***	Plain 7ml	**Plain 2ml**		Separate sample and fridge.	Biochemistry Dept, Beaumont Hospital (9) Tel: 01 8092668
Alpha-fetoprotein (as tumour marker)	**AFP***	Plain 7ml		2 weeks	Adult: Stable on gel after spinning.	Biochemistry St. Vincent's. (6) Tel: 01 2214550
Alpha-fetoprotein (for neural tube defect)	**AFPP***		Plain 2ml or Heparin 1.3ml	2 weeks	Paed: Separate + fridge	Biochemistry Dept, OLCH Crumlin (1) Tel : 01 4096427
AMH (Paed)	**AMHP**	In house	EDTA/ Plasma or Serum		Separate and Freeze. Send frozen	Department of Chemical Pathology Great Ormond Street Hospital for Children. Contin.. RESULTS ENQUIRIES/GENERAL ENQUIRIES Email: gos-tr.chemicalpathology@nhs.net Departmental Office 020 7829 8662 (note: email preferred) CLINICAL ADVICE 020 7405 9200 bleep 0589 Email: duty.biochemists.distribution@gosh.nhs.uk
Amikacin	**AMKI**	Plain 7ml			Samples must be analysed within 24 hours of collection. Patients on once-daily regimens should have specimens taken 12-24 after the dose is given. Single Daily Dose Regimen: Pre-	Biochemistry St. Vincent's. (6) Tel: 01 2214550

Test	Code	Adult	Paed	TAT	Special Requirements	Referral Centre
					Dose Level: <5.0 mgs/L. Separate sample and fridge.	
Amino Acids - Urine	**AMAU***	Urine	Urine	10 days	5 ml random urine required transfer urine from MSU to 10 ml tube and freeze ASAP	Metabolic Department Temple Street Tel: 01 8784724
Amino Acids- Blood	**AMA***		Heparin 1.3ml	5 days	Separate immediately blood/CSF and store in fridge. Please note if CSF sample is haemolysed. Sample can be frozen and sent to TSH with Ammonia if there is only one sample.	Metabolic Department Temple Street Tel: 01 8784724
Amino Acids- CSF	**ACF***		Plain tube	5 days	CSF should be paired with plasma to calculate ratios.	Metabolic Department Temple Street Tel: 01 8784724
Amiodarone (Cordarone)	**AMIO**	Plain 7ml Or EDTA			Separate and freeze within 4 hours.	Eurofins Biomnis (11) Tel: 01 2958545
Ammonia (Paed)	**AMM***		Heparin 1.3ml	2 days	-Separate and **freeze** immediately. Avoid haemolysis - Routine and OOH – Send as urgent once frozen. - Contact referral lab	Biochemistry Dept, Temple St. (4) Tel : 01 8784272
Ammonia (Adults)	**AMMT**	EDTA 3ml			Separate and **freeze** immediately- Send as urgent once frozen.	Biochemistry St. Vincent's. (6) Tel: 01 2214550
Androstenedione (Paed)	**ANDP***		**Plain 2ml**		Spin to separate from cells. Stable on gel. Separate + fridge if not sent on the same day.	Endocrinology Dept. St James Hospital (3) Tel : 01 416 2991
Androstenedione (Adult)	**AND***	Red No Gel 9ml		5 days	Separate + fridge if not sent on the same day.	Endocrinology Dept, St. Vincent's. (6) Tel : 01 2213107
Anti-Adrenal Antibodies (21- Hydroxylase)	**ADGA**	Plain 7ml		5 days	Spin to separate from cells. Stable on gel. Separate + fridge if not sent on the same day.	Protein Reference Unit (5) Sheffield Northern General Hospital +44 114 2715552
Anti-Ovarian Antibodies (Endocrine Auto-antibodies)	**AOA**	Plain 7ml		5 days	Spin to separate from cells. Stable on gel. Separate + fridge if not sent on the same day.	Protein Reference Unit (5) Sheffield Northern General Hospital +44 114 2715552
Anti-parietal cells antibody	**PCA**	Plain 7ml		10 days	Spin to separate from cells.	Immunology Lab, St. Vincent's. (6) Tel: 01 2214550
Apolipoprotein B		Heparin 4ml		7 days		Biochemistry Tallaght University Hospital

Test	Code	Adult	Paed	TAT	Special Requirements	Referral Centre
β-Hydroxybutyrate	**BHBY***		Fluoride 1.2ml		See RF-CS-BIO-41 Hypoglycaemia Workup Request Form - Separate and freeze	Biochemistry Dept, Temple St. [4] Tel : 01 8784272
Bile Acids (Paed)	**BILP**	N/A	Heparin 1.3ml		Spin to separate from cells and store in fridge. For the diagnosis of bile acid synthesis disorders.	Camilla Scott, Metabolic Section, Clinical Chemistry, Sheffield Children's Hospital [7], Western Bank, Sheffield S10 2 TH, England Tel: +441142717305
Biotinidase Activity	**BIOT***		Heparin 1.3ml	4 weeks	Separate and freeze	Chemical Pathology, Sheffield Children's Hospital [7], Western Bank, Sheffield S10 2 TH, England Tel: +441142717305 (or 7306)
Brivaracetam	**BRIV***	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Brain natriuretic peptide (BNP)					See NT-BNP	
C1 Esterase (Function & Total)	**C1E**	2 Sodium Citrate samples			Separate and freeze sample within 4 – 6 hours	Eurofins Biomnis [11] Tel: 01 2958545
C1 Esterase Inhibitor	**C1ES**	Plain 7ml	**Plain 2ml**	6 days	Spin to separate from cells. Stable on gel. Separate + fridge if not sent on the same day.	Eurofins Biomnis [11] Tel: 01 2958545
CA 15.3	**C153***	Plain 7ml	**Plain 2ml**		Spin to separate from cells. Stable on gel.	Biochemistry St Vincent's Hospital [6] Tel : 01 2214550
CA 19.9	**C199***	Plain 7ml	**Plain 2ml**		Spin to separate from cells. Stable on gel	Biochemistry St Vincent's Hospital [6] Tel : 01 2214550
Caeruloplasmin	**CER***	Plain 7ml		5 days	Spin to separate from cells. Stable on gel. Separate + fridge if not sent on the same day.	Biochemistry Dept, St James Hospital [3] Tel : 01 4162918
Caeruloplasmin (Paed)	**CERP**		**Plain 2ml**		Transport at ambient temperature via courier	Protein Reference Unit [5] Sheffield Northern General Hospital +44 114 2715552
Calcitonin	**CALN***	Plain 7ml	**Plain 2ml**		Separate and freeze within 10 mins	Biochemistry Dept, The Mater Hospital, Tel: 01 8032383
Calcium Creatinine Ratio	**CCR**		Spot Urine			Biochemistry Dept, Temple St. [4] Tel : 01 8784272
Carbamazepine (Tegretol)	**CARB***	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Carcinoembryonic antigen (CEA)	**CEA***	Plain 7ml		7 days	Spin to separate from cells. Stable on gel. Most useful in colorectal cancer	Biochemistry St. Vincent's Hospital [6] Tel: 01 2214550

Test	Code	Adult	Paed	TAT	Special Requirements	Referral Centre
Carnitine (Total, Free & Acyl)	**CARN***		Heparin 1.3ml	3 weeks	Separate + fridge. Stable in the fridge over the weekend	Chemical Pathology, Sheffield Children's Hospital [7], Western Bank, Sheffield S102TH, Tel: +44 1142717305 (or 7306)
Catecholamines (Adult)	**CAT***				Replaced by "plasma metanephrines"	HPLC Dept, Beaumont Hospital [9] Tel : 01 8092351
Catecholamines (Paed)	**CATP***		5-10 ml Urine		See WI-CS-BIO-17 *Patients <14 years old send to Beaumont (>14 years send to Eurofins Biomnis)	HPLC Dept, Beaumont Hospital. [9] Tel : 01 8092351
Cholesterol	**LIP***	Plain 7ml		5 days	Fasting sample is preferable. Serum or heparin accepted. Serum sample stable after spinning on gel. If a Lithium heparin sample is received please separate sample into a 2° tube	Biochemistry Dept, The Mater Hospital, Tel: 01 8032383
Cholinesterase/ Pseudocholinesterase	**CHOI***	Plain 7ml	**Plain 2ml**		Separate + fridge if not sent on the same day. (In preoperative screening, cholinesterase is used to detect patients with atypical forms of the enzyme and hence avoid prolonged apne caused by slow elimination of muscle relaxants.)	Biochemistry Dept, St James Hospital [3] Tel : 01 4162918
Clobazam (Frisium)	**CLOB**	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Clonazepam (Rivotril)	**CLON***	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Copper	**COP***	Serum/ Urine	Serum/ Urine		**Blood:** Trace metal tube required from Tallaght Hospital **Urine :** 24 hour collection in acid washed containers received from Tallaght Hospital	Biochemistry Dept, AMNCH Tallaght Hospital [8]. Tel : 01 4143951
Cortisol (Paed)	**CORP***		**Plain 2ml**		Separate and freeze ASAP	Biochemistry Dept, Temple St. [4] Tel : 01 8784272
Cortisol (Adult)	**COR***	Plain 7ml		7 days	Note time of sample. Spin to separate from	Biochemistry Dept, The Mater Hospital, Tel: 01 8032383

Test	Code	Adult	Paed	TAT	Special Requirements	Referral Centre
					cells. Stable on gel.	
C-Peptide (Paed)	**PCP***		**Plain 2ml**		Separate and freeze ASAP.	Biochemistry Dept, Temple St. [4]
C-Peptide (Adult)	**CPEP***	Plain 7ml			Separate immediately and freeze.	Endocrinology Dept, St James Hospital [3] Tel : 01 416 2991
Cystine	**CYS***	Heparin 4ml	Heparin 1.3ml	8 weeks	Do not separate. Contact Temple St for sample details.	Metabolic Laboratory, Temple St. [4] Tel : 01 8784272
Diazepam (Valium)	**DIAZ***	Plain 7ml			Stable after spinning on gel.	Eurofins Biomnis Tel: 01 2958545 [2]
DHEA	**DHEA***	Plain 7ml	**Plain 2ml**		Spin to separate from cells. Stable on gel. Separate if not sent within the day.	Endocrinology Dept, St. Vincent's Hospital [6] Tel : 01 2214406
Dihydrotestosterone	**DHTE**	Plain 7ml	**Plain 2ml**		In pre-pubertal patients values should be assessed before and after treatment with hCG.	Leeds SAS Steroid Centre [16], St James's University Hospital, Leeds
Digoxin	**DIG***	Plain 7ml		4 days	Samples must be taken pre-dose or at least 6 hours post-dose. State dose. Spin to separate from cells. Stable on gel.	Biochemistry Dept, Beaumont Hospital [9] Tel: 01 8092668
Electrophoresis	**SPE**	Plain 7ml		1 week		Biochemistry Dept, St. Vincent's Hospital [6] Tel: 01 2214550
Epanutin (Phenytoin)	**PHN***	Plain 7ml	**Plain 2ml**		Stable after spinning on gel.	Biochemistry Dept, Beaumont Hospital [9] Tel: 01 8092668
Eslicarbazepine (Zebinex)	**ESCL**	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Ethosuximide (Zarontin)	**EXE**	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Felbamate	**FELB**	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Flecainide	**FLE***	Red No Gel 9ml	EDTA 1.3ml		Serum: Separate and freeze ASAP	Eurofins Biomnis Tel: 01 2958545 [2]
Free fatty acids (non-esterified fatty acids, NEFA)	**FA**		EDTA 1.3ml		Separate and freeze ASAP	Level 3, Leazes Wing Royal Victoria Infirmary Queen Victoria Road Newcastle upon Tyne, UK NE1 4LP Tel: 0044191 244 8889

Test	Code	Adult	Paed	TAT	Special Requirements	Referral Centre
Frisium (Clobazam)	**CLOB**	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Fructosamine	**FRUC**	Heparin 4ml				Biochemistry Dept, Rotunda Hospital
FSH	**FSH***	Heparin 4ml / Plain 7ml	Plain 2ml / Heparin 1.3ml	7 days	Spin to separate from cells in gel tubes. Remove from gel after 24 hours. Stable in 2° tubes in fridge for 7 days at 2 - 8°C. If paeds, use same test code but send it to Crumlin	**Adult :** Biochemistry Dept, The Mater Hospital, **Paed :** Biochemistry Dept, OLCH Crumlin (1) Tel : 01 4096427
Gabapentin	**GABP**	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Glycosaminoglycans (GAG's)		Urine			See below for Mucopolysaccharides	
Glutamic Acid Decarboxyalse (GAD) Antibodies	**GAD**	Plain 7ml		1 week	Spin and separate.	Protein Reference Unit (5) Sheffield Northern General Hospital +44 114 2715552
Gamma Gluyamyl Transferase (GGT-Paed)	**GGTP***		Heparin 1.3ml			Biochemistry Dept, OLCH Crumlin (1) Tel : 01 4096427
Gamma Gluyamyl Transferase (GGT-Adult)	**GGT***	Heparin 4ml / Plain 7ml			Serum or heparin accepted. Serum sample stable after spinning on gel. If Lithium heparin sample received separate into a 2° tube	Biochemistry Dept, The Mater Hospital, Tel: 01 8032383
Ganciclovir	**CBR**	Plain 7ml	**Plain 2ml**		Transport time must be less than 7 days	Antimicrobial Reference Laboratory, Severn Pathology, North Bristol NHS Trust, Southmead Hospital, Southmead Road, Westbury-on-Trym, Bristol UK BS10 5NB
Growth Hormone (Paed)	**GHP***		**Plain 2ml**	7 days	Separate and fridge. If send as part of Hypoglycaemia work up, send it to Temple St. They will refer the sample if enough sample.	Biochemistry Dept, OLCH Crumlin (4) Tel : 01 4096427
Growth Hormone (Adult)	**GH***	Plain 7ml		7 days	Separate and fridge	Biochemistry Dept, The Mater Hospital, Tel: 01 8032383
HbA1c	**HA1C***	EDTA 3ml		7 days	Send 1° tube unseparated. Stable over the	Endocrinology Dept, Vincent's (6) Tel : 01 2213107

Test	Code	Adult	Paed	TAT	Special Requirements	Referral Centre
					weekend.	
Hypoglycaemia Workup					Careset orderable in Powerchart also see **RF-CS-BIO-41**	
IGE	**IGE**	Plain 7ml	**Plain 2ml**		Separate sample and fridge.	Immunology St James Hospital [3] Tel : (01) 4162928
Immune Reactive Trypsin	**IRT***		Guthrie Card			For referral lab check with Bio team
Immunoglobulins (IgG, IgA, IgM, IgE)	**IMM***	Plain 7ml	**Plain 2ml**	7 days	Separate sample and fridge.	Immunology St James Hospital [3] Tel : (01) 4162928
IgG subclasses	**IGGS**	Plain 7ml	**Plain 2ml**		Separate sample and fridge.	Protein Reference Unit [5] Sheffield Northern General Hospital +44 114 2715552
Inhibin A	**INA**	Plain 7ml		1 month	Send to referral lab ASAP. Sample must be separated and frozen if not sent on same day	Eurofins Biomnis [11] Tel: 01 2958545
Inhibin B	**INH***	Plain 7ml		4 days	Separate sample and freeze. Sample from Day 3 of cycle required. Send sample Urgently	Eurofins Biomnis [11] Tel: 01 2958545
Insulin (Paed)	**INSP***		**Plain 2ml**		A paediatric glucose sample should be sent with all Insulin requests Separate and freeze ASAP.	Biochemistry Dept, Temple St. [4] Tel : 01 8784272
Insulin (Adult)	**INSU***	Plain 7ml		3 weeks	Separate and freeze ASAP.	Endocrinology Dept, St James Hospital [3] Tel: 01 416 2991
Insulin antibodies	**IA**	Plain 7ml		5 days	Spin to separate from cells.	Protein Reference Unit [5] Sheffield Northern General Hospital +44 114 2715552
Insulin Growth Factor / Somatomedin	**IGF***	Plain 7ml	**Plain 2ml**		Separate and freeze ASAP.	**Adult**: Biochemistry Dept, The Mater Hospital, Tel: 01 8032383 **Paed:** Biochemistry Dept, OLCH Crumlin [1] Tel : 01 4096427
Islet cell antibodies	**ICA**	Plain 7ml		1 week	Spin to separate from cells. Stable on gel.	Protein Reference Unit [5] Sheffield Northern General Hospital +44 114 2715552
Isoelectric Focusing of Transferrin	**IFTR***	Plain 7ml	**Plain 2ml**		Separate and store in fridge. **Do not send on a Friday**, leave in fridge to send on Monday.	Dept. of Neuroimmunology, Institute of Neurology, Queen Square House, London WC1N3BG. Tel: 00442034483814
Keppra Levels (Leviteracetam)	**KEPP***	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300

Test	Code	Adult	Paed	TAT	Special Requirements	Referral Centre
Lacosamide	**LACS**	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Lactate (CSF)	**CSFL***		CSF		Freeze sample before dispatch.	Biochemistry Dept, Temple St. (4) Tel : 01 8784272
Lamotrigine (Lamictal)	**LAMO***	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
LH	**LH***	Heparin 4ml / Plain 7ml	Plain 2ml / Heparin 1.3ml	7 days	Spin to separate from cells in gel tubes. Remove from gel after 24 hours. Stable in 2° tubes in fridge for 7 days at 2 - 8°C. If paeds, use same test code but send it to Crumlin	**Adult :** Biochemistry Dept, The Mater Hospital, **Paed :** Biochemistry Dept, OLCH Crumlin (1) Tel : 01 4096427
Lipase	**LIPE***	Plain 7ml	**Plain 2ml**	1 day		Eurofins Biomnis (11) Tel: 01 2958545
Lipids (Adults)	**LIP***	Heparin 4ml / Plain 7 ml		5 days	Fasting sample is preferable. Serum or heparin accepted. Serum sample stable after spinning on gel. If a Lithium heparin sample is received please separate sample into a 2° tube	Biochemistry Dept, The Mater Hospital, Tel: 01 8032383
Lipids (Paeds)	**LIPP***		Heparin 1.3ml		Fasting sample preferred. Separate plasma to send.	Biochemistry Dept, Temple St. (4) Tel : 01 8784272
Lithium	**LI***	Plain 7ml		5 days	Spin to separate from cells. Stable on gel	Biochemistry Dept, Beaumont Hospital (9) Tel: 01 8092668
Lysosomal Enzymes(Lysosomal storage disease/White cell enzymes)	**WCE***		EDTA 1.3ml x4		Send primary sample unseparated	Heather Church, Willink Unit Genetic Medicine (13), 6th Floor, POD 1, St Mary's Hospital, Oxford Road, Manchester, M13 9WL. Tel: +441617012137
Maple Syrup Urine Disease Screen (MSUD)	**AMA***		Heparin 0.6ml		Separate and fridge. Carried out as part of an amino acid screen to include Branched chain amino acids(Leu, Iso, Val)	Biochemistry Dept, Temple St. (4) Tel : 01 8784272
Metabolic Workup					Careset orderable in Powerchart also see **RF-CS-BIO-36**	
Methionine	**METH***		Heparin 0.6ml		Separate and freeze	Metabolic lab, Temple St. (4)

Test	Code	Adult	Paed	TAT	Special Requirements	Referral Centre
Microalbumin	**MALB**	Urine			Early morning urine	Biochemistry St. Vincent's. [6] Tel: 01 2214550
Mucopolysaccharides (MPS) screen	**MUCO**	Urine		4 weeks	Random urine frozen. 5 ml required	Heather Church, Willink Unit Genetic Medicine [13], 6th Floor, POD 1, St Mary's Hospital, Oxford Road, Manchester, M13 9WL. Tel: +441617012137
Myelin oligodendrocyte glycoprotein antibodies		Plain 7ml or Lithium Heparin		14 days	Spin to separate from cells. Stable on gel. Freezing not required. Ensure delivery Monday to Friday 07:00 - 17:30	Clinical Laboratory Immunology [18] Churchill Hospital, Churchill Drive, Old Road, Headington, Oxford OX3 7LE UK. Enquiries: 0044 (0) 1865 225995 immunology.office@nhs.net
NT- Pro BNP (N-terminal portion of ProBNP)	**NTPR***	Plain 7ml			Done as per part of Suspected Transfusion work up. If not received on same day, the sample needs to be separated.	Biochemistry St. Vincent's. [6] Tel: 01 2214550
Oestradiol (Paed)	**OESP***		**Plain 2ml**		Separate and fridge if not sent on the same day.	SAS Endocrine Lab, Specialist Lab Medicine, Block 46,Beckett St. Leeds, LS97TF Tel: +44 1132067043
Oligosaccharides	**OLIG**		Urine		Stable at 2 - 8ºC or RT	Heather Church, Willink Unit Genetic Medicine [13], 6th Floor, POD 1, St Mary's Hospital, Oxford Road, Manchester, M13 9WL. Tel: +441617012137
Organic Acids	**ORG***		Urine		Dipstick urine samples for organic acids for **pH**. Record the pH in the clinical details line in WP. If the urine is alkaline (pH≥8.5), microbial contamination is suspected and the analysis of the sample may be compromised. While alkaline urines are not suitable for accurate analysis, a gross abnormality may still be detected. Hence, the laboratory should continue to dispatch the alkaline urine sample to TSCUH AND request a repeat urine sample on the	Metabolic Department Temple Street Tel: 01 8784724

Test	Code	Adult	Paed	TAT	Special Requirements	Referral Centre
					patient and send on to TSCUH as soon as possible. Transfer urine from MSU to 10 ml tube and **freeze** ASAP.	
Orotic Acid	**ORO**		Urine		Contact Metabolic Lab in Temple St.	
Oxcarbazepine	**OXCA**	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Parathyroid Hormone (PTH)	**PTH***	2 x EDTA 3ml		7 days	An EDTA whole blood sample is suitable for samples received Monday to Thursday. There is a requirement to separate and & freeze samples on Fridays, as samples are only stable for 48 hours.	Biochemistry Dept, The Mater Hospital, Tel: 01 8032383
Paediatric - Parathyroid Hormone (PTH)	**PTHP**		**Plain Serum 1.3ml**	5 days	Separate and freeze immediately (within 20 mins) measure plasma calcium at same time	Biochemistry Dept, Temple St. (4) Tel : 01 8784272
Perampanel	**PRMP***	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Phenobarbitone (Paed)	**PHBP***		**Serum /** Heparin 1.3ml		Separate and fridge	Biochemistry Dept, Temple St. (4) Tel : 01 8784272
Phenobarbitone (Adult)	**PHB***	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Phenylalanine (PKU)	**PHAL***		Heparin 1.3ml		Spin and separate sample	Metabolic Department Temple Street Tel: 01 8784724
Phenytoin (Paed)	**PHNP***		Heparin 1.3ml or Serum		Separate and fridge	Biochemistry Dept, Temple St. (4) Tel : 01 8784272
Phenytoin (Epanutin)	**PHN***	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Plasma Metanephines		EDTA 3 ml			Separate and freeze immediately. Must be sent to the laboratory on ice. Contact Beaumont Hospital before sending. If not	HPLC Dept, Beaumont Hospital (9) Tel : 01 8092351

Test	Code	Adult	Paed	TAT	Special Requirements	Referral Centre
					available, send it to Mater.	
Plasmalogens	**PLMG**		3 x EDTA 1.3ml		3 EDTA samples required. Send unseparated. Samples must be received in the Willink within 48 hours of blood draw. (Can be sent with white cell enzymes).	Heather Church, Willink Unit Genetic Medicine [13], 6th Floor, POD 1, St Mary's Hospital, Oxford Road, Manchester, M13 9WL. Tel: +441617012137
Porphyrins	**POR**	EDTA 3ml	EDTA 1.3ml		Send primary sample urgently during routine hours. If samples can't be sent immediately separate sample and freeze until next routine day. Cover in tinfoil at all times.	Biochemistry Dept, St James Hospital [3] Tel : 01 4162918
Pregabalin	**PRGL***	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Primidone	**PRMD***	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Prolactin (Macroprolactin)	**PRO***	Plain 7ml / Heparin 4ml		7 days	Spin to separate from cells in gel tubes. (Macroprolactin will be analysed if Prolactin is raised)	Biochemistry Dept, The Mater Hospital, Tel: 01 8032383
Prostate Specific Antigen (PSA)	**PSA***	Plain 7ml			Separate and fridge.	Biochemistry St. Vincent's. [6] Tel: 01 2214550
Pseudocholinesterase	**CHOI***	Plain 7ml	**Plain 2ml**		Measured with Cholinesterase	Biochemistry Dept, St James Hospital [3] Tel : 01 4162918
Purine / Pyrimidine	**PUPY**		Urine		Transfer urine from MSU to 10 ml tubes. Freeze immediately	Purine Research Lab, Biochemical Sciences, 4th Floor, North Wing St Thomas Hospital [10], London, SE1 7EH Tel: +442071881266
Quadruple Test (Second trimester screen)	**TRT***	Plain 7ml		21 days	Serum must be taken at 15 - 20 weeks (usually 16 weeks). Separate and fridge. Requires special form EXT-CS-SR-4. Only send out Mon - Thurs. For interpretation enquires contact Carol Mason at Tel: 0044 1223216447	Clinical Biochemistry, Level 4, Addenbrookes Hospital, Cambridge CB2 2QQ. Tel 00441223217157

Test	Code	Adult	Paed	TAT	Special Requirements	Referral Centre
RAST for Latex	**RAS***	Plain 7ml	**Plain 2ml**	10 days	Separate and fridge. Please write RAST for Latex if written on form to prevent full RAST profile being done.	Immunology Dept, St James Hospital [3] Tel : 01 4162918
Renin	**REN***	EDTA 3ml			Separate and freeze within 40 minutes. *If Aldosterone is also requested please separate into two aliquots for freezing.	Eurofins Biomnis [11] Tel: 01 2958545
Rivotril (Clonazepam)	**CLON***	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Rufinamide	**RFMD***	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Salicylate	**SALI***	Plain 7ml		5 days	Stable after spinning on gel.	Biochemistry Dept, Beaumont Hospital [9] Tel: 01 8092668
SHBG(Sex hormone binding globulin)	**TEST***	Plain 7ml		14 days	Separate if not sent within the day. When SHBG is requested order a TEST profile.	Endocrinology Dept, St. Vincent's. [6] Tel: 01 2213107
Stiripentol	**STRL***	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Tacrolimus (FK506 / Prograf)	**TACR**	EDTA 3ml			Trough samples required, and to be sent to SVUH before 10:30am. Place in Fridge overnight if not sending until next day.	Immunology Lab, St. Vincent's. [6] Tel: 01 2214550
Tegretol (Carbamazepine)	**CARB***	Plain 7ml	Heparin 1.3ml	5 days	Spin to separate from cells. Stable on gel.	Biochemistry Dept, Beaumont Hospital [9] Tel: 01 8092668
Teicoplanin	**TEIC***	Plain 7ml			Spin to separate from cells. Stable on gel	Eurofins Biomnis Tel: 01 2958545 [2]
T3 Free (Tri-Iodothyronine)	**T3***	Plain 7ml	Heparin 1.3ml	7 days	Spin to separate from cells in gel tubes. Remove from gel after 24 hours. Stable in 2° tubes in fridge for 6 days at 2 - 8°C.	Biochemistry Dept, The Mater Hospital, Tel: 01 8032383
Testosterone (Adults)	**TEST***	Plain 7ml	Plain 2ml	14 days	Separate if not sent within the day.	Endocrinology Dept, St. Vincent's. Tel : 01 2213107 [6]
Testosterone (Paeds) Testosterone + SHBG	**TESP***		**Serum**		Spin and separate Phone SJH to notify TESP is on route + indicate	Biochemistry Dept, St James Hospital [3] Tel : 01 4162918

Test	Code	Adult	Paed	TAT	Special Requirements	Referral Centre
					that testosterone is priority	
Thyroid Antibodies (Anti - TPO)	**THYA***	Plain 7ml	Heparin 1.3ml / Serum	7 days	Adult: Spin to separate from cells in gel tubes. Remove from gel after 8 hours. Stable in 2 ° tubes in fridge for 72 hours at 2 - 8°C.	Biochemistry Dept, The Mater Hospital, Tel: 01 8032383
Thyroid Receptor Antibody (TRAB)	**TRAB***	Plain 7ml	Plain 2ml		Spin to separate from cells in gel tubes. Stable on gel over the weekend. Paed: Spin and separate to secondary tube. Freeze it if it isn't sent on the same day	Endocrinology Dept, St James Hospital [3] Tel 01 4162991
Tiagabine	**TGBN***	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Topiramate (Topamax)	**TOPI***	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Toxicology Screen	**TOX***	Urine	Urine	5 days	1 – 2 ml sufficient. Handwrite test on sample container.	Drug Treatment Centre [17], Mc Carthy Centre,30/31 Pearse Street (01) 648 8600
Transferrin Isoforms					See **Isoelectric Focusing of Transferrin**	
Troponin T (Paed)	**TROT***		Heparin 1.3ml		Separate if not sent within the day. Not a useful test until child is > 7 months old	Biochemistry Dept, Tallaght Hospital [8] Tel: 01 4143951
Troponin T (Adult)	**TROA***	Plain 7ml			Spin and separate from cells. **Send out urgently.** It is recommended that two Troponin specimens are taken for measurement, the first at presentation and the second at a minimum of 6 hours later.	Biochemistry Dept, St. Vincent's. [6] Tel 01 2214550
Tryptase	**TRYP***	Plain 7ml or EDTA			Separate and freeze immediately. Samples should be collected up to 1 hr, 3 hr, 12 hrs and 24hrs post event. Label each sample with time and	Immunology Dept, St James Hospital [3] Tel : 01 4162924

Test	Code	Adult	Paed	TAT	Special Requirements	Referral Centre
					sample type. Samples should be accompanied with relevant clinical information. Lithium heparin samples are unsuitable.	
Tyrosine	TYR		Heparin 1.3ml		Spin and separate sample	Metabolic Department Temple Street Tel: 01 8784724
Urine Steroid Profile	**UST***		Urine		If child on steroids, state clearly on request form.	Biochemistry Laboratory, King's College Hospital [(14)], Denmark Hill, London. SE5 9RS Tel : 004420 3299 4131
Urine Sulphite Oxidase	**USO**		Urine		Transfer urine from MSU to 10 ml tube and freeze 1ml of Urine frozen required.	IMD Section, Clinical Chemistry, Laboratory Medicine Block, Children's Hospital , Whittall Street, Birmingham B46NL, Tel : 00441213339942
Unsuitable sample (Referral)	**UXCR**				Test code to be used in the event of an unsuitable sample being received. Put in reason for sample unsuitability also. Phone clinical area and record in phone record of Winpath.	Not Sent
Ustekinumab	**USTE**	Plain 7ml	**Plain 2m**	4 weeks	Trough (pre dose) specimen required	Area A2 Royal Devon & Exeter NHS Foundation Trust, Barrack Road Exeter, EX2 5DW [(20)]
Valproate	**VALP***	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Vancomycin (Trough, Peak or Random)	**VAN 1* (Trough) VAN2* (Peak) VANR* (Random)**	Plain 7ml	**Plain 2ml**	24 hours	State if Trough, Peak or Random. Separate and freeze if not sent within 24 hours. (Trough = Pre, Peak = Post) OOH: Send first thing in the next morning. Routine hours: Send with next courier.	Biochemistry Dept, St. Vincent's. [(6)] Tel: 01 2214550
Venlafaxine (Effexor)	**EFF**	Plain 7ml			Spin to separate from cells. Stable on gel	Eurofins Biomnis Tel: 01 2958545 [(2)]
Vigabatrin	**VGBT***	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300
Vitamin A (Retinol)	**VITA***	Plain 7ml	**Plain 2ml**		Light sensitive, ensure sample is	Biochemistry Dept, St James Hospital [(3)]

Test	Code	Adult	Paed	TAT	Special Requirements	Referral Centre
					covered in foil when taking the sample, spinning and separating. If received uncovered, cover immediately, spin, separate, and freeze. Record the time uncovered in WP. Separate and freeze covered in foil. **Freeze within an hour.**	Tel : 01 4162918
Very Long Chain Fatty Acid	**LCFA***		**EDTA**		See Peroxisomal Disorders section below.	
Vitamin B6 (Pyridoxine)	**VB6**	EDTA 3ml			Light sensitive, ensure sample is covered in foil when taking the sample, spinning and separating. Separate and freeze covered in foil.	Eurofins Biomnis [(11)] Tel: 01 2958545
Vitamin D (Vitamin D3)	**VITD***	Plain 7ml	**Plain 2ml**		Sample stability for Vitamin D is 4 days at 2-8 degrees C. Samples to be spun and stored in fridge if received out of hours. Samples only need to be frozen if not received in SVUH within 4 days.	Metabolic Unit, Biochemistry, St. Vincent's. Tel: 01 2214672 [(6)]
Vitamin E	**VITE***	Plain 7ml	**Plain 2ml**		Light sensitive, ensure sample is covered in foil when taking the sample, spinning and separating. If received uncovered, cover immediately, spin, separate, and freeze. Record the time uncovered in WP. Separate and freeze covered in foil. **Freeze within an hour**	Dept, St James Hospital [(3)] Tel : 01 4162918
Vitamin K	**VITK**	Plain 7ml			Sample must be kept protected from light at all times by tin foil. Spin and separate sample and it is stable in the fridge over the weekend.	St Thomas' Hospital Westminster Bridge Road [19] London SE1 7EH Telephone: 020 7188 7188 https://www.viapath.co.uk/nutristasis-direct
Zinc	**ZINC***	Serum/ Urine	Serum/ Urine		**Blood:** Trace metal tube	Biochemistry Dept, AMNCH Tallaght Hospital [(8)]. Tel : 01

Test	Code	Adult	Paed	TAT	Special Requirements	Referral Centre
					required from Tallaght Hospital **Urine :** 24 hour collection in acid washed containers received from Tallaght Hospital	4143951
Zonegram (Zonisamide)	**ZONE***	Red No Gel 9ml			Routine: Spin and separate to secondary tube. Out of hours: refrigerate	National Society for Epilepsy, Chalfont, St Peter, Bucks, UK, SL9 0RJ Tel: 0044 1494 601300

*Test codes marked with an asterisk are orderable through the patients' electronic chart - Cerner Powerchart.
NB. All serum samples for referral that are not sent out within 48 hours must be centrifuged & separated into secondary tubes for referral on the next working day.

Hypoglycaemia workup: Please use the form **RF-CS-BIO-41** when labelling samples.

Test	Code		Paed: Cap	TAT	Special Requirements	Referral Centre
Glucose, β-OH Butyrate, Lactate	**HGW**		Fluoride 1.2ml		Separate and freeze immediately **(within 20mins)** **Routine and OOH: To be sent urgently – Contact referral lab**	Biochemistry Dept, Temple St. (4) Tel : 01 8784272
Insulin, Cortisol & Growth Hormone	**INSP, CORP, GHP**		**Plain 2ml**		Separate and freeze immediately. Ensure a glucose sample (if available) is sent with all Insulin requests'. **Routine and OOH: To be sent urgently – Contact referral lab**	Biochemistry Dept, Temple St. (4) Tel : 01 8784272
C-Peptide	**PCP**		**Plain 2ml**		Separate and freeze immediately.	Biochemistry Dept, Temple St. (4) Tel : 01 8784272
Amino Acids-Blood	**AMA***		Heparin 1.3ml	5 days	Separate immediately blood/CSF and store in fridge. Please note if CSF sample is haemolysed. Sample can be frozen and sent to TSH with Ammonia if there is only one sample.	Metabolic Department Temple Street Tel: 01 8784724
Ammonia	**AMM***	Heparin 4ml	Heparin 1.3ml	2 days	-Separate and **freeze** immediately. Avoid haemolysis -Routine and OOH – Send as urgent once frozen. -Contact referral lab	Biochemistry Dept, Temple St. (4) Tel : 01 8784272
Acylcarnitine	**ACAT**		Guthrie Card			Metabolic Department Temple Street Tel: 01 8784724
Organic Acids	**ORG**		Urine		Transfer urine to 10 ml secondary tube check pH and freeze immediately. Record pH on Winpath and on sample container	Metabolic Department Temple Street Tel: 01 8784724

Note: A second fluoride oxalate (yellow) sample may be taken if Glucose is to be analysed in NMH lab.

Peroxisomal Disorders					
Test	**Code**	**Paed sample**	**TAT**	**Special Requirements**	**Referral Centre**

Very Long chain fatty acids	**LCFA**	EDTA 1.3ml X3	4 working weeks	Separate and freeze ASAP General peroxisomal disorders, VLCFA oxidation defects and X-Linked ALD. To reach the laboratory within 72 hrs	Heather Church, Willink Unit Genetic Medicine [(13)], 6th Floor, POD 1, St Mary's Hospital, Oxford Road, Manchester, M13 9WL. Tel: +441617012137 Fax: 0161-70-12303
Phytanic and Pristinic Acid	**PHY**			Send primary sample. **Do not separate.**	
Plasmalogens	**PLMG**			Send primary sample. **Do not separate.** Protect sample from light. Cover in tinfoil at all times.	
Lysosomal Enzymes (Lysosomal storage disease/White cell enzymes)	**WCE**	EDTA 1.3ml X3		Send primary sample. **Do not separate.** To reach the laboratory within 72 hrs	

References:

1. OLCH Crumlin online Lab manual: http://olchlab.return2sender.ie/Default.aspx
2. Medlab Pathology online Lab manual: http://www.sonichealthcare.ie/test-information/tests-a-z/tests-a.aspx
3. St James Hospital online Lab manual: http://search.stjames.ie/Labmed/
4. TSCUH DPLM Test requirements manual: EXT-CS-LM-42
5. Protein Reference Unit, Sheffield Northern General Hospital online Lab manual: https://www.immqas.org.uk/pru.asp?ID=316
6. St Vincent's Hospital Pathology User Handbook: EXT-CS-LM-43
7. Sheffield Children's NHS Foundation Trust User's Handbook: EXT-CS-BIO-98
8. AMNCH Tallaght Lab user manual: EXT-CS-LM-53
9. Beaumont Hospital Lab user manual: EXT-CS-LM-52
10. Thomas' Hospital online user manual: http://www.viapath.co.uk/test-alphabetical?location=113&department=130&laboratory=146&letter=
11. Eurofins Biomnis online user manual: https://www.eurofins-biomnis.com/en/services/test-guide/
12. TDL online user manual: https://tdlpathology.com/test-information/a-z-test-list/a/
13. Willink lab manual: EXT-CS-SR-8
14. Steroid laboratory at King's College Hospital: http://www.viapath.co.uk/our-tests/urine-steroid-profile
15. Dept. of Neuroimmunology, Institute of Neurology, UCL: https://www.uclh.nhs.uk/OurServices/ServiceA-Z/Neuro/NEURI/Pages/Testdirectory.aspx
16. St James's University Hospital, Leeds: http://www.sas-centre.org/assays/hormones/5a-dihydrotestosterone
17. HSE National Drug Treatment Centre Lab manual: EXT-CS-BIO-173
18. Oxford Immunology lab: https://www.ouh.nhs.uk/immunology/diagnostic-tests/default.aspx
19. Viapath https://www.viapath.co.uk/nutristasis-direct
20. Royal Devon & Exeter NHS https://www.exeterlaboratory.com/contact/

If the Biochemical investigation required is not listed in Figure 20 above, please contact the Biochemistry laboratory directly at Ext: 3546.

13.4 Retrospective Requesting/Additional Requests

Routine specimens are retained in the Biochemistry laboratory for up to one week, refrigerated at 2-6˚C.Analyses of additional tests are subject to specimen integrity and analyte stability. Add on facility only available for routine Biochemistry samples up to 24 hours from sample draw. Telephone requests for additional analyses are accepted from clinicians, but must be followed up with the appropriate add-on request form.

13.5 Reference Ranges and Critical Alert Ranges

The reference ranges quoted for women on Biochemistry reports refer to the **pregnant** state, apart from AMH, Oestradiol and hCG. In general, levels of plasma analytes tend to be lower in pregnant women mainly due to haemodilution as a result of plasma volume expansion. However, there are some analytes that increase during pregnancy (e.g. plasma Alkaline Phosphatase and Urinary Protein). The minor plasma concentration changes that occur during pregnancy of **Potassium,**

Chloride, Total Calcium, Corrected Calcium, Inorganic Phosphate, Total and Direct Bilirubin, Magnesium, Triglycerides, CRP, Total Bile Acids, ALT, AST, LDH, CK, and Amylase are considered not clinically significant and non-pregnant reference ranges can be used to interpret the results of these analytes. The table below is intended to act as a guide to the changes that occur to Biochemistry references ranges during pregnancy. However, care must be taken in the interpretation of results as there can be variation among pregnancies and also within trimester specific ranges particularly for analytes where there are changes in concentrations as pregnancy progresses e.g. ALP.

Pregnancy related reference ranges are quoted on NMH Biochemistry reports and in Cerner (MN-CMS). **Please note**: Due to lack of IT flexibility, pregnancy related ranges are also quoted on reports of non-pregnant women; where ranges differ between pregnant and non-pregnant women, the non-pregnant ranges will be available as an added comment.

Due to the complexity of Biochemistry reference ranges throughout pregnancy, the provision of pregnancy reference ranges falls into three categories (refer to Figure 21 below for further details):

- **A.** Quoted reference ranges will apply to both pregnant and non-pregnant women for the following tests: Plasma Potassium, Chloride, Total Calcium, Corrected Calcium, Inorganic Phosphate, Total and Direct Bilirubin, Magnesium, Triglycerides, CRP, Total Bile Acids, and Enzymes ALT, AST, LDH, CK, and Amylase.
- **B.** Pregnancy specific reference ranges that span the entire pregnancy. This will apply to the following tests: Plasma Sodium, Urea, Creatinine (Enzymatic), Urate, Total Protein, Albumin, Osmolality and Urinary PCR and 24hr urinary protein excretion.
- **C.** Trimester specific pregnancy reference ranges. **Second trimester ranges will be reported on reports/Cerner with an added comment detailing 1st and 3rd trimester ranges.** This will apply to the following tests: Plasma ALP, TSH and Free T4 and urinary Creatinine Clearance.

In MN-CMS, for categories B and C tests, a comment will be attached to test results detailing applicable supplementary reference ranges. For category B tests, the attached comment will detail the corresponding non –pregnant reference range. For category C tests, the attached comment will detail the corresponding 1st and 3rd trimester ranges (and non-pregnant ranges).

For the correct interpretation of the results of category C tests (trimester specific ranges) in pregnancy, it is essential to click on the attached comment to access all three trimesters ranges- 2nd Trimester ranges are quoted with result.

Figure 21 below is intended to act as a guide to the changes that occur to Biochemistry references ranges during pregnancy. However, care must be taken in the interpretation of results as there can be variation among pregnancies and also within trimester specific ranges particularly where there are changes in concentrations as pregnancy progresses

Figure 21: Reference Ranges for In House Testing

Values in bold are the default adult ranges quoted on Winpath/MN-CMS.

Analyte (Plasma)	Method	Reference Range	Units	Reference Source
Sodium	Ion Selective Electrode	< 28 days: 131-143 28 days - < 1 year: 133-142 1 year - < 16 years: 133-144 <u>Adult:</u> **Pregnant: 133-143** Non- Pregnant: 133 - 146	mmol/L	Sheffield Children's NHS Foundation Trust Harmonisation with Rotunda Pathology Harmonisation UK
Potassium	Ion Selective Electrode	< 28days: 3.5-6.5 28 days - < 1 year: 3.5-5.7	mmol/L	Sheffield Children's NHS Foundation Trust

Analyte (Plasma)	Method	Reference Range	Units	Reference Source
		1 year - < 16 years: 3.5-5.4 **Adult: 3.5 – 5.3**		 Pathology Harmonisation UK
Chloride	Ion Selective Electrode	< 28 days: 97-114 28 days - < 1 year: 98-113 1 year - < 16 years: 98-111 **Adult: 95-108**	mmol/L	Sheffield Children's NHS Foundation Trust Pathology Harmonisation UK
Urea	Urease Kinetic	<15 days: 1.1-7.9 15 days - < 1year: 1.3-5.8 1 year - < 10 years: 3.2-7.6 10 years - < 16 years (Female): 2.6-6.5 10 years - < 16 years (Male): 2.6-7.2 <u>Adult:</u> **Pregnant: 1.0 - 3.8** Non-Pregnant: 2.5 – 7.8	mmol/L	Caliper EXT-CS-BIO-319 Pathology Harmonisation UK
Creatinine	Enzymatic	< 7 days: 0 – 100 7 days - < 4 weeks: 10-70 4 weeks - < 1 year: 10-70 1 year - < 4 years: 15-40 4 years - < 6 years: 15-60 6 years - < 9 years: 15-60 9 years- < 14 years: 20-80 14 years - < 16 years: 30-90 <u>Adult:</u> **Pregnant: 40 - 80** <u>Non-Pregnant</u>: 45-84 (Female) 59-104 (Male)	µmol/L	Harmonisation with Rotunda EXT-CS-BIO-319 Roche Roche
Urate	Uricase	< 15 days: 158-748 15 days - < 1 year: 88-370 1 year - < 12 years:100-282 12 years - < 16 years (Female): 147-342 12 years - <16 years (Male): 150-446 <u>Adult:</u> **Pregnant: 120 – 375** Non pregnant: 140 – 360 (Female) 200 – 420 (Male)	µmol/L	Caliper EXT-CS-BIO-228 Pathology Harmonisation UK Roche
Glucose	Hexokinase	Neonate: Fasting: 3.0 – 5.1 <u>Adult:</u> **Fasting: 4.0 – 6.0**	mmol/L	HSE Guidelines 2010 Roche
Glucose Challenge Test (GCT)	Hexokinase	**Adult: < 7.8**	mmol/L	PP-CS-DB-2 Antenatal Screening for Gestational Diabetes
Antenatal Glucose Tolerance Test	Hexokinase	<u>Adult:</u> Fasting: < 5.3 1 Hour: < 10.0 2 Hours: < 8.6 3 Hours: < 7.8	mmol/L	PP-CS-DB-2 Antenatal Screening for Gestational Diabetes
Total Calcium	NM-BAPTA	<1 year: 2.16 - 2.74 1 year - < 16 years: 2.31 - 2.64 **Adult: 2.2 – 2.6**	mmol/L	Caliper Pathology Harmonisation UK
Corrected Calcium	Calculated	<1 year: 2.16 - 2.74 1 year - < 16 years: 2.31-2.64	mmol/L	Caliper

Analyte (Plasma)	Method	Reference Range	Units	Reference Source
		Adult: 2.2 – 2.6		Pathology Harmonisation UK
Phosphate	Phosphomolybdate UV	<15 days: 1.71-3.15 15 days – < 1 year: 1.47-2.54 1 year - < 5 years: 1.33-2.06 5 years - <13 years: 1.28-1.82 13 years - < 16 years (Female): 1-1.7 13 years - <16 years (Male): 1.11-1.88 **Adult: 0.80 – 1.50**	mmol/L	Caliper Pathology Harmonisation UK
Bilirubin-Direct	Doumas	< 15 days: 3.4 - 7.7 15 days - < 1 year: 1.5 - 3 1 year - < 9 years: 1.5 – 1.8 9 years - < 13 years: 1.5 – 2.9 13 years - < 16 years (Female): 1.5 – 4 13 years - < 16 Years (Male): 1.5 – 4.3 **Adult: <5**	µmol/L	Caliper Roche
Bilirubin-Total	DPD	< 15 days 0 - 250 15 days - < 1 year: 2.5-10 1 year - < 9 years: 2.5-5 9 years - < 12 years: 2.5-8 12 years - < 15 years: 2.5-10 15 years - < 16 years: 2.5-12 **Adult: < 21**	µmol/L	Caliper Pathology Harmonisation UK
Total Protein	Biuret	<15 days: 51-80 15 days - < 1 year: 43-69 1 year - < 6 years: 59-73 6 years - < 9 years: 62-75 9 years - < 16 years: 63-78 Adult: **Pregnant: 56-76** Non-Pregnant: 60 - 80	g/L	Caliper EXT-CS-BIO-228 Pathology Harmonisation UK
Albumin	BCG	<15 days: 33-45 15 days - < 1 year: 31-50 1 year - < 8 years: 40-49 8 years - <15 years: 42-51 15 years - < 16 years (Female): 40-53 15 years - <16 years (Male): 43-53 Adult: **Pregnant: 23 - 42** Non-Pregnant: 35 - 50	g/L	Caliper EXT-CS-BIO-228 Pathology Harmonisation UK
Magnesium	Xylidyl Blue	Neonate: 0.60 – 1.00 **Adult: 0.70 – 1.00**	mmol/L	Pathology Harmonisation UK Pathology Harmonisation UK
Osmolality	Freezing Point/VP	Neonate: 275 – 295 Adult: **Pregnant: 275 – 289** Non-Pregnant: 275 - 295	mOsm/kg	Anne Green EXT-CS-BIO-228 Pathology Harmonisation UK
AST	Tris buffer with P5P	<15days: 40-175 15 days - < 1 year: 28-77 1 year - < 7 years: 29-53 7 years - < 12 years: 26-45 12 years - <16 years (Female): 21-34 12 years - <16 years (Male): 22-44	U/L	Caliper Harmonisation with SVUH (Roche)

Analyte (Plasma)	Method	Reference Range	Units	Reference Source
		Adult: 11 - 34		
ALT	Tris buffer with P5P	<1 year: 7-36 1 year - < 13 years: 12-28 13 years - < 16 years (Female): 10-25 13 years - < 16 years (Male): 12-27 Adult: Female: 8 – 41 Male: 9 - 59	U/L	Caliper Harmonisation with SVUH (Roche) Harmonisation with SVUH (Roche
LDH	L to P IFCC	<15days: 10-1128 15 days - < 1 year: 10-424 1 year - < 10 years: 10-305 10 years - < 15years (Female): 10-260 10 years - < 15 years (Male): 10-270 15 years - <16years: 10-240 **Adult: 135-250**	U/L	Caliper Roche
CK	CK-NAC[IFCC]	< 90 days: 0 – 475 90 days – 1 year: 0 – 250 Adult: Female: 25-200 Male: 40-320	U/L	Harmonisation with Rotunda/ Sheffield Roche Roche
ALP	Roche AMP buffer IFCC	< 14days: 83-248 15days-<1 year: 122-469 1 year - <10years: 142-335 10years-<13years: 129-417 13years-<15years (Male): 116-468 13years-<15years (Female): 57-254 15years-<16years (Male): 82-331 15years-<16years (Female): 50-117 Adult: 1st Trimester: 35 - 105 **2nd Trimester: 35 - 105** 3rd Trimester: 20 - 230 Non pregnant: 30 – 130	U/L	Caliper EXT-CS-BIO-228 Pathology Harmonisation UK
Amylase	Roche liquid stable pNPG7	<15days: 3-11 15 days - < 13 weeks: 3-26 13 weeks - < 1 year: 3-58 1 year - <16years: 29-118 **Adult: 28-100**	U/L	Caliper Roche
Triglycerides	Lipase/GPO-PAP no correction	<15 days: 1.02-3.25 15 days - < 1 year: 0.65-3.24 1 year - <16 years: 0.54-2.47 **Adult: 0.0 – 1.70**	mmol/L	Caliper EXT-CS-BIO-320
CRP	Immunoturbidimetric	Neonate: < 5 **Adult: < 5**	mg/L	Roche Roche
Gentamicin	CEDIA	<u>Neonate:</u> Trough: 0-2 Recommended pre-dose (trough) gentamicin level <1mg/L (or <2 mg/L in neonates if 3 doses or less have been given) Peak: Dependent on dose and time of dose. Discuss reference range with Consultant Microbiologist. <u>Adult:</u> **Trough: <1**	mg/L	PP-CS-NEO-224 Neonatal drug administration monographs PP-CS-IC-17 Adult Antimicrobial Guideline

Analyte (Plasma)	Method	Reference Range	Units	Reference Source
		Peak: Dependent on dose and time of dose. Discuss reference range with Consultant Microbiologist.		
Vancomycin	KIMS	Neonate: Trough: 10 - 20 Peak: Dependent on dose and time of dose. Discuss reference range with Consultant Microbiologist. Adult: Trough: 10 - 20 Peak: Dependent on dose and time of dose. Discuss reference range with Consultant Microbiologist.	mg/L	Roche Roche
Procalcitonin	Electrochemiluminescence immunoassay	<0.06: No systemic inflammatory reaction. 0.06 - < 0.5: Measureable but low systemic inflammatory reaction. 0.5 - < 2.0: Significant but moderate systemic inflammatory reaction. 2.0 - < 10.0: Systemic infection is likely unless other causes are known. 10 - > 100: Indicates an important systemic inflammatory response.	ng/ml	Roche
IL-6	Electrochemiluminescence immunoassay	1.5 – 6.9: No systemic inflammatory reaction.	pg/ml	Roche
Total Bile Acids	Thio NAD-Thio NADH	< 5 months: 3.9 – 6.3 5 months - < 24 months: 6.6 - 9.4 24 months - < 5 years: 4.3 – 6.4 5 years - < 11 years: 3.6 5.4 11 years - <16 years: 3.1 – 4.1 **Adult: 0-18**	µmol/L	EXT-CS-BIO-231 EXT-CS-BIO-205
Oestradiol	Electrochemiluminescence immunoassay	Female: Follicular phase: 114 - 332 Ovulation phase: 222 - 1959 Luteal phase: 222 - 854 Post menopause: < 505 Male: 50 - 159	pmol/L	Roche
CA125	Electrochemiluminescence immunoassay	0-35	kU/L	Roche
HCG	Electrochemiluminescence immunoassay	<5.3	mIU/mL	Roche
Anti-Mullerian Hormone	Electrochemiluminescence immunoassay	20 – 24 years 8.7 – 83.6 25 – 29 years 6.4 – 70.3 30 – 34 years 4.1 – 58.0 35 – 39 years 1.1 – 53.5 40 – 44 years 0.2 – 39.1 45 – 50 years 0.2 – 19.3	pmol/L	Roche
sFlt-1/PlGF ratio	Electrochemiluminescence immunoassay	Ratio <39 (20-40wks gestation): Rule out PE for at least 1 week Ratio 39 - 84 (20-33+6 wks gestation): Moderate/High risk of developing PE Ratio 39 - 109 (≥34 wks gestation): Moderate/High risk of developing PE Ratio >84 (20-33+6 wks gestation): Very high risk of developing PE Ratio >109 (≥34 wks gestation): Very high risk of developing PE	Ratio	Roche
Free T4	Electrochemiluminescence immunoassay	Neonate: 0 – 6 days: 11.0 – 32.0 >6 days–3 mths: 11.5– 28.3 >3 – 12 mths: 11.9 – 25.6	pmol/L	Roche

Analyte (Plasma)	Method	Reference Range	Units	Reference Source
		Adult: Non-pregnant: 12-22 Trimester specific: - First Trimester: 12.1-19.6 **Second Trimester: 9.6-17.0** Third Trimester: 8.4-15.6		Roche
TSH	Electrochemiluminescence immunoassay	Neonate: 0 – 2 days 5.0 –40 3 days – 11 years 0.7 – 5.5	mU/L	Roche/National Newborn Screening Programme
		Adult: Non-pregnant: 0.27 - 4.2 Trimester specific: First Trimester: 0.1- 3.1 **Second Trimester: 0.2- 3.3** Third Trimester: 0.4-3.6		EXT-CS-BIO-161
Ferritin	Electrochemiluminescence immunoassay	Adult: Female: 13 – 150 Male: 30 – 400	µg/L	Roche
Free ßHCG **PAPP-A**	Electrochemiluminescence immunoassay.	Reference ranges are not applicable. Results are used in conjunction with 'Viewpoint' software for the calculation of risk for foetal aneuploidy.	U/L U/L	
Progesterone	Electrochemiluminescence immunoassay	Adult: Follicular: < 0.64 Ovulation: 0.64 – 13.2 Luteal: 13.1 – 46.3 Post Menopause: < 0.64	nmol/L	Roche

Analyte (CSF)	Method	Reference range	Units	Reference Source
CSF Protein	Turbidimetric	<28 days: 0.65 - 1.5 28 to 56 days: 0.5 - 0.9 56 days to 18 yrs: 0.05 - 0.35 18 to 60 years: 0.15 - 0.45 Over 60 years: 0.15 - 0.6	g/L	EXT-CS-BIO-152 UK Standards for Microbiology Investigations Investigation of Cerebrospinal Fluid
CSF Glucose	Hexokinase	<28 days 1.9 - 5.6 28 to 58 days 1.6 - 5.6 58 days to 1 year 1.9 - 5.0 1 year + 2.2 - 4.4	mmol/L	

Analyte (Urine)	Method	Reference Range	Units	Reference Source
Spot Sodium	Ion Selective Electrode	No Range Quoted. Interpret in conjunction with corresponding plasma result.	mmol/L	
Spot Potassium	Ion Selective Electrode		mmol/L	
Spot Chloride	Ion Selective Electrode		mmol/L	
Creatinine Clearance	Calculation	1st Trimester: 69 – 140 **2nd Trimester: 55 – 136** 3rd Trimester: 50 – 166 Non pregnant: 90-130	ml/min	EXT-CS-BIO-228 Jacques Wallach
24h Urine Protein	Turbidimetric	Adult: **Pregnant: ≤0.30** Non Pregnant: ≤0.15	g/24h	NICE Guideline (ng 133) Tietz
Protein: Creatinine Ratio	Calculation	Adult: **Pregnant: ≤ 30** Non Pregnant: ≤ 15	mg/mmol	NICE Guideline (ng 133)

Osmolality	Freezing Point/VP	No Range Quoted. Interpret in conjunction with plasma osmolality.	mOsm/kg	

A critically abnormal result may or may not be unexpected. It may be due to a disease process, the effect of treatment or it may be artifactual. A critically abnormal result is reported urgently by telephone to clinical staff, as per PP-CS-BIO-10. The telephoning of reports is documented in the telephone audit log on WinPath. Refer to Figure 22 below for critical phone limits.

Figure 22: Test Results for Telephoning in Biochemistry

Analyte	Lower Limit	Upper Limit	Comment/ Ref
Sodium	≤125 mmol/L ≤130 mmol/L	≥150 mmol/L Adult ≥150 mmol/L Neonate	1 1
Potassium	≤2.9 mmol/L	≥6.0 mmol/L	2
Urea	-	≥15.0 mmol/L Adult ≥ 10.0 mmol/L Neonate	1 1
Creatinine	-	≥354 µmol/L Adult ≥100 µmol/L Neonate	1
Urate	-	≥450 µmol/L	1 & 3
Calcium	≤1.80 mmol/L	≥ 2.80 mmol/L	Always check for EDTA contamination (Low calcium level) 1
Magnesium	≤0.4 mmol/L	≥1.70 mmol/L	1
Phosphate	≤0.45 mmol/L	-	2
Triglycerides	-	≥20 mmol/L Adult >3 mmol/L Neonate*	If neonate on PN, quote result comment. 2(Adult), 4(neonate) See * comment below
Albumin	≤16 g/L		
Direct Bilirubin	-	≥ 25 µmol/L (Neonate only)	1
Total Bilirubin	-	≥ 100 µmol/L Adult ≥ 240 µmol/L Neonate	5(Adult), 6(Neonate)
AST	-	≥150 IU/L	1
ALT	-	≥150 IU/L	1
CK	-	≥500 IU/L	1
LDH	-	≥500 IU/L	1
Total Bile Acids	-	≥40 µmol/L on first finding	7/8
Amylase	-	≥100 IU/L	3
CRP	-	≥ 100 mg/L Adult ≥30 mg/L Neonate	1 3
CSF glucose & protein			Always phone CSF results
Gentamicin (Trough)		≥ 1 mg/L	8
Gentamicin (Peak)	-	≥10 mg/L Neonate ≥20 mg/L Adult	
Glucose	See Table below for Glucose Results for Telephoning		
Serum Osmolality	≤ 250 mOsm/kg	≥320 mOsml/kg	9
Urinary Protein/ Creatinine Ratio (PCR)	-	> 300 mg/mmol	8
Adult Free T4 (FT4)	<7 pmol/L	> 29 pmol/L	8
Paediatric Free (FT4)	Any result outside the reference range	Any result outside the reference range	

Adult TSH	<0.01 mIU/L	> 5.0 mIU/L	8
Paediatric TSH	< 0.1 mIU/L	> 10 mIU/L	3
CA125	-	>100 KU/L	9

Note: Phoning only required on new/first finding within a distinct clinical episode unless stated otherwise.

Glucose Results for Telephoning				
	Lower Limit	**Upper Limit**	**Comment**	**Ref**
Glucose	≤2.5 mmol/L	≥ 15.0 mmol/L	Phone to appropriate clinical area.	1
Glucose Challenge Test (GCT)	-	>14.0 mmol/L	-Contact the clinician with critical GCT results. -For private patients the GCT result should be phoned to the private consultant that the patient is attending. If no answer, leave a message. If no follow up by the next routine day contact the Obs Reg on Bleep 045. -For patients attending OPD/SPC the GCT result should be phoned to the appropriate clinical area.	8
Oral Glucose Tolerance Test (OGTT)	-	Any result > 15.0 mmol/L	Contact the Diabetes Team on Bleep 025	8
Gestational Glucose (GEST)	-	Fasting ≥ 7.0 mmol/L and/or 1Hr PP ≥ 11.1 mmol/L	Contact the Diabetes Team on Bleep 025	8

14 BLOOD TRANSFUSION DEPARTMENT

Blood Transfusion samples may be analysed up to 48 hours after sample draw.
See SI-NOT-GEN1 and SI-NOT-GEN2 for Order of Draw charts on Q-Pulse

Figure 23: Blood Transfusion Tests

Test/Profile and Request Form (if not using MN-CMS)	**MN-CMS Test Profile**	**Container Type(Vol)**	**Turnaround Times** from time of specimen receipt in laboratory	**Special Requirements** All handwritten specimens must contain the hospital number, patient name date of birth and signed by the collector	**Accreditation Status**
Cord Blood Group and Coombs **LF-BTR-CRREQ Rev 2**	Cord Blood Group and DAT, blood NMH	**EDTA 6ml**	1-36 hours as per special requirements	Cord specimens. Specimens analysed once daily in the morning. Contact laboratory if urgent due to maternal antibodies.	Accredited
Group and Coombs Paediatric **LF-BTR-XREQ Rev 3**	Blood Group and DAT, Paed NMH	**EDTA 3ml**	Same day	**PATIENT MUST BE WEARING AN ID ARMBAND.** **Out of hours:** Available when bilirubin is raised and result is required for blood or product issue. When Cord Bloods were not received and the mother is RhD Neg and may require Anti-D urgently. When a maternal antibody is present and Cord bloods are not available for testing i.e. Maternal antibody first identified postnatal/transfer baby	Accredited
Group and Antibodies (Type and Screen) **LF-BTR-XREQ Rev 3**	Inpatient Group and Antibody Screen NMH	**EDTA 9ml**	24 hours Urgent 1 hour*	**PATIENT MUST BE WEARING AN ID ARMBAND** BT lab / on-call scientist to be phoned if the group and antibodies is deemed urgent. *The presence of a positive antibody screen will increase turnaround times. These samples remain suitable for x-matching blood up to 72 hrs from the time of phlebotomy.	Accredited
Outpatient Group and Antibodies LF-BTR-GCREQ Rev 3	Outpatient group and antibody screen NMH	**EDTA 9ml**	1 routine day	These patients do not have to wear an ID armband and therefore the PPID override function can be used in MN-CMS. However, manual PPID procedures should be followed. In the case of community/GP samples please see section 5.2.3 above. These patients EDTA samples can be in 6 / 9ml tubes. **THESE SAMPLES ARE NOT**	Accredited

				SUITABLE FOR BLOOD COMPONENT PROVISION	
Crossmatch LF-BTR-XREQ Rev 3	Red cells NMH or Crossmatch Red Cells NMH	**EDTA 9ml**	Electronic crossmatch (if eligible as per lab policy) = 5-10 minutes Serological crossmatch requests = 3 hours. Urgent 1 hour*	BT/on-call scientist to be phoned if the crossmatch is deemed urgent. *The presence of a positive antibody screen will increase turnaround times. A current valid inpatient group and antibodies sample is required prior to crossmatch requests with ID armband in place. Blood Product Requests created in MN-CMS must be printed and sent to the lab. The clinical area must inform the Blood Bank when a patient with known immune antibodies is admitted to allow adequate time to source suitable blood products.	Accredited
Uncrossmatched Blood	Uncrossmatched, group specific RCC NMH or Uncrossmatched, O Neg Red Cells NMH	**EDTA 9ml**	**Group specific = approx. 15 minutes O negative = STAT***	The request for uncrossmatched blood must be authorised by a member of the medical staff.	Accredited
Neonatal Crossmatch	Paed Pack (1-5 NMH)	**EDTA 9ml from mother EDTA 3ml from Neonate**	Up to 3 hours (Depending on blood stock arrival from IBTS)	Crossmatched against maternal specimen (correctly labelled with maternal details). Please check if a current valid sample is available on the mother prior to maternal sample collection. The baby must be transfused the first pedi pack split within the first five days of the unit's shelf life. For this reason, paedi-packs should only be ordered where there is an immediate clinical requirement. Blood Product Requests created in MN-CMS must be printed and sent to the lab.	Accredited
Transfusion Reaction Investigation	Transfusion Reaction Investigation Adult/Paed NMH	**See section 14.9 below**	Preliminary 2 hours Final 7 days	See Section 14.9 below.	Accredited
Antenatal Booking	Booking Visit	**EDTA 9ml**	1 routine working day	If patient is not wearing an ID armband an Outpatient Group and antibodies must be selected or if handwriting the sample use form LF-BTR-GCREQ Rev 3.	Accredited
28 Week Antibody Check	Outpatient group and antibody screen NMH	**EDTA 9ml**	1 routine working day	It is policy for all RhD negative women and women with antibodies to have a 28 week antibody check.	Accredited

Antibody Identification	N/A	**EDTA 9ml**	0-5 days	Test initiated by the laboratory. Depending on the complexity and the requirement for blood or blood products.	Accredited
Antibody Titration	N/A	**EDTA 9ml**	0-5 days	Test initiated by the laboratory. Depending on the complexity and the requirement for blood or blood products.	Accredited
Antigen Typing	N/A	**EDTA 9ml**	0-5 days	Test initiated by the laboratory. Depending on the complexity and the requirement for blood or blood products.	Accredited

Figure 24: Blood Transfusion Referral Tests

	MN-CMS Test Profile	Container Type(Vol)	Turnaround Times from time of specimen receipt in laboratory	Special Requirements All specimens must be handwritten with hospital number, patient name date of birth and signed by the collector	Referral Laboratory	Accreditation Status
Anti-D/Anti-c Quantitation	Anti-D or Anti-c blood level, NMH	**9ml EDTA x2**	1 week for verbal report 2 weeks for written report	Please provide EDD when requesting Anti-D/-c quantitation.	IBTS	Reference Laboratory
HLA typing	Group and Antibodies Inpatient / Outpatient	**9ml EDTA**	2 weeks	Test request must be accompanied by associated referral form. Contact the Blood Bank to request form	IBTS	Reference Laboratory
HLA antibodies	Group and Antibodies Inpatient / Outpatient	**9ml serum sample (clotted)**	2 weeks	Test request must be accompanied by associated referral form. Contact the Blood Bank to request form	IBTS	Reference Laboratory
Platelet Alloantibodies	Group and Antibodies Inpatient / Outpatient	**9ml serum sample (clotted)**	2 weeks	Test request must be accompanied by associated referral form. Contact the Blood Bank to request this form	IBTS	Reference Laboratory
NAITP	NAITP investigation, Maternal/ Paed/ Paternal blood NMH	**Mother:9ml EDTA 2X9ml Serum (clotted)** **Father: 2 x9ml EDTA** **Neonate: 1ml Paediatric EDTA**	2-3 weeks	Request must be authorised by Consultant/Haematologist. Test request must be accompanied by associated referral form. Contact the Blood Bank to request this form.	IBTS	Reference Laboratory
Foetal Genotyping in maternal blood samples of patients with immune antibodies must be handwritten and only to be collected Mon – Thur before 12:30 PM to accommodate	Fetal genotyping, blood NMH	**9mlx2 EDTA**	2-3 weeks	Test request must be accompanied by associated referral form. Contact the Blood Bank to request this form	NHS Blood and Transplant	Reference Laboratory

transport requirements						
Platelet Crossmatching **Samples must be handwritten and only to be collected Mon – Thur before 12:30 PM to accommodate transport requirements**	N/A	**Mother: 9ml EDTA** **Mother: 2X9ml Serum (clotted)** **Father: 2 x9ml EDTA**	2-3 weeks	Test request must be accompanied by associated referral form. Contact the Blood Bank to request form.	NHS Blood and Transplant	Reference Laboratory
Fetal RHD screen (cffDNA testing) by the IBTS	Fetal RHD Screen (IBTS), blood NMH	**Mother 1 x 9 ml EDTA**	2 weeks	**STORE SAMPLE AT ROOM TEMPERATURE.** Sample must be accompanied by associated referral form. Contact the Blood Bank to request this form or available on Q-Pulse. MN-CMS printed request forms also appropriate	IBTS	Reference Laboratory
Non-invasive HPA-1A foetal genotyping		**Mother 1 x 9 ml EDTA**	2-3 weeks	**STRECK TUBES REQUIRED.** Consultant/Consultant Haematologist request	Sanquin Diagnostics, Amsterdam	Reference Laboratory

Figure 25: Blood Transfusion Blood Product Requests

Blood Product	Test/Profile and Request Form (if not using MN-CMS)	MN-CMS Test Profile	Container Type(Vol)	Turnaround Times from time of specimen receipt in laboratory	Special Requirements All specimens must be handwritten with hospital number, patient name date of birth and signed by the collector	Accreditation Status
Anti-D (Potentially Sensitising Event - PSE)	Outpatient Group and Antibodies LF-BTR-GCREQ Rev 3	Antenatal (PSE) Anti-D Immunoglobulin NMH	**9ml EDTA**	1 routine day	Indicate the EDD and the reason for request e.g. Antenatal Fall. If requesting Anti-D using MN-CMS the Anti-D must be ordered, the requisition printed and sent to the Blood Bank	Accredited
Anti-D (RAADP)	Outpatient Group and Antibodies LF-BTR-GCREQ Rev 3	RAADP Anti-D Immunoglobulin NMH	**9ml EDTA**	1 routine day	Indicate sample is a 28 week / RAADP sample	Accredited

Anti-D (Post Natal)	Group and Antibodies (Type and Screen) LF-BTR-XREQ Rev 3	Post Natal Anti-D Immunoglobulin NMH	**9ml EDTA**	1 routine day	If requesting Anti-D using MN-CMS the Anti-D must be ordered, the requisition printed and sent to the Blood Bank	Accredited
Blood Products (non-red cells) **Refer to Figure 25 for red cells**	Group and Antibodies (Type and Screen) LF-BTR-XREQ Rev 3 Sample may already be available – contact lab	Blood Products Order /Prescribe Adults and Neonates	**9ml EDTA**	TAT is dependent on product required and availability – contact lab for approximate estimation	When requesting blood products using MN-CMS the blood product must be ordered, print the requisition and sent to the Blood Bank.	Accredited

14.1 Storage of Blood Specimens

Blood specimens can be stored for 48 hours at 4˚C if there is a delay in transport to the laboratory. The exception to this is the storage of samples collected for the Fetal RhD screen, which must be stored at room temperature.

14.2 Specimen Request Form

Please refer to Figure 23, Blood Transfusion Tests, for appropriate requests forms if not using MN-CMS. The request form must have the relevant details as outlined below:

1) Patient details: Surname, first name, hospital number, date of birth, ward.
2) Clinical details: Surgical procedure, transfusion and pregnancy history.
3) Signature of person making the request.
4) Signature of the person taking the specimen.
5) GP bloods must indicate the full address of the patient on both specimen and request form.

14.2.1 Antenatal Blood Grouping and Antibody Screen

Please refer to PP-CS-AN-24, Antenatal Blood Grouping and Red Cell Antibody Screening Policy, for frequency and details of tests required.

Cord bloods should be sent for Group and DCT on infants of all RhD negative women/blood group unknown to assess requirement for postnatal Anti-D Ig injection. Anti-D Ig will be issued to RhD negative women based on these results. Cord blood must also be sent for Urgent Group and DCT on infants of women with irregular red cell antibodies and suspected Haemolytic Disease of the Fetus/Newborn (HDFN). Paper request form must supply the demographic details of both the mother and the infant. Please inform the Blood Transfusion laboratory/On Call scientist when sending these sample to the laboratory.

14.2.2 Crossmatch Request

In addition to the information required under Section 14.2 ‘Specimen Request Form’, please supply the following:

1) Relevant clinical information, antenatal history, blood transfusion history, transfusion reaction etc., patient diagnosis (special conditions require special blood - example sickle cell disease requires special antigen negative blood).
2) If specific blood components/products are required i.e. CMV negative, irradiated, this should be requested.
3) The specific surgery or reason for a transfusion request should be indicated.

4) A clear indication as to whether the tests/components/products requested are **urgent** or **routine**. All urgent requests must be made by contacting the Blood Transfusion department during routine hours or the medical scientist On Call at all other times. Where a verbal request is made it must be followed up by a written/printed request form.
5) For paediatric/neonatal crossmatch requests, a valid maternal sample taken within 72hours of delivery must be available.
6) A current valid inpatient Type & Screen sample is required for adult red cell requests. This is one that is collected within 72 hours of the transfusion event being completed. A formal exception to this rule exists for Placenta Praevia and Accreta patients, providing they do not have any alloantibodies.
7) It is recommended that a second sample should be taken for the confirmation of the ABO group of a first time patient prior to transfusion, where this does not impede the delivery of urgent red cells or other components. However, it is important that the two samples are taken independently of one another. This recommendation is an important step in mitigating the risks associated with Wrong Blood in Tube (WBIT).

14.2.3 Blood Transfusion Laboratory Services at the National Maternity Hospital to Support Termination of Pregnancy Services

The Blood Transfusion laboratory will accept samples for Blood Group and RhD status from GPs and community based services like the Irish Family Planning Association for women within the NMH catchment area (South Dublin, Wicklow and Kildare) who are seeking abortion. The purpose of this blood group is to identify women who are RhD Negative and who will require prophylactic Anti-D Ig as part of her abortion treatment. The Blood Bank returns the results of the blood group via encrypted email. GPs must register with the department and provide their registration number and health mail email account. Details on sample acceptance requirements are issued to each GP along with information on Anti-D Ig for this patient cohort.

If the patient is RhD Negative, Anti-D Ig prophylaxis is recommended following therapeutic termination of pregnancy after 10 weeks' gestation to prevent sensitisation and to safeguard any further pregnancy. This Anti-D Ig may be given post administration of the first tablet and should be given no later than 72 hours post ingestion of the second tablet. Service users should contact the Annex Clinic at the NMH to arrange for Anti-D Ig administration for their patients.

14.2.4 Routine Antenatal Anti-D Prophylaxis (RAADP) at the NMH

A RAADP service at approximately 28 weeks' gestation is offered to all RhD Negative mothers at the NMH in an effort to reduce sensitisation and the production of immune Anti-D. However, approximately 40% of pregnant RhD Negative women will carry a RhD Negative foetus that poses no risk of sensitisation to the mother. This results in these women receiving at least one dose of Anti-D Ig unnecessarily, which has ethical and cost implications. To avoid this, the NMH, via the Irish Blood Transfusion Service (IBTS), offers all known RhD Negative mothers cell free foetal DNA (cffDNA) analysis from their maternal blood sample in order to determine the RhD gene (RHD) status of the foetus. This allows a targeted RAADP and Anti-D Ig prophylaxis approach to the antenatal care of RhD negative women at the NMH.

14.3 Maximum Blood Order Schedule

A maximum blood order schedule is in effect. Please refer to PP-CS-BT-1, Maximum Blood Ordering Schedule, for details. The Blood Bank must be informed when a patient with known immune antibodies is admitted to allow appropriate time to source suitable blood products for the patient.

14.4 Massive Haemorrhage Pathway

Please refer to PP-CS-PN-15, Massive Haemorrhage in Obstetrics, and CG-GYN-INPAT-18, Blood Transfusion Management of Major Haemorrhage in Gynaecology.

14.5 Urgent Blood Product Requests

Urgent blood product requests, e.g. the request for 'Pack 1', can be made verbally. All blood product requests can be sent to the laboratory retrospectively either via request forms or MN-CMS printed requisitions.

14.6 Investigation Following Suspected Transfusion Reaction

If a transfusion reaction is suspected, the unit being transfused (with giving set attached) at the time of reaction along with any/all units transfused prior should be returned to the Blood transfusion laboratory (not just the unit being transfused at the time) with the relevant specimens and completed transfusion reaction form. Two copies of the NMH Transfusion Reaction Form should be printed from MN-CMS and sent to the laboratory. In the event MN-CMS is down, a hardcopy is available on Q-Pulse, RF-CS-HV-1, Suspected Transfusion Reaction Form. Blood product packs should be stored at room temperature while awaiting investigation.

Figure 26: Suspected Transfusion Reaction Specimen Types

Transfusion Reaction Investigation Test/Profiles	Container (Vol)	Special Requirements Take all samples post suspected Transfusion reaction.	Accreditation Status
Type/Screen or Inpatient Group and Antibodies	**9ml EDTA**	Specimens must be correctly labelled with hospital Number, patient name and date of birth. Include signature of collector if ordered manually	Accredited
FBC	**EDTA 5ml**		Accredited
COAG	**Citrate 3.0ml**		Accredited
UE, LFT's, LDH	**Lithium Heparin4ml**		Accredited
Haptoglobins	**Plain 7ml**		Accredited
MSU	**MSU Jar**	1st voided urine	Accredited
Blood Cultures Adult	**BacT Alert aerobic and anaerobic vials**		Accredited
Blood Cultures Baby	**BacT Alert Paeds vial**		Accredited
All Blood Packs including giving sets (used and unused)		All Blood Packs and Giving Sets are sent to The IBTS for culture	Referred Test

14.7 Reference Ranges and Critical Alert Ranges

- The results are abnormal or unexpected.
- The result deviates significantly from previous results.
- Grouping discordance.

Ref: LP-GEN-TELREP/PP-CS-LM-4

Critical Alerts in Blood Transfusion that require telephoning to the clinical area

Anti-D Quantitation
A woman who has an Anti-D Quantitation > 4 IU/ml or has a rising Anti-D level or has a history of HDFN in a previous pregnancy should be referred to a Fetal Medicine Consultant Obstetrician in the Fetal Assessment Unit of NMH. Phone FAU midwife with the result on 086-0285343 immediately. If contact cannot be made via the mobile leave a message and then attempt to phone 6373217/3218 with the result.
Anti-c Quantitation
A woman who has an Anti-c Quantitation > 7.5 IU/ml or has a rising Anti-c level or has a history of HDFN in a previous pregnancy should be referred to a Fetal Medicine Consultant Obstetrician in the Fetal Assessment Unit of NM. Phone FAU midwife with the result on 086-0285343 immediately. If contact cannot be made via the mobile leave a message and then attempt to phone 6373217/3218 with the result.
All other Clinically Significant Red Cell Antibodies
A woman who has an antibody titre ≥ 32 or has a history of HDFN in a previous pregnancy should be referred to a Fetal Medicine Consultant Obstetrician in the Fetal Assessment Unit of NMH. Phone FAU midwife with the result on 086-0285343 immediately. If contact cannot be made via the mobile leave a message and then attempt to phone 6373217/3218 with the result.
Identification of New Antibodies at Delivery or Prior to Surgical Procedure (Gynae)
If a new antibody is discovered at delivery or prior to surgical procedure, the clinical area must be contacted immediately and informed that blood transfusion support has the potential to be compromised due to the presence of an antibody. Cord bloods for Group/DAT/FBC/SBR must also be requested from the clinical area at delivery in this instance as the neonate may be at risk of HDFN.
Weak RhD Blood Group
If a patient's RhD status is weak and needs to be sent to the IBTS for confirmation, the decision to issue Anti-D immunoglobulin, red cells or platelets needs to be brought to the attention of the requesting clinician immediately.
Direct Coombs Test
The DCT result must be phoned when: • DCT >2+ • The DCT is Positive (any grade) where no history of Anti-D Immunoglobulin was given in this pregnancy • The DCT is Positive (any grade) where ABO incompatibility is a possible cause • The DCT is Positive (any grade) where an immune antibody is the possible cause.
Blood & Blood Products
The availability of Blood or Blood Products is phoned in all urgent situations. These include: • Code Red Activation (Obstetric or Gynaecology) • Availability of Anti-D Ig in the event of a Kleihauer result > 12 mls FMH requiring additional doses of Anti-D. • Availability of Anti-D Ig in the event of a PSE approaching 72hours post event. • Uncollected Anti-D Ig in issue fridge approaching 48 hours post issue.
Note: Where a result is critically abnormal and contact cannot be made with the clinical area it is important that a clinical team be contacted. These results may have implications for the immediate treatment of the patient and/or may indicate a life-threatening situation. Please refer to LP-GENTELREP for the procedure to follow in this instance.

14.8 Collection/Delivery of Blood, Components and Blood Products

All movement of blood and platelets is monitored by Blood Track, please refer to the procedure PP-CS-HV-11 for further details.

Three emergency O RhD Negative units for adult use and one emergency O RhD Negative unit for neonatal use are available from the theatre blood fridge.
Note that the neonatal red cell unit in theatre is <8 days old and not suitable for exchange transfusion.

14.9 Intra Uterine Transfusion

Intrauterine transfusion (IUT) of donor red cells is the primary treatment for significant foetal anaemia in pre-term pregnancies where delivery is not appropriate. The process requires excellent communication between the Blood Bank and the Fetal Assessment Unit (FAU). The foetal anaemia can be the result of maternal red cell alloantibodies causing HDFN or, more rarely, foetal anaemia due to Parvovirus B19 infection. An IUT of platelets is also available when there is foetal alloimmune thrombocytopenia.

Following the request for the first IUT from the FAU, the Irish Blood Transfusion Service (IBTS) will perform an extended phenotype on the most recent sample from the mother to include Fya, Fyb, Jka, S and s types and where time allows source donors to match the patients extended phenotype as far as possible. Once an IUT date has been scheduled, the patient must present to the FAU to have two 9ml EDTA inpatient Group and Antibody (Type and Screen) samples collected. The timing of this sample collection must be discussed between the FAU and the Blood Bank. The samples are required for crossmatching and referral to the IBTS and must be collected no sooner than 72 hours prior to the transfusion event.

At the first IUT it is important to always do a foetal Group and DCT and a foetal FBC using a pre-transfusion sample. Depending on the clinical picture, other pre-transfusion samples may be taken for Cytogenetics, Parvovirus or a TORCH screen. It is the responsibility of the attending clinician to request these. At subsequent IUTs, the only pre-transfusion foetal sample collected is an FBC. The sample requirements for the above tests are as follows:

- Group and SCT – 3ml EDTA
- FBC – 1.3ml EDTA
- Cytogenetics - 1.3 ml Lithium Heparin
- Parvovirus - 1.3 ml Serum
- Torch Screen - 1.3 ml Serum

At all IUTs, the clinician will take numerous foetal 1.3ml EDTA FBC samples for the estimation of foetal haemoglobin using a point of care testing device. The results of this testing will guide the required transfusion volume. A Kleihauer test on the mother may be required on post-transfusion samples after multiple IUT's. In the case of first time platelet IUTs for foetal alloimmune thrombocytopenia, a sample may also need to be further referred to the IBTS HLA laboratory for platelet genotype as per the Consultant Haematologist.

15 Haemovigilance

The definition of Haemovigilance is "A set of organised surveillance procedures relating to serious adverse or unexpected events or reactions in donors or recipients and the epidemiological follow-up of donors (EC Directive 2002/98/EC)". At hospital level, the main objectives of the Haemovigilance system are:

- To ensure the safety of the transfusion system.
- Educate staff in best transfusion practice.
- Show that problems are recognized and effectively managed.
- Ensure compliance with legal requirements,
- Improve public confidence in the safety of blood and blood components.

Misidentification at blood sampling may lead to fatal ABO-incompatible blood transfusion, especially if the patient has not previously had their blood group documented in the laboratory system. The error will not be picked up.

Great care must be taken to ensure that the patient record open in MN-CMS is that of the patient requiring the sample collection, especially noting that there may be two patients with the same name and date of birth. The unique patient hospital number (MRN) on the **patient identification band must be checked against the MRN on the banner bar of the record open for all inpatient sampling.**

For outpatient blood sampling clinical staff must ensure that positive identification of the patient has been undertaken prior to sampling. Again ensure that the record open in MN-CMS is that of the out-patient requiring the blood sample collection. Noting that there may be two patients with the same name and date of birth.

Inadequately or mislabelled samples carry a significantly increased risk of containing blood from the wrong patient. Risk of misidentification may be reduced by staff adhering to the following principals below:

1) Patients must be positively identified (see Sections 15.1-15.2) and their details must match those on the request form for all sampling (manual or electronic forms).
2) All inpatients must wear an identity band.
3) In the event of an ID band being removed from a patient, it is the responsibility of the clinician (nurse/midwife/doctor) removing the ID band to replace it.
4) Collection of the sample and labelling of the sample tubes must be performed as one uninterrupted process involving one member of staff and one patient at the patient bedside.
5) Sample labels must not be printed away from the patient bedside when using the MN-CMS system for sample collection/labelling.
6) Sample tubes must never be pre-labelled.
7) If MN-CMS is down or not available, the sample tube label must be handwritten with the minimum patient identifiers by the sample collector (identifiers exactly matching those on the identity band worn by the patient) at the patient bedside. The date and time of sampling and the identity of person taking the sample must also be recorded on the sample tube. The request form must have identical identifiers. See Section 4.6 for specimen labelling in the event of MN-CMS printer failure.
8) Labels printed away from the patient (e.g. addressograph labels) must not be used on the transfusion sample but printed addressograph labels are acceptable on the manual request form only if available.
9) All handwritten details must be legible.
10) For samples ordered and collected using the MNCMS, follow procedures outlined in this document, see Section 4.3 Specimen Collection MN-CMS. Verification of the match

between the patient and the computer record and printing of the sample label must be performed at the bedside at the time of phlebotomy. Samples must be labelled at the bedside using the correct printed label after PPID (e.g. FBC label on FBC sample tube).

11) Prior to taking a blood specimen from a patient the following actions should be undertaken:
    - Inform patient of reason for collection of specimen, and any follow up/results of same.
    - Observe hospital policy.
    - Observe hospital phlebotomy (preparation of patient), and health and safety guidelines.
    - The blood sample should not be obtained from an arm being used for the infusion of intravenous fluids because these may alter the blood specimen and invalidate the crossmatch.
    - Observe infection control procedures.
    - Give the patient any relevant printed information leaflets and record this in patients' medical chart (e.g. Rhesus Negative leaflet, Blood Transfusion Information leaflet).
    - BSH guidelines recommend that laboratories have a 'zero tolerance' policy for rejecting samples that do not meet the above minimum requirements.

15.1 Patient Identification

A patient identification band must be worn by all in patients at time of sampling and receiving a blood transfusion. The patient is instructed not to remove the identification band because it is also required for pre-transfusion bedside checking. To ensure accuracy and legibility, the ID band should be printed, from the hospital's computerised patient administration system. The minimum identifiers on the identification band are:

1) Last name.
2) First name or Baby (also if applicable include Twin 1, Twin 2).
3) Date of birth.
4) Unique patient hospital number.

15.2 Positive Patient Identification Procedure

Wherever possible, patients for blood sampling or transfusion should be asked to:

- State their full name and date of birth and this must exactly match the information on the identification band worn by the patient. Check spellings are correct.
- Patients who cannot confirm their identity are at particular risk.
- Great care must be taken in identifying neonates (twins/triplets) and unconscious or anaesthetized patients who cannot aid in the identification process. Identification discrepancies at any stage of the transfusion process must be investigated and resolved before moving to the next stage.
- If not using MN-CMS, all in-patient samples **MUST** be hand labelled from patient identification armband after performing PPID at the bedside for Blood Transfusion department (e.g. crossmatch sample, Group and Antibodies) applicable to obstetric, neonatal and gynaecology patients, or labelled with printed labels from MN-CMS if available after performing PPID and scanning the patient barcoded ID band at the patient bedside.
- Please note in all cases when using printed labels from MN-CMS, **verification of the match between the patient and the computer record and printing of the sample label must be performed at the bedside at the time of phlebotomy - *Is this the RIGHT PATIENT?* This verification is applicable to both inpatient and outpatient settings. EACH label printed using MN-CMS must be checked before applying to the sample tube to avoid wrong blood in tube (WBIT).**
- If not using MN-CMS before sending a sample to laboratory, check that the identifiers on patient identification armband, sample tube and manual form or printed order form from MN-CMS are identical. Great care must be taken when recording the date of birth and hospital

number to avoid transcription errors which will lead to rejection of sample and a repeat been requested.

- See PP-CS-HV-16 for blood transfusion sample phlebotomy in Covid-19 patient clinical areas.
- Complete all sections of request form - include gestation, reason for request, previous doses of Anti-D Ig, date and time of sensitizing event, surgical procedure, etc.

15.3 General Haemovigilance Issues

15.3.1 Traceability (Legal Requirement)

A traceability tag is attached to each blood component (red cells, plasma and platelets) issued. The administrator of the product must sign the bottom half of the tag with date and time and return the tag to the Blood Transfusion department. In cases where the emergency group O RhD Negative uncrossmatched blood is used, complete the patient identifiers on the traceability label. Traceability of all blood is a mandatory requirement and failure to comply with the traceability system will result in a non-conformance being generated and investigated to close out. See the Blood Transfusion Administration Guideline, PP-CS-HV-7, for the records required in patient chart.

15.3.2 Notification of Serious Adverse Events and Reactions (SAR and SAE)

Any serious adverse events (accidents and errors) related to the collection, testing, processing, storage and distribution of blood and blood components which may have an influence on their quality and safety, as well as any serious adverse reactions observed during or after transfusion which may be attributed to the quality and the safety of blood and blood components must be notified to the competent authority. See Mandatory Reporting of SAR/SAE/IBCT/Non Mandatory in PP-CS-HV-5, and the Blood Transfusion Administration Guideline, PP-CS-HV-7, available in Q-Pulse.

15.3.3 Following Suspected Transfusion Reaction

In cases of suspected transfusion reaction, retain and send all used blood packs (in that transfusion episode) with the administration set attached, sealed with a sterile cap to prevent spillage in a sealed bag to the Blood Transfusion laboratory with the necessary samples and suspected transfusion reaction report form completed by the clinician reviewing the patient at the time of the reaction. A Suspected Transfusion Reaction investigation can be ordered in MN-CMS as an adult or infant care set as applicable. Two copies of the NMH Transfusion Reaction Form should be printed from MN-CMS and sent to the laboratory. In the event MN-CMS is down, a hardcopy is available on Q-Pulse, RF-CS-HV-1 Suspected Transfusion Reaction Form. All adverse reactions must be reported as per pertinent Haemovigilance policy. Refer to the Management and Investigation of Adverse Transfusion Reactions, PP-CS- HV-2, available in Q-Pulse.

16 Haematology

16.1 Haematology Tests

Correct filling of Sodium Citrate (Coagulation) tubes is essential. See Figure 11 for routine cut off times. Urgent samples will be processed ASAP as per LP-GEN-SPECREC. All Haematology samples are stored at room temperature.
See SI-NOT-GEN1 and SI-NOT-GEN2 for Order of Draw charts on Q-Pulse

Figure 27: Routine Haematology Tests

Test/Profile	Adult: Cap Additive (Vol)	Paediatric: Cap Additive (Vol)	Frequency of Testing/ Turnaround Times	Special Requirements	Accreditation Status
Full Blood Count	**EDTA 3.0ml**	**EDTA 1.3ml**	**Routine:** Same day **Urgent (MHP):** 15 minutes	Clotted specimens cannot be processed. Send within 24 hours of phlebotomy - No FBC samples are processed after 24 hours of phlebotomy.	Accredited
Manual Differential	**EDTA 3.0ml**	**EDTA 1.3ml**	Mon – Fri only: Same day if received before 13:00.Saturday before 11:00.	Clotted specimens cannot be processed	Accredited
Coagulation	**Sodium Citrate 3.0ml**	**Sodium Citrate 1.3ml**	**Routine:** Same day **Urgent (Haemorrhage):** 30 minutes	Send within 4hrs. Correct volume essential Relevant clinical details must be provided. **Paeds with HCT >0.60 require citrate adjusted specimen tube (contact Haematology lab).**	Accredited
D-dimer	**Sodium Citrate 3.0ml**	**Sodium Citrate 1.3ml**	Same day	Send immediately Correct volume essential. D-dimers on antenatal women available on Consultant request only.	Accredited
Antiphospholipid Screen / Lupus Screen	**Sodium Citrate 3.0ml**	**NA**	2 Weeks	Send within 4hrs. Correct volume essential Relevant clinical details must be provided.	Accredited
Kleihauer	**EDTA 3.0ml**		Mon – Fri only: Same day if received before 13:00. Kleihauer	**NB:** All specimens for Kleihauer testing must be hand written unless ordered via MN-CMS. Only patients >20	Accredited

Test/Profile	Adult: Cap Additive (Vol)	Paediatric: Cap Additive (Vol)	Frequency of Testing/ Turnaround Times	Special Requirements	Accreditation Status
			samples are refrigerated and disposed of after 7 days.	weeks' gestation Relevant clinical details must be provided. Kleihauer samples should be taken > 20 minutes post delivery	
Sickle Screen	**EDTA 3.0ml**		Same day		Accredited
Infectious Mononucleosis	**EDTA 3.0ml**		Same day	Can be requested by laboratory in response to WBC results	Accredited
Malaria	**EDTA 3.0ml**		2 hrs for RDT Mon – Fri only. 5 hrs for Blood films (referred to SJH or SVUH for review).	Blood films to be made less than 3 hours after the blood was drawn. Blood films are referred to SVUH on the direction of the Consultant Microbiologist	Not Accredited

Referral Coagulation Samples

All referral coagulation samples out of hours must be ordered on a clinician to clinician basis. When this is confirmed, the medical scientist on call must contact the medical scientist in the referral laboratory to inform them that the samples are on the way. The samples must reach the destination lab with 4 hours of phlebotomy.

Platelet Counts and Covid Vaccinations

Ref: EXT-CS-HAE-175. Recently there has been specific concern around people post vaccination where they may have a platelet consuming condition which may lead to clots which may be fatal. Therefore, particular attention needs to be paid to low platelet counts.

Haematology Report Comment for Fibrinogen

Please refer to the current literature for trimester specific ranges. Please note the difference in Fibrinogen levels in pregnant vs. non-pregnant patients:

- 1.5 – 4.0 g/l: Non-Pregnant
- 4.0 – 6.5 g/l: Pregnant

16.2 Stability of Routine Haematology Tests

The following tests need to be processed within the stated timeframes.

Figure 28: Stability of Routine Haematology Samples

Test/Profile	Sample Stability
FBC	Within 24 hours of phlebotomy
Coagulation/D-dimer Samples	Within 4 hours of phlebotomy
Lupus Screen	Within 4 hours of phlebotomy
Kleihauer Requests	Within 48 hours of phlebotomy
Sickle Screen	Within 48 hours of phlebotomy
Infectious Mononucleosis	Within 48 hours of phlebotomy
Malaria Screen	Within 3 hours of phlebotomy

Figure 29: Additional Haematology Investigations

These are referred to external agencies. Turnaround times reflect specialist nature and referral laboratory response time

Test Investigation	Test Code	Container Type	Turnaround Time	Referral Laboratory	Comment
Anaemia Screen ADULT\Adolescent **Includes: Serum Iron, Serum Transferrin, TIBC (calculated), and % Iron Binding Saturation, B12 and Folate.**	**ANE**	**1 x 4ml Lithium Heparin**	**10 days**	**St. Vincent's Biochemistry**	**Send on same day as received.** **If this is not possible the sample needs to be spun down and plasma removed from the cells.** **A vial is labelled with the patients' hospital number, patient's name, D.O.B., small lab number sticker and today's date and stored in the fridge until sent.**
ADAMTS13	**ADAM**	**Contact Consultant Haematologist for advice on ADAMTS13 Testing**	**Contact Consultant Haematologist for advice on ADAMTS13 Testing**	**Contact Consultant Haematologist for advice on ADAMTS13 Testing**	**Contact Consultant Haematologist for advice on ADAMTS13 Testing**
Anti Cardiolipin Antibodies	**ACAV**	**1 x 7ml plain**	**10 days**	**St. Vincent's Immunology**	**Assay includes IgG and IgM antibodies.**
Anti-CCP (Anti-Cyclic Citrullinated Peptides)	**CCPV**	**1 x 7ml plain**	**14 days**	**St. Vincent's Immunology**	**CCP antibody appears to be more specific (approx 90%) for Rheumatoid Arthritis than Rheumatoid factor.**

Test Investigation	Test Code	Container Type	Turnaround Time	Referral Laboratory	Comment
Anti-dsDNA	DDNA	1 x 7ml plain	10 days	St. Vincent's Immunology	Performed when ANA is positive with a titre of 1:800 or greater. Strongly positive anti-dsDNA is suggestive of SLE.
Anti-Neutrophil Cytoplasmic Antibody	ANCV	1 x 7ml plain	14 days	St. Vincent's Immunology	This test is available on an urgent basis by arrangement with the laboratory.
Anti-Nuclear Antibodies	ANA	1 x 7ml plain	7 days	St. Vincent's Immunology	Samples are screened at 1/80 dilution. Staining pattern and titre are reported on positive samples.
Antiphospholipid Screen/ Lupus Screen Includes: Lupus Anticoagulant (To be referred only in the event of an analyser failure/confirmation required)	LASV	2 x 3ml Sodium Citrate	15 days	St. Vincent's Coagulation Laboratory	SEND STRAIGHT AWAY Ensure coagulation samples are sufficiently filled. The screen must arrive into the lab before 3pm as it will not be processed in St Vincent's if it arrives in the Coagulation lab after 4pm. Sodium Citrate samples must be processed within 4 hours of collection. It may be required to phone for an urgent courier to collect sample in order for them to be processed in time.
	ACAV	1 x 7ml plain			
Anti Cardiolipin Antibodies	B2GP	1 x 7ml plain	7 days	St. Vincent's Immunology	
Beta-2-Glycoprotein			7 days	St. James's immunology	

Test Investigation	Test Code	Container Type	Turnaround Time	Referral Laboratory	Comment
Auto Antibody Screen Includes: Smooth Muscle Antibody (SMA)/ Parietal Cell Antibody/ Mitochondrial Antibody/ Liver Kidney Microsomal Antibody (Anti-LKM)	AAS	1 x 7ml plain	30 Days	St. Vincent's Immunology	Order AAS for any one antibody requested. When ANA is positive 1:800 or greater, an anti-ENA screen is performed. When positive, sample is further tested for antibodies to the individual antigens.
Anti Thrombin	ATSV	1 x 3ml Sodium Citrate	4-6 weeks	St. Vincent's Coagulation Laboratory	SEND STRAIGHT AWAY Tests done in batches unless requested urgently.
Anti Thrombin URGENT	ATJ	1 x 3ml Sodium Citrate		NCHCD St. James's Hospital	SEND STRAIGHT AWAY The Coagulation Lab NCHCD James's Hospital must receive the samples by 4pm Mon-Fri.
Anti-Xa (Heparin Assay, Anti Factor Xa Assay)	XAJ	2 x 3ml Sodium Citrate	7 days	NCHCD St James's Hosptial	SEND STRAIGHT AWAY The Coagulation Lab NCHCD James's Hospital must receive the samples by 4pm Mon-Fri. The type of heparin treatment must be specified in the clinical details.
APCR + FV Def. Plasma (Activated Protein C Resistance + Factor V Leiden)	APCJ	2 x 3ml Sodium Citrate	8 weeks	NCHCD St James's Hospital	SEND STRAIGHT AWAY The Coagulation Lab NCHCD James's Hospital must receive the samples by 4pm Mon-Fri.

Test Investigation	Test Code	Container Type	Turnaround Time	Referral Laboratory	Comment
BCR-ABL Mutation (p190/p210)	BCR	1 x 9ml EDTA	10-15 days	St. James's Cancer Molecular Diagnostics	Consultant Haematologist approval required. Samples should arrive in St. James's Cancer Molecular Diagnostics laboratory as soon as possible post collection and within 24 hours of sampling. Available Mon - Fri 9.30am – 5pm. Samples should be refrigerated until dispatched. St. James's Cancer Molecular Diagnostics Request form must be received with samples. Available on Q-Pulse as EXT-CS-HAE-190.
Beta 2 Glycoprotein 1 Antibodies (IgG)	B2GP	1 x 7ml plain	7 days	St. James's Immunology	Tests done in batches unless required urgently. This test is always performed in conjunction Anti-Cardiolipin IgG antibody. Anti-β2-Glycoprotein-1 antibodies are more specific for anti-phospholipid syndrome than Anti-Cardiolipin antibodies.
Blood Film Review ADULT	MDH	Film is made using a glass slide and EDTA sample received. A second film is made from the EDTA sample to retain in NMH	Available in 2 hours if Urgent or 4 hours if Routine. Hard Copy Report 10 Days	St. Vincent's Haematology	During the routine day or out of hours: Adult films are referred to St. Vincent's Hospital at the request of a clinician/consultant or by a medical scientist for review and/or confirmation of blood film morphology. Slides are stained as per PP-CS-HAE-17. They are packed into a slide holder to be sent.

Test Investigation	Test Code	Container Type	Turnaround Time	Referral Laboratory	Comment
Blood Film Review (PAED)	MDC	Glass slide - as above. A second film is made from the EDTA sample to retain in NMH	Available in 2 hours if Urgent or 4 hours if Routine. Hard Copy Report 10 Days	Children's Health Ireland at Crumlin Haematology	As above.
Coeliac Screen OR Tissue Transglutaminase Antibody (Anti-tTG) (included in a Coeliac Screen)	COES	1 x 7 ml plain	14 days	St. Vincent's Microbiology	Referred to Immunology Dept, St. James's Hospital. Anti-tTG antibodies are strongly associated with Coeliac disease. An anti-EMA test will follow all positive tests.
Complement (Total C3 + Total C4)	COMP	1 x 3 ml EDTA OR 1 x 7 ml plain	10 days	St. Vincent's Biochemistry	
D-Dimers ADULT (In event of analyser failure)	DDIV	1 x 3ml Sodium Citrate ADULT 2 x 1.3ml Sodium Citrate PAED	Available in 2 hours if Urgent or 4 hours if Routine. Hard Copy Report 10 Days	St. Vincent's Coagulation Laboratory	D-Dimers are processed in Haematology NMH but in the case that the samples must be referred out i.e Failure – Send straight away. D-Dimers must be processed within 4 hours of collection. Contact St. Vincent's Coagulation laboratory before sending. D-Dimer requests on antenatal women available on consultant request only. Can send Paediatric samples to SVUH if required.
D-Dimers (PAED) (In event of analyser failure)	DDIC	1 x 1.3ml Sodium Citrate	Performed Urgently	Children's Health Ireland at Crumlin Haematology	SEND STRAIGHT AWAY Phone before sending.

Test Investigation	Test Code	Container Type	Turnaround Time	Referral Laboratory	Comment
ENA Screen (Rheumatoid Investigation) Includes: Anti La/ Anti Ro/ Anti RNP/ Anti SM/ Anti Scl-70/ Anti JO Antibodies	ENAS	1 x 7ml plain	30 days	St. Vincent's Immunology	When ANA is positive 1:800 or greater, an anti-ENA screen is performed. When anti-ENA screen is positive, further tests for antibodies to individual antigens are performed.
Endomysial Antibodies (IgA) (Part of Coeliac Screen)	EMA	1 x 7ml plain	14 days	St. Vincent's Immunology	Assay only performed if anti-tTG is positive. Anti-EMA antibodies are highly specific for Coeliac disease.
EMA Screen (Membrane Screen, Osmotic Fragility, Spherocytosis)	EHS	1 x 3ml EDTA	Available in 2-4 Hours if Urgent Hard copy report 10 days	St. James's Haematology	Fresh EDTA anti-coagulated blood required (analysis must be within 24hours of collection). FBC and blood film required. Phone ahead when sending test.
Erythropoietin (EpO)	EPOJ	1 x 7ml plain	7 days	St. James's Haematology	Fresh sample required. Available during routine hours (Mon-Fri). Urgent Analysis on Request.
Erythrocyte sedimentation rate ADULT	ESRV	1 x 3ml EDTA	Available in 4 hours Hard Copy Report 10 Days	St Vincent's Hospital	Please refer to Measuring Erythrocyte Sedimentation Rate Guidance advice note from the Laboratory Reform Programme for guidance on ESR testing - document number EXT-CS-HAE-146
Erythrocyte sedimentation rate PAED	ESRT	1 x 3ml EDTA	3 hrs for samples received within routine hours. 24 hrs for samples outside of routine hours Hard Copy Report 10 Days	Children's Health Ireland at Temple St.	

Test Investigation	Test Code	Container Type	Turnaround Time	Referral Laboratory	Comment
Factor Assays ADULT Includes: Factor V Factor VII Factor VIII (Chromogenic Assay) Factor IX Factor XI Factor XII	FVJ F7J F8J F9J F11J F12J	All adult factor assays require 2 x 3ml Sodium Citrate	10 days	NCHCD St. James's Hospital	SEND STRAIGHT AWAY Samples must be received in NCHCD by 4pm Monday – Friday. If factor assays are received OOH – refer to RF-CS-HAE-81 for instructions. If patients with a history of coagulation defects are awaiting delivery, clear instructions will be available on RF-CS-HAE-81 which will be on the table in the Haematology laboratory. Under the instruction of the Consultant Haematologist some factor assays may be sent to SVUH instead – Use test code F8V/F9V if so.
Factor Assays PAED Includes: Factor VIII Factor IX	F8C F9C	All paediatric factor assays require 1 x 1.3ml Sodium Citrate	14 days	Children's Health Ireland at Crumlin Haematology	SEND STRAIGHT AWAY If factor assays are received OOH – refer to RF-CS-HAE-81 for instructions. If patients with a history of coagulation defects are awaiting delivery, clear instructions will be available on RF-CS-HAE-81 which will be on the table in the Haematology laboratory.
Factor Five Leiden (Factor V Leiden mutation/ Genetic tests for Thrombophilia)	FVLJ	2 x 3ml Sodium Citrate (for FVL) 1 x 3ml EDTA (for APCR)	8 weeks	NCHCD St. James's Hospital	SEND STRAIGHT AWAY Samples must be received by Coag Lab, NCHCD by 4pm Mon-Fri. Requests for Factor V Leiden must be accompanied by either samples for APCR analysis or an APCR result from an external source. FV Leiden requests must be accompanied by request form EXT-CS-HAE-151 with box ticked to indicate patient consent received.

Test Investigation	Test Code	Container Type	Turnaround Time	Referral Laboratory	Comment
Factor Five Leiden (Factor V Leiden mutation, Genetic tests for Thrombophilia)	FVLC	1 x 1.3ml Sodium Citrate	14 days	Children's Health Ireland at Crumlin Haematology	Factor V Leiden is not indicated at birth; consult Consultant Haematologist if requested. SEND STRAIGHT AWAY IF REQUIRED
FBC ADULT (In event of analyser failure)	Contact Haematology lab	1 x 3ml EDTA	Available in 4 hours if Urgent or 24 hours if Routine. Hard Copy Report 10 Days	St. Vincent's Haematology	
FBC PAED (In event of analyser failure)	Contact Haematology lab	1 x 1.3ml EDTA	Available in 4 hours if Urgent or 24 hours if Routine. Hard Copy Report 10 Days	Children's Health Ireland at Crumlin Haematology	
Ferritin (PAED)	FERC	1 x 1.3ml plain	7 days	Children's Health Ireland at Crumlin Haematology	Send on same day as received if possible. If not possible: Monday to Thursday - Store in fridge (2 - 8oc) overnight. Friday to Sunday- The sample needs to be spun down and plasma removed from the cells. A vial is labelled with the patients' hospital number, patient's name, D.O.B., small lab number sticker and today's date. Sample to be stored at -20oc.
Flow (for Leukaemia) (Immunophenotyping)	FLOV	1 x 3ml EDTA	48 hours (Provisional results) Hard Copy Report 10 Days	St. Vincent's Haematology	Consult Haematology Medical Team for immunophenotyping requests. Prior arrangement with Haematology lab at St. Vincent's is essential.

Test Investigation	Test Code	Container Type	Turnaround Time	Referral Laboratory	Comment
Folate	FOLV	1 x 4ml Lithium Heparin	10 days	St. Vincent's Biochemistry	**Send on same day as received.** If sample is being sent within 24 hours of collection, sample can be sent as whole blood. If this is not possible, the sample needs to be spun down and plasma removed from the cells. A vial is labelled with the patients' hospital number, patient's name, D.O.B., small lab number sticker and today's date and stored in the fridge until sent.
Glucose-6-phosphate dehydrogenase deficiency ADULT	G6PD	2 x 3ml EDTA	7 days. Urgent: service available (48 hours) by arrangement	St. James's Haemolytic Laboratory	**Available during routine hours (Mon- Fri).**
Glucose-6-phosphate dehydrogenase deficiency (PAED MALE)	G6PC	1 x 1.3ml EDTA	2 – 3 weeks	Children's Health Ireland at Crumlin Haematology	
Glucose-6-phosphate dehydrogenase deficiency (PAED FEMALE)	Consult Haematology Lab	1 x 1.3ml EDTA		Red Cell Centre Protein Laboratory, Synnovis, King's College Hospital, London	**Sample must be received with the appropriate King's College Hospital referral form, available in Q-Pulse EXT-CS-HAE-188.**
Haptoglobin (Serum Hp)	HAPT	1 x 7ml plain	10 days	Ferritin	**Consult with a Haematologist before taking the sample for Haptoglobin.** **Available during routine hours (Mon-Fri).** **Do not measure levels in children < 1 yr old.**
Haemoglobin S Levels	HBSL	1 x 3ml EDTA	14 days	St. James's Haemolytic Laboratory	**Sample must be received before 12:00 with FBC result and 2 unstained slides.**
Haemoglobinopathy Screen ADULT	HBE	1 x 7ml plain	14 days	St. James's Haemolytic Laboratory	**Available during routine hours Mon – Fri.** **Urgent analysis available**

Test Investigation	Test Code	Container Type	Turnaround Time	Referral Laboratory	Comment
		1 x 3ml EDTA (for FBC – not essential)			on request. Send a copy of the most recent FBC and Ferritin result if available.
Haemoglobinopathy Screen (PAED)	PHBE	1 x 1.3ml EDTA	14 days	Children's Health Ireland at Crumlin Haematology	Send most recent FBC report (if available) with request.
Heparin Induced Thrombocytopenia Screen (HIT Screen)	HIT	2 x 7ml plain	PF4 Anti IgG Elisa – 3 days Heparin Induced Platelet Aggregation (HIPA) test – 2 days post receipt in referral laboratory Hard copy report 14 days.	NCHCD St. James's Hospital	1 Vial of patients Heparin to be included with samples. The Coagulation Lab NCHCD James's Hospital must receive the samples by 4pm Mon-Fri. Routine hours Mon-Fri or out of hours only by authorisation by Coagulation Consultant. Request form EXT-CS-HAE-152 must accompany all requests.
Hereditary Spherocytosis (PAED)	HSSC	1 x 3ml EDTA	Available in 2-4 Hours Hard copy report 10 days	Children's Health Ireland at Crumlin Haematology	
HHT Genetic Testing (Hereditary Hemorrhagic Telangiectasia)	HHT	2x 9ml EDTA or 4 x 3ml EDTA (>10mls EDTA samples required)	8 weeks	Molecular Genetic Service David Brock Building Western General Hospital Crewe Road South Edinburgh EH42XU Scotland Tel: 0044 1315 371116	Consultant Haematologist approval required.

Test Investigation	Test Code	Container Type	Turnaround Time	Referral Laboratory	Comment
Homocysteine (Adult)	**HCYS**	**1 x 3ml EDTA**	**10 days**	**St. Vincent's Biochemistry**	**Please send full clinical details.** **The Homocysteine sample must be centrifuged and plasma removed from the cells. The plasma must be frozen in a 1.8ml appropriately labelled vial.** **A vial is labelled with the patients' hospital number, patient's name, D.O.B., small lab number sticker and today's date. This sample is sent frozen to the Biochemistry Lab in St Vincent's once a week.**
Homocysteine (Paediatric)	**HOM***	**1 x 4ml Lithium Heparin**	14 days	Metabolic Department Temple Street Tel: 01 8784724	Separate and freeze within 15 minutes
Intrinsic Factor *Screen* ADULT **(Factor VIII, Factor IX, Factor XI, Factor XII, Factor 8, Factor 9, Factor 11, Factor 12)**	**IFS**	**6 x 3ml Sodium Citrate**	**10 days**	**NCHCD St. James's Hospital**	**SEND STRAIGHT AWAY** **The Coagulation Lab NCHCD James's Hospital must receive the samples by 4pm Mon-Fri.** **Routine hours Mon-Fri or out of hours only by authorisation by Coagulation Consultant.**
Intrinsic Factor *Screen* (PAED) **(Factor VIII, Factor IX, Factor XI, Factor XII, Factor 8, Factor 9, Factor 11, Factor 12)**	**IFSC**	**Minimum 7mls required in 1.3ml Sodium Citrate Containers**	**14 days**	**Children's Health Ireland at Crumlin Haematology**	**SEND STRAIGHT AWAY** **Clinical details required. Samples are run in batches. Urgent analysis available on request by Consultant.**

Test Investigation	Test Code	Container Type	Turnaround Time	Referral Laboratory	Comment
Intrinsic Factor ***Antibody***	IFAJ	1 x 7ml plain (Serum sample to be taken >14 days post B12 injection)	7 days	St. James's Haematology	Available during routine hours (Mon-Fri). Urgent analysis available on request. IFA testing should be avoided within two weeks of parenteral vitamin B12 or high-dose oral supplementation.
Iron Studies ADULT/Adolescent Includes : Serum Iron, Serum Transferrin, TIBC (calculated), % Iron Binding Saturation	FES	1 x 4ml Lithium Heparin	10 Days	St. Vincent's Biochemistry	Send on same day as received. If this is not possible centrifuge and remove serum from red cells. A vial is labelled with the patients' hospital number, patient's name, D.O.B., small lab number sticker and today's date.
Iron Studies (PAED) (Neonate)	FESP	1 x 7ml plain	7 days	Children's Health Ireland at Crumlin Haematology	Send on same day as received. If this is not possible centrifuge and remove serum from red cells. A vial is labelled with the patients' hospital number, patient's name, D.O.B., small lab number sticker and today's date.
Lymphocyte Subsets ADULT and PAED If associated with immunodeficiency	LS	1 x 3ml EDTA	10 days	St. James's Immunology	Fresh sample required (<24hrs). Samples must be kept at room temperature until analysis. Cut-off time for receipt of samples in 3pm. The request 'Lymphocyte Subsets' only provides T-Cell quantitation. If B-cell and Natural Killer (NK) cell quantitation is required this must be specified on request form.
Lymphocyte Subsets Paed	LSP	1 x 1.3ml EDTA		Children's Health Ireland at Crumlin Haematology	

Test Investigation	Test Code	Container Type	Turnaround Time	Referral Laboratory	Comment
Myeloproliferative Neoplasms Panel Includes: JAK2-V617F, JAK2 exon 12, CALR and MPL mutation analysis.	MPNP CALR JAK2	1 x 9ml EDTA	20 days	St. James's Cancer Molecular Diagnostics	Consultant Haematologist approval required. Available Mon - Fri 9.30am – 5pm. Samples must be received before 3pm on Fridays. Samples should be sent as soon as possible post collection or if appropriate, refrigerated until dispatch. St. James's Cancer Molecular Diagnostics Request form must be received with samples. Available in Q-Pulse as EXT-CS-HAE-190. If either Jak2/CALR are requested, a full MPN panel will be processed.
Platelet Function Assay (PFA-100 Test)	Contact Haematology Lab	2 x 3ml Sodium Citrate 1 x 3ml EDTA	10 days	St Vincent's Haematology	SEND STRAIGHT AWAY Samples must arrive in Coagulation Laboratory SVUH before 2pm Mon - Fri. Screening test only.
Protein C	PTC	1 x 3ml Sodium Citrate	4-6 weeks 6 hours (URGENT)	St. Vincent's Coagulation Laboratory	SEND STRAIGHT AWAY Tests done in batches as part of the Thrombophilia screen every 4 - 6 weeks, unless requested urgently.
Protein S	PS	1 x 3ml Sodium Citrate	4-6 weeks	St. Vincent's Coagulation Laboratory	SEND STRAIGHT AWAY Test done in batches as part of the Thrombophilia screen every 4-6 weeks.
Prothrombin Mutation (PTGA, G20210A, Genetic testing for Thrombophilia)	PMUT	1 x 3ml EDTA	8 weeks	NCHCD St. James's Hospital	Samples can be refrigerated and sent with routine couriers within 5 days of phlebotomy. Available during routine hours (Mon-Fri). PMUT requests must be accompanied by request form EXT-CS-HAE-151 with box ticked to indicate patient consent received.

Test Investigation	Test Code	Container Type	Turnaround Time	Referral Laboratory	Comment
Pyruvate Kinase (PK Screen)	PKA	2 x 3ml EDTA	7 days	KCH	Chris Lambert Red Cell Centre , Dept. Haematology King's College Hospital 00442032993576 Sent from Specimen reception Include a copy of FBC and Reticulocyte count and blood film interpretation (if applicable).
Red Cell Folate	RCFJ	1 x 3ml EDTA 1 x 7ml plain	Available in 48 hours Hard copy report 10 days	St. James's Nutrition Laboratory	Fresh sample required. Available during routine hours (Mon-Fri).
Rheumatoid Factor	RFSV	1 x 7ml plain	10 days	St. Vincent's Immunology	
Thrombophilia Screen ADULT TPSL Includes: Protein C, Protein S, Anti-Thrombin, Activated Protein C Resistance, Fibrinogen, Lupus Screen, Factor VIII	TPSL ACAV B2GP HCYS	5 x 3ml Sodium Citrate 1 x 7ml plain 1 x 7ml plain 1 x 3ml EDTA	4-6 weeks	St. Vincent's Coagulation Laboratory St. Vincent's Immunology St. James's Immunology St. Vincent's Biochemistry	SEND STRAIGHT AWAY 5 Sodium Citrate Samples are sufficient for the TPSL. The Thrombophilia screen must be sent straight away. The screen must arrive into the lab before 3pm as it will not be processed in St. Vincent's if it arrives in the Coagulation lab after 4pm. The Homocysteine (HCYS) sample must be centrifuged and plasma removed from the cells. The plasma must be frozen in a 1.8ml appropriately labelled vial. A vial is labelled with the patient's hospital number, patient's name, D.O.B., small lab number sticker and today's date. This sample is sent frozen to the Biochemistry Lab in St. Vincent's once a week.

Test Investigation	Test Code	Container Type	Turnaround Time	Referral Laboratory	Comment
	PMUT	1 x 3ml EDTA		NCHCD St. James's Hospital	The sample is placed into a frozen container provided by Biomnis. The relevant printed referral form and frozen container are then placed into a Styrofoam container and then into a card board box containing the UN3373 label. The boxes are located in Specimen Reception. The labels are stored in the referral folder in the Haematology Dept. The Prothrombin mutation (PMUT) sample is sent to the NCHCD in St. James's Hospital. This may be the next routine day. Sample can be refrigerated until sent. PMUT requests must be accompanied by request form EXT-CS-HAE-151 with box ticked at the bottom of the form to indicate patient consent received.
Thrombophilia Screen (PAED)	TPSC	6 x 1.3ml Sodium Citrate 1 x 1.3ml EDTA (can be booked in for PFBC if received)	4 Weeks	Children's Health Ireland at Crumlin Haematology	SEND STRAIGHT AWAY Clinical details required.
Thrombin Time	TT	1 x 3ml Sodium Citrate	Available within 4 hours Hard copy 10 Days	St James's Haematology Laboratory	Can be performed on same sample as coagulation screen. This test is requested only through the coagulation team.

Test Investigation	Test Code	Container Type	Turnaround Time	Referral Laboratory	Comment
Vitamin B12	**B12V**	**1 x 4ml Lithium Heparin**	**10 days**	**St. Vincent's Biochemistry**	**Please state if patient is receiving exogenous Vitamin B12.** **Send on same day as received.** If sample is being sent within 24 hours of collection, sample can be sent as whole blood. If this is not possible, the sample needs to be spun down and plasma removed from the cells. A vial is labelled with the patients' hospital number, patient's name, D.O.B., small lab number sticker and today's date and stored in the fridge until sent.
Von Willebrand *Factor* ADULT **(Von Willebrand Ristocetin Co-Factor)**	**VWF**	**4 x 3ml Sodium Citrate**	**14 days**	**NCHCD St. James's Hospital**	**SEND STRAIGHT AWAY** **The screen must arrive into the lab before 3pm as it will not be processed in St James if it arrives in the lab after 4pm.** **Available during routine hours (Mon-Fri).**
Von Willebrand Screen ADULT (>16 years) **Includes: Factor VIII:C, VWF Antigen, VWF Ristocetin Co-factor, VWF Collagen Binding.** **(VWF Multimers and VWF:VIIIB assays available also only in specific circumstances or on request by Coagulation Consultant)**	**VWS**	**4 x 3ml Sodium Citrate**	**See individual tests for Von Willebrand disease for test specific turn around times** **3 weeks (Including Multimers 6 weeks)**	**NCHCD St. James's Hospital**	**SEND STRAIGHT AWAY** **The screen must arrive into the lab before 3pm as it will not be processed in St James if it arrives in the lab after 4pm.** **Routine hours Mon-Fri or out of hours only by authorisation by Coagulation Consultant.**
Von Willebrand Screen (PAED) (<16 years)	**VWSC**	**3 x 1.3ml Sodium Citrate**	**3 – 4 Weeks**	**Children's Health Ireland at Crumlin Haematology**	**SEND STRAIGHT AWAY**

16.3 Blood Films Outside of Routine Hours

- Scientists 'On Call' prepare films for review. They are trained to recognise platelet clumping. All other urgent film review 'Out of Hours' is referred to Consultant Haematologist.
- Paediatric blood films are referred to the Haematology service at Children's Health Ireland at Crumlin on a Consultant to Consultant request.
- Adult blood films are referred to the Haematology service at St. Vincent's University Hospital on Consultant to Consultant Request.
- In both cases the requesting Consultant discusses the case with the Consultant Haematologist On Call, and the blood films are referred on request to the named Consultant.

16.4 Haematology Reference Ranges

	Full Blood Count Reference Ranges (WinPath)				
Parameter	**Units**	**M/F**	**Age**	**Range**	**Reference**
Haemoglobin	**g/dl**	F/M	D0 - D2	13.5 – 19.5	GOSCH
		F/M	D3 - D4	14.5 – 22.5	GOSCH
		F/M	D5 - D8	13.5 – 21.5	GOSCH
		F/M	D9 - D21	12.5 – 20.5	GOSCH
		F/M	D22 - D35	10.0 – 18.0	GOSCH
		F/M	D36 - D63	9.0 – 14.0	GOSCH
		F/M	D64 - 18M	10.0 – 13.5	GOSCH
		F/M	18M - 3Y	10.5 – 13.5	GOSCH
		F/M	3Y - 7Y	11.5 – 14.5	GOSCH
		F/M	7Y - 13Y	11.5 – 15.5	GOSCH
		M	14Y - 19Y	13.0 – 16.0	GOSCH
		F	Adult	11.0 – 15.0	BSH^
		M	Adult	13.0– 17.0	SVUH
RBC	**x10^12/l**	F/M	D0 - D2	3.9 - 5.3	GOSCH
		F/M	D3 - D4	4.0 - 6.6	GOSCH
		F/M	D5 - D8	3.9 - 6.3	GOSCH
		F/M	D9 - D21	3.6 - 6.2	GOSCH
		F/M	D22 - D35	3.0 - 5.4	GOSCH
		F/M	D36 - D63	2.7 - 4.9	GOSCH
		F/M	D64 - D98	3.1 - 4.5	GOSCH
		F/M	D99 - 3Y	3.7 - 5.3	GOSCH
		F/M	3Y - 7Y	3.9 - 5.3	GOSCH
		F/M	7Y- 13Y	4.0 - 5.2	GOSCH
		F/M	13Y - 19Y	4.1 - 5.1	GOSCH
		F	Adult	3.8 - 4.8	SVUH
		M	Adult	4.5 - 5.3	SVUH
Haematocrit	**L/L**	F/M	D0 - D1	0.42 - 0.6	GOSCH
		F/M	D2 - D4	0.45 - 0.67	GOSCH
		F/M	D5 - D8	0.42 - 0.66	GOSCH
		F/M	D9 - D21	0.39 - 0.63	GOSCH
		F/M	D22 - D35	0.31 - 0.55	GOSCH
		F/M	D36 - D49	0.34 - 0.4	GOSCH

	Full Blood Count Reference Ranges (WinPath)				
Parameter	**Units**	**M/F**	**Age**	**Range**	**Reference**
		F/M	D50 - D63	0.28 - 0.42	GOSCH
		F/M	D64 - D98	0.29 - 0.41	GOSCH
		F/M	D99 - 3Y	0.33 - 0.39	GOSCH
		F/M	3Y - 13Y	0.35 - 0.45	GOSCH
		F	Adult	0.33 - 0.47	BSH^
		M	Adult	0.4 - 0.5	SVUH
MCV	**fl**	F/M	D0 - D2	98 - 118	GOSCH
		F/M	D3 - D4	95 - 121	GOSCH
		F/M	D5 - D8	88 - 126	GOSCH
		F/M	D9 - D21	86 - 124	GOSCH
		F/M	D22 - D35	85 - 123	GOSCH
		F/M	D36 - D63	77 - 115	GOSCH
		F/M	D64 - D98	74 - 118	GOSCH
		F/M	D99 - 3Y	70 - 86	GOSCH
		F/M	3Y - 7Y	75 - 87	GOSCH
		F/M	7Y - 13Y	77 - 94	GOSCH
		F/M	13Y - 19Y	78 - 102	GOSCH
		F/M	Adult	80 - 100	SVUH
MCH	**pg**	F/M	D0 - D4	31 - 37	GOSCH
		F/M	D5 - D35	28 - 40	GOSCH
		F/M	D36 - D63	26 - 34	GOSCH
		F/M	D64 - D98	25 - 35	GOSCH
		F/M	D99 - 3Y	23 - 31	GOSCH
		F/M	3Y - 7Y	24 - 30	GOSCH
		F/M	7Y - 13Y	25 - 33	GOSCH
		F/M	13Y - 19Y	25 - 35	GOSCH
		F/M	19Y - Adult	26 - 34	GOSCH
		F/M	Y7 – Y12	25 - 33	GOSCH
		F/M	Y13 – Y18	25 - 35	GOSCH
		F/M	Adult	27 - 32	SVUH
MCHC	**g/dl**	F/M	D0 – D1	30.0 – 33.0	CHI@Crumlin
		F/M	D2 – D13	29.0 – 34.0	CHI@Crumlin
		F/M	D14 – D56	28.0 – 35.0	CHI@Crumlin
		F/M	D56 – 2Y	29.0 – 34.0	CHI@Crumlin
		F/M	2Y – Adult	30.0 – 33.0	CHI@Crumlin
		F/M	Adult	30 – 35.5	CHI@Crumlin
RDW	**%**	F/M	0Y - Adult	11.0 - 16.0	GOSCH
White Cells	**x10^9/l**	F/M	D0 - D7	10 - 26	GOSCH
		F/M	D7 - 1Y	6 - 18	GOSCH
		F/M	1Y - 8Y	5 - 15	GOSCH
		F/M	8Y - 13Y	4.5 - 13.5	GOSCH

	Full Blood Count Reference Ranges (WinPath)				
Parameter	**Units**	**M/F**	**Age**	**Range**	**Reference**
		F	Adult	3.5 - 14.6	Lower SVUH Upper-Paper*
		M	Adult	3.5 - 11.0	SVUH
Neutrophils	**x10^9/L**	F/M	0Y - 2Y	1.0 - 8.5	GOSCH
		F/M	2Y - 6Y	1.5 - 8.5	GOSCH
		F/M	6Y - 12Y	1.5 - 8.0	GOSCH
		F/M	12Y - 16Y	1.8 - 8.0	GOSCH
		F	Adult	2.0 - 11	Lower SVUH Upper-Paper*
		M	Adult	2.0 - 8.0	SVUH
Lymphocytes	**x10^9/L**	F/M	Y0 - Y2	3.0 - 13.5	GOSCH
		F/M	Y2 - Y6	2.0 - 9.5	GOSCH
		F/M	Y6 - Y12	1.5 - 7.0	GOSCH
		F/M	Y12 - Y16	1.2 - 5.2	GOSCH
		F/M	Adult	1.0 - 4.0	SVUH
Monocytes	**x10^9/l**	F/M	0Y - 6Y	0.3 - 1.5	GOSCH
		F/M	6Y - 16Y	0.1 - 0.8	GOSCH
		F/M	Adult	0.2 - 1.0	SVUH
Eosinophils	**x10^9/l**	F/M	0Y - 2Y	0.1 - 0.3	GOSCH
		F/M	2Y - 6Y	0.3 - 0.8	GOSCH
		F/M	6Y - 16Y	0.1 - 0.8	GOSCH
		F/M	Adult	0 - 0.5	SVUH
Basophils	**x10^9/l**	F/M	0Y - 16Y	0 - 0.2	GOSCH
		F/M	Adult	0 - 0.2	SVUH
Platelet Count	**x10^9/l**	F/M	0Y - Adult	150 - 450	GOSCH
		F/M	Adult	150 - 400	SVUH
Reticulocyte Count	**x10^9/l**	F/M	OD – 1 D	110 - 450	CHI@Crumlin
		F/M	2D – 7D	18 - 80	CHI@Crumlin
		F/M	8D – 30D	10 - 65	CHI@Crumlin
		F/M	31D – 60D	35 – 200	CHI@Crumlin
		F/M	61D – 5M	15 – 110	CHI@Crumlin
		F/M	5M – 1Y	30 – 130	CHI@Crumlin
		F/M	1Y - Adult	20 - 100	CHI@Crumlin
		F/M	Adult	16 - 80	SVUH

***^**The default displayed reference range for Hb and HCT is for pregnant patients and is taken from BSH Guidelines on the Management of Iron Deficiency in Pregnancy.*

*****The default displayed reference ranges for the upper limit for total and differential leucocyte counts percentiles are those for normal pregnancy as per paper by Samuel Lurie 2006 in the European Journal of Obstetrics and Gynaecology.*
The non-pregnant upper range is provided in the tables below.
***SVUH:** St Vincent's University Hospital*
***CHI@Crumlin:** Children's Health Ireland at Crumlin*
***GOSCH**: Great Ormond Street Children's Hospital*

The following comments are reported with these tests:

Test	Comment
Haemoglobin	Pregnant ref. range is quoted and applies to later gestations (>24 weeks). Anaemia Diagnosis for Haemoglobin: 1st Trimester: <11.0 g/dL, After 12 wks: <10.5g/dL Immediately postpartum: <10.0 g/dL HB Non-pregnant range: 11.5 - 15 g/dl
White Cell Count	Pregnant ref. range is quoted and applies to later gestations (>24 weeks). Trimester specific ranges: 1st Trimester: 5.7-13.6, 2nd Trimester: 6.2-14.8 3rd Trimester 5.9-16.9 Non-pregnant range: 4 - 10
Neutrophil Count	Pregnant ref. range is quoted and applies to later gestations (>24 weeks). Trimester specific ranges: 1st Trimester: 3.6-10.1, 2nd Trimester: 3.8-12.3 3rd Trimester 3.9-13.1 Non-pregnant range: 2 - 7

Coagulation Reference Ranges (WinPath)			
Age	**APTT (seconds)**	**Prothrombin Time (seconds)**	**Fibrinogen (g/L)**
D1 – D5	31.3 – 53.6	10.14 – 15.86	1.67 – 3.99
D5 – D30	25.36 – 59.84	9.48 – 15.32	1.62 – 4.62
D30 – D90	25.56 – 55.24	9.3 – 14.3	1.62 – 3.78
D90 – D180	24.06 – 50.14	9.6 – 14.2	1.07 – 3.79
D180 – 1Y	28.08 – 42.92	10.72 – 13.86	1.15 – 3.87
1Y – 5Y	24 - 36	10.6 – 11.4	1.70 – 4.05
6Y – 10Y	26 - 36	10.1 – 12.1	1.57 – 4.0
11Y – 16Y	26 – 37	10.2 – 12.0	1.54 – 4.48
Adult	25.1- 36.5	9.6 - 12	4.0 – 6.5
Adult Non-pregnant			1.5 – 4.0

References

Paediatric: *Paed ranges Day 1-Day180 (Andrew et al, Blood, Vol 70, No. 1 (July), 1987:pp 165-172. Paed ranges Year 1-16 (Andrew et al, Blood, Vol 80, No. 8 (Oct), 1992:pp 1998-2005)*
Adult pregnant and non-pregnant Fibrinogen: *Abbassi-Ghanavati M, Greer LG, Cunningham FG. Pregnancy and laboratory studies: a reference table for clinicians. Obstet Gynecol. 2009 Dec;114(6):1326-31. PMID:19935037*
Adult APTT range: *ACL-TOP-550 APTT Reagent Product insert*

Published Ranges for Infants, Adults and Pregnant Females (Trimester Specific)

Haematological values for normal infants from birth - 6 months (Practical Haematology, Dacie and Lewis; 10th Edition).

Parameter	Birth	Day 3	Day 7	Day 14	1 Month	2 Months	3-6 Months
RBC ($x10^{12}$/l)	5 - 7	4 - 6.6	3.9 - 6.3	3.6 - 6.2	3.0 - 5.4	3.1 - 4.3	4.1 - 5.3
Hb (g/dl)	14 - 22	15 - 21	13.5 - 21.5	12.5 - 20.5	11.5 - 16.5	9.4 - 13	11.1 - 14.1
HCT (l/l)	0.45 - 0.75	0.45 - 0.67	0.42 - 0.66	0.31 - 0.71	0.33 - 0.53	0.28 - 0.42	0.30 - 0.40
MCV (fl)	100 - 120	92 - 118	88 - 126	86 - 124	92 - 116	87 - 103	68 - 84
MCH (pg)	31 - 37	31 - 37	31 - 37	31 - 37	30 - 36	30 - 36	24 - 30
MCHC (g/dl)	30 - 36	30 - 37	28 - 38	28 - 38	29 - 37	28.5 - 35.5	30 - 36
WBC ($x10^9$/l)	10 - 26	7 - 23	6 - 22	6 - 22	5 - 19	15	6 - 18
Neutrophils ($x10^9$/l)	4 - 14	3 - 5	3 - 6	3 - 7	3 - 9	1 - 5	1 - 6
Lymphocytes ($x10^9$/l)	3 - 8	2 - 8	3 - 9	3 - 9	3 - 16	4 - 10	4 - 12
Monocytes($x10^9$/l)	0.5 - 2.0	0.5 - 1.0	0.1 - 1.7	0.1 - 1.7	0.3 - 1.0	0.4 - 1.2	0.2 - 1.2
Eosinophils($x10^9$/l)	0.1 - 1.0	0.1 - 2.0	0.1 - 0.8	0.1 - 0.9	0.2 - 1.0	0.1 - 1.0	0.1 - 1.0
Basophils*($x10^9$/l)	0.02 - 0.12						
Platelets($x10^9$/l)	100 - 450	210 - 500	160 - 500	170 - 500	200 - 500	210 - 650	200 - 550
Reticulocytes($x10^9$/l)	120 - 400	50 - 350	50 - 100	50 - 100	20 - 60	30 - 50	40 - 100
NRBCs*($x10^9$/l)	0 - 5.4	0 - 5.4	0 - 5.4	0 – 0.1	0 - 0.1	0.0	0.0

*Basophil count reference range taken from *Blood Cells, A Practical Guide, Barbara J. Bain, 3rd Edition. Range is from 9 days - 1 year*

**NRBC count reference range taken from GOSH, London*

Haematological Values for Normal Adults (Practical Haematology 10th Edition)

Parameter	Female	Male
RBC ($x10^{12}$/l)	3.8-4.8	4.5-5.5
Hb (g/dl)	12-15	13-17
HCT (l/l)	0.36-0.46	0.4-0.5
MCV (fl)	83-101	83-101
MCH (pg)	27-32	27-32
MCHC* (g/dl)	31-37	31-37
RDW (CV %)	11.6-14	11.6-14
WBC ($x10^9$/l)	4-10	4-10
Neutrophils ($x10^9$/l)	2-7	2-7
Lymphocytes ($x10^9$/l)	1-3	1-3
Monocytes($x10^9$/l)	0.2-1.0	0.2-1.0
Eosinophils($x10^9$/l)	0.02-0.5	0.02-0.5
Basophils($x10^9$/l)	0.02-0.1	0.02-0.1
Platelets($x10^9$/l)	150-410	150-410
Reticulocytes($x10^9$/l)	50-100	50-100
Reticulocytes(%)	0.5-2.5	0.5-2.5
NRBCs($x10^9$/l)	0.0	0.0

***MCHC reference range taken from Blood Principles and Practice of Haematology; Handin, R.I., Lux, S.E., Stossel T.P. 1995.*

Haematological Values during Pregnancy

Blood Cells. A Practical Guide Barbara J. Bain; 3rd Edition

Parameter	First Trimester	Second Trimester	Third Trimester*
RBC ($x10^{12}$/l)	3.52-4.52	3.20-4.41	3.10-4.44
Hb (g/dl)	11.0-14.3	10.0-13.7	9.8-13.7
HCT (l/l)	0.31-0.41	0.30-0.38	0.28-0.39
MCV (fl)	81-96	82-97	91-99
WBC ($x10^9$/l)	5.7-13.6	6.2-14.8	5.9-16.9
Neutrophils($x10^9$/l)	3.6-10.1	3.8-12.3	3.9-13.1
Lymphocytes($x10^9$/l)	1.1-3.5	0.9-3.9	1.0-3.6
Monocytes($x10^9$/l)	0.0-1.0	0.1-1.1	0.1-1.1
Eosinophils($x10^9$/l)	0.0-0.6	0.0-0.6	0.0-0.6
Basophils($x10^9$/l)	0.0-0.1	0.0-0.1	0.0-0.1
Platelets($x10^9$/l)	174-391	171-409	155-429
NRBCs($x10^9$/l)	0.0	0.0	0.0

* Third trimester reference range is applicable for 6 weeks post delivery

16.5 Haematology Critical Alert Ranges

Figure 22: Haematology Critical Values Management

The following results are to be phoned to the requesting clinician / teams soon as possible. For notes see next page

	Test	Lower Limit	Upper Limit	Phone To	Comments
Adult Coagulation: Pregnant/Non Pregnant, not on anticoagulant	**PT**	-	> 20 seconds	**Requesting Clinician (& Haematology team for INR>4)**	After all investigations carried out as per PP-CS-HAE-29
	APTT	-	> 40 seconds	**Requesting Clinician (& Haematology team for APTT>150sec)**	After all investigations carried out as per PP-CS-HAE-29
	Fibrinogen	Pregnant < 2.0 g/L Non-Pregnant <1.0 g/L	-	**Requesting Clinician (& Haematology team if <0.5)**	After all investigations carried out as per PP-CS-HAE-29
	D-Dimer	-	>4 ug/ml FEU	**Requesting Clinician**	
Adult	**Haemoglobin**	< 7.0 g/dl	> 17 g/dl	**Clinical area**	
	Platelets	< 80 x10^9/l	> 800 x10^9/l	**Requesting Clinician**	If platelet count suppressed due to platelet clumping ward should be informed of this.
	Neutrophils	< 1 x10^9/l	-	**Requesting Clinician & Haematology team (During routine hours)**	- New onset. If neutrophil count is < 1 after manual differential report to haematology team
	WCC	< 3 x10^9/l	>/=17 x10^9/l	**Clinical area**	- New onset. - In the event of a substantial, clinically significant change in WCC of **rapid** onset -inform

					clinical team.
	Kleihauer	-	> 4mls FMH	**Haematology team and Clinical area**	
	Malaria	-	-	**Clinical area and Consultant Microbiologist**	All Malaria requests are phoned to the consultant microbiologist
	HBE	-	-	**Requesting Clinician & Haematology team**	All positive screens for sickle cells disease (HBSS or HB SC)
Paediatric	**PT**	-	> 20 seconds	**Requesting Clinician**	After all investigations carried out as per PP-CS-HAE-29
	APTT	-	> 70 seconds	**Requesting Clinician**	After all investigations carried out as per PP-CS-HAE-29
	APTT	-	>150seconds	**Paediatric registrar & Haematology team**	After all investigations carried out as per PP-CS-HAE-29 (confirmed sample not taken from a heparinised line)
	Fibrinogen	< 1 g/L	-	**Requesting Clinician & (Haematology team if <0.5)**	After all investigations carried out as per PP-CS-HAE-29
	Haemoglobin	< 9.0 g/dl	> 26 g/dl	**Requesting Clinician**	
	Platelets	< 80 x10^9/l	> 800 x10^9/l	**Requesting Clinician**	
	Neutrophils	< 1 x10^9/l	-	**Paediatric Registrar**	

- The Haematology team is defined as the Haematology CMS, Haematology registrar (contactable through St Vincent's University Hospital switch), Dr Joan Fitzgerald (Consultant Haematologist) and the Haematology Medical rota contactable through St Vincent's University Hospital switch.
- Adult/paediatric unsuitable samples reported as UXCH are phoned to the clinical area if appropriate as per the telephoning of results procedure outlines in LP-GEN-TELREP.
- Adult/paediatric external test results are phoned to the clinical area if abnormal as per LP-GEN-TELREP. This is not necessary for flow cytometry results <4mls FMH.
- All medical scientists working in the Haematology laboratory, including On Call staff, may telephone authorised results.
- Any other phoned results are left up to the discretion of the medical scientist.

16.6 Retrospective/Add-On Requesting

FBC and coagulation specimens are usually kept for one week at room temperature after processing. Kleihauer samples are kept 2 – 6C for 1 week after processing. Blood films are kept for 1 month after review unless requested to be stored by the Chief/Consultant Haematologist. Analyses of additional tests are subject to stability of analyte. All add-on requests require a requisition form and are entered in the laboratory information system. Analyses of additional tests are subject to stability of analyte. Appropriate additional tests can be added onto an FBC sample depending on sample volume and integrity.

Additional tests:

- Reticulocytes within 24 hours
- Blood film within 24 hours
- Kleihauer within 48 hours
- Flow cytometry (FMH) within 3 days
- D-Dimer within 4 hours

- Extra coagulation studies – Lupus, within 4 hours.
- Haemoglobinopathy samples are stored at 2 - 8C for 1 week - HBE can be added to EDTA sample (FBC) if requested within 3 days of phlebotomy (to allow for confirmation testing is required)
- For advice on any other haematology add-ons, please contact the haematology laboratory on Ext.3548

17 Microbiology

17.1 Microbiology Specimens and Tests

Follow the instructions in section 2.2 above for labelling of specimen and form (paper or electronic).

- **Please note**: Samples for Blood Culture investigation **must be drawn first** to avoid contamination. See SI-NOT-GEN1and SI-NOT-GEN2 for Order of Draw charts on Q-Pulse.
- Blood cultures, CSF samples and any sample requiring urgent testing whether during routine hours or On-Call (as applicable) must be transported to the laboratory without delay.
- Routine specimens for culture must be stored at 4°C, if there is any delay in transport to the laboratory (excludes blood cultures and CSF, keep at room temperature and transport to laboratory without delay).
- Inoculated agar plates from corneal scrapings, blood cultures, ocular fluid inoculated into paediatric blood culture bottle and inoculated chocolate agar plates for *N. gonorrhoeae* culture are processed immediately. Any remaining sample from ocular fluids (vitreous tap, AC tap, aqueous fluid) is then stored at 4°C. Other specimens transferred from RVEEH are stored at 4°C in NMH Microbiology laboratory upon receipt until such time as they are processed.
- See also document PP-CS-MIC-64, Clinical Indication for Micro Specimens, available in Q-Pulse.

17.2 Microbiology Specimen Stability

The majority of specimens for Microbiology are stable for up to 3 days once stored at 4°C. Some exceptions apply for particular specimens and/or tests as follows:

Figure 23: Stability of Microbiology Specimens

Test / Profile	Sample Stability
Blood Cultures	Send ASAP - Max 4 hours at room temperature
CSF	Send ASAP – Store at room temperature
Inoculated Plates (Corneal scraping, gonorrhoeae)	Send ASAP - For incubation upon arrival
Endocervical swab for gonorrhoeae culture	Send ASAP – Max 30 minutes. During routine hours only
Environmental settle plates	Send ASAP – Store at room temperature
Urine for Chlamydia / Gonorrhoeae	Maximum of 24 hours – Store at 4˚C
Faeces – All tests (excl. ova and parasites)	4 days, store at 4˚C
Faeces - Ova and Parasites	Send ASAP, store at 4˚C
All other specimens	3 days, store at 4˚C

Figure 24: Blood Cultures

Blood Culture	Container	Volume	Turnaround Times	Special Requirements	Accreditation Status	Referred Test
Adult	**Aerobic and anaerobic vials**	8-10 mls per bottle	Interim negative to date results at 24 and 48 hours for adults and 36 and 48 hrs for paeds. Full negative results after 5 days. Positive results available 48- 96 hours from time bottle flagged positive. TAT for blood cultures,	Specimens should be taken before commencement of antimicrobial therapy. Send to laboratory immediately.	Accredited	No
Neonate	**Paeds vial**	≥ 1 ml			Accredited	No

Blood Culture	Container	Volume	Turnaround Times	Special Requirements	Accreditation Status	Referred Test
			for reporting of Gram stain from time flagged positive in BacT Alert is <=4 hours			

Figure 25: CSF Microbiology Examination

CSF	Container	Turnaround Times	Special Requirements	Accreditation Status	Referred Test
Culture	**3 X Sterile CSF tubes**	Minimum: ≤48hrs. Maximum: 96 hrs.	Specimens should be taken before commencement of antimicrobial therapy. Send to laboratory immediately. PCR only performed under certain criteria as laid down by IMSRL	Accredited	No
Microscopy, Gram		Cell count: 2 hrs Gram stain: 4 hrs		Accredited	
GBS, *E.coli* and *Listeria* sp. PCR (IMSRL) or CSF FilmArray (Temple Street)		Verbal: Same day, available if received before 11am Written: 6 Days		Accredited	**Yes:** IMSRL
Viral studies		≤1 week		Accredited	**Yes:** NVRL

Figure 26: Faeces Examination

Faeces	Container	Specimen Volume	Turnaround Times	Special Requirements	Accreditation Status	Referred Test
Faeces PCR			Minimum: 1 days Maximum: 3 days		Accredited	No
Ova and Parasites			1 - 9 days	Test not indicated on neonates. Clinical details essential	Not Accredited	**Yes:** Microbiology, St. Vincent's Hospital
Bloody Stools			≤2 weeks	Clinical details essential. Sent for VTEC isolation	Accredited	**Yes:**Public Health Lab, Cherry Orchard Hospital
Occult Blood			10 days		Accredited	**Yes:** Biochemistry, St. James' Hospital

*Please note there is no set run time for processing of specimens for *C. difficile* or Norovirus. They will be processed as soon as possible, depending on availability of resources for testing.

Figure 27: Fluids for Microbiology Examination

Fluid from Normally Sterile Sites		Container	Specimen Volume	Turnaround Times	Special Requirements	Accreditation Status	Referred Test
Fluid from any site processed in NMH	**Culture and Gram stain and / or cell count**	**Sterile container**	>5ml	Minimum: 48hrs Maximum: 96hrs	Please indicate if any specific infection is suspected. Send specimen to laboratory as soon as possible.	Accredited	No

T.B.	**Culture, AFB stain**			6 - 8 weeks		Accredited	**Yes:** Microbiology, St Vincent's Hospital
EBM	**Culture**		Min. 1ml	Minimum: 72hrs Maximum: 96hrs		Accredited	No

Figure 28: Sputum Microbiology Examination

Sputum	Container	Specimen Volume	Turnaround Times	Special Requirements	Accreditation Status	Referred Test
Culture	**Sterile container**	Deep cough purulent specimen. 1 ml	Minimum: 48hrs Maximum: 96hrs	Specimens should be taken before antimicrobial therapy started. Salivary and perinasal secretions are unsuitable	Accredited	No
Legionella		1 ml	1 week		Accredited	**Yes:** Microbiology, St Vincent's Hospital
AFB Stain		Early morning specimen on 3 consecutive days	1 week		Accredited	
T.B Culture			6 - 8 weeks		Accredited	
Bloodstained Sputa		1 ml	Routine Culture: 10 days. TB: 6 – 12 weeks	Any bloodstained sputa are referred to SVUH for AFB stain, TB culture and routine culture if required	Accredited	

Figure 29: Routine Swabs Microbiology Examination

Swabs	Container	Turnaround Times	Special Requirements	Accreditation Status	Referred Test
HVS: Microscopy	**Amies transport swab (blue top)**	Gram stain: Minimum: 24 hours Maximum: 96 hours		Accredited	No
All swabs (see RF-CS-MIC-40 for all swabs processed in NMH)		Vary depending on swab type, see individual procedures for reporting times		Accredited	No
GBS Screen (culture): Combined LVS/Rectal	**Amies transport swab (blue top) / or GBS broth (Purple top)**	Minimum: 48 hrs Maximum: 96 hrs	For GBS screen only from out-patients (OPD, SPC, PP, CM), not for inpatients or for HVS.	Accredited	No

GBS Screen Rectal swab only	**Amies transport swab (blue top) / or GBS broth (Purple top)**	Minimum: 48 hrs Maximum: 96 hrs		Accredited	No
***Neisseria gonorrhoeae* Culture**	**Amies transport swab (blue top)**	Minimum: 48 hrs Maximum: 96 hrs	Endocervical swab, send immediately to Microbiology and Contact Micro Laboratory. Available during routine hours only	Accredited	**No:** Culture **Yes**: For susceptibility testing when isolated. Referred to Microbiology, SJH
Rapid GBS Screen (GeneXpert) – Combined HVS/Rectal	**Red Copan collection device (double swab)**	Same day	As per guidelines and/or as per Consultant Microbiologist.	Accredited	No
PCR test for Chlamydia trachomatis, *N. gonorrhoeae, Trichomonas vaginalis, Mycoplasma genitalium*	**Aptima swab**	7 - 10 Days	Mycoplasma testing is only available for patients attending Preterm Surveillance Clinic	Accredited	**Yes:** NVRL

Rapid GBS Screen – Run Times:

- During routine hours:
  - Monday – Friday: 10:00, 16:30
  - Saturday: 11:45

- Out of hours (including Bank Holidays):
  - Monday – Friday: 22.00
  - Saturday: 22.00
  - Sunday and Bank Holidays: 12:30, 22.00

Any samples received after the scheduled run time will not be processed until the next scheduled run. If specimens miss the 22.00 run, they will not be processed until the next scheduled run the next day. We would advise that if a sample is being taken near the last run time (22:00) and is deemed too urgent to wait until the next day, please contact the Microbiology laboratory at Ext. 3533 or on-call mobile to inform them that urgent sample on way and if possible to hold the run for a few minutes. It is only possible to hold the run for a maximum of 10 minutes, if the sample(s) are not down within the allotted time, they will not be processed until the next scheduled run.

Figure 30: Surveillance Screens

Screen	Container	Specimen	Turnaround Times	Special Requirements	Accreditation Status	Referred Test
MRSA: Adults	**Amies transport swabs**	Nasal, throat, perineal / groin, eye, ear	Minimum : 24hrs Maximum: 72hrs		Accredited	No

MRSA: Neonatal Screen	**(blue top)**	Nasal, Groin and Umbilical		All babies in the unit are screened every Tuesday. All new admissions and re-admissions to the unit should be screened on arrival.	Accredited	No
MRSA: Occupational Health Screen*		Nasal			Accredited	No
Gentamicin Resistant Enterobacterales Neonates	**Sterile container OR Amies transport swab (blue top)**	Stool or Rectal Swab	Minimum : 24hrs Maximum: 72 hrs	All babies in the unit are screened every Monday. Faecal matter required on swab. All new admissions and re-admissions to the unit should be screened on arrival.	Accredited	No
ESBL Screening Neonates			Minimum: 24hrs Maximum: 96 hrs		Accredited	
VRE Neonates			Minimum : 48hrs Maximum: 96 hrs		Accredited	No
CPE Neonates			Minimum : 24hrs Maximum: 72 hrs		Accredited	No
VRE Adults			Minimum : 48hrs Maximum: 96 hrs	Pre-op screening not required. Screening done as per guidelines	Accredited	No
CPE Adults			Minimum : 24hrs Maximum: 72 hrs		Accredited	No

***Note:** Occupational health screen results are not available to view on Winpath Ward Enquiry.

Figure 31: Urines Microbiology Examination

Urine	Container	Specimen Volume	Turnaround Times	Special Requirements	Accreditation Status	Referred Test
Adults: Culture	**Sterile MSU Jar**	Midstream urine, catheter - 10 ml	Minimum: 24 hrs Maximum: 96 hrs	Specimens should be taken before antimicrobial therapy initiated. Specimens should be ≤ 48 hours old upon receipt in lab.	Accredited	No
Paediatric: Culture		CCU, bag - 1 ml			Accredited	No
Microscopy			Minimum: 24 hrs Maximum: 48 hrs, where applicable		Accredited	No
Pregnancy Test		1 ml early morning specimen	Same day	Early morning specimens preferred	Accredited	No
AFB Stain		60 ml	1 week	Complete early morning specimens from 3 consecutive days	Accredited	**Yes:** Microbiology, St. Vincent's Hospital
TB Culture			6 - 8 weeks		Accredited	
Chlamydia trachomatis, *N. gonorrhoeae* PCR		60 ml	7 – 10 days	First void specimen, only if CT/NG swab is not available	Accredited	**Yes:** NVRL

Figure 32:Other Specimens Microbiology Examination

Specimen	Container	Specimen Volume	Turnaround Times	Special Requirements	Accreditation Status	Referred Test
Abscess and Pus	**Sterile container**	> 1ml	Minimum : 48hrs Maximum: 6 days	Send to lab as soon as possible for anaerobic culture	Accredited	No
I.U.C.D.		IUCD	**Routine C/S:** Minimum:48 hrs Maximum: 96 hrs **Actinomyces** Minimum: 10 days Maximum: 14 days	Leave all material on IUCD	Accredited	No
Environmental swabs / water	**Amies transport swab (blue top) / sterile container**	1ml	Minimum: 5 days Maximum: 7 days		Accredited	No
Environmental settle plates	**SDA / TSA agar**		Minimum: 5 days Maximum: 7 days Minimum: 14 days Maximum: 16 days	When extended incubation requested	Accredited	No
Bacterial PCR (e.g. GBS, E. coli, Listeria etc.)	**EDTA**	>0.5ml	Verbal: Same day, available if received before 11am Written: 6 Days	N/A	Accredited	**Yes:** IMSRL

***Sars-CoV-2 / Influenza A/B, RSV PCR**	**Copan universal transport medium**	Ensure swab is present in the container	Urgent: 3 hours Routine: 24 hours	As per clinical guidelines	Accredited	No

*Please note there is no set run time for processing of specimens for Sars-CoV-2 / Influenza A/B / RSV. All specimens will be processed as soon as possible, depending on availability of resources for testing.

Sars-CoV-2:

- Only symptomatic patients are processed urgently.
- All other patients and staff are processed within 24 hours of receipt of the sample.

Figure 33: Microbiology Referral Tests

Test	Code	Container Type/ Sample requirements	Investigation required	TAT	Lab Series	Referral Centre	Specific Form Required and Location
16s rRNA Bacterial Gene Detection	16SR	Fluid from normally sterile site e.g. ocular fluid, CSF	PCR	10 days	M	**Micropathology Ltd.**	Yes www.micropathology.com
18s rRNA Fungal Gene Detection	18SR	Fluid from normally sterile site e.g. ocular fluid, CSF	PCR	10 days	M		
16s Gene Sequencing	REFL	Suitable agar plate / slope (for identification of unknown organisms)	PCR	10 days	M	**Irish Meningococcal and Sepsis Reference Laboratory**	Yes www.cuh.ie – Healthcare Professionals – Departments – Laboratory – IMSRL Request Form
Acanthamoeba	ACAN	Dry corneal swab	PCR	10 days	M	**Micropathology Ltd.**	Yes www.micropathology.com
Adenovirus DNA	ADVD	Ocular fluid	PCR	10 days	M		
A.S.O. Titre	ASO	Serum 7 ml Only send after approval by Consultant Microbiologist	Titre		M	**Microbiology Laboratory, SVUH**	No
***Aspergillus* DNA**	ASPD	EDTA, BAL, Sputum. Only send after approval by Consultant Microbiologist	PCR	10 days	M	**Micropathology Ltd.**	Yes www.micropathology.com
Atypical Pneumonia	TYA	Respiratory type samples in sterile container	PCR	5 days	D	**National Virus Reference Laboratory**	No
Bartonella DNA	BADA	EDTA, tissue	PCR	10 days	M	**Micropathology Ltd.**	Yes www.micropathology.com
Borrelia DNA	BORD	EDTA, serum, tissue	PCR	10 days	M		

Test	Code	Container Type/ Sample requirements	Investigation required	TAT	Lab Series	Referral Centre	Specific Form Required and Location
***Bordetella pertussis* PCR Screen**	BPPC	Perinasal swabs (from Micro Lab) Serum sample for Serology. Also accept NPA, sputum & perinasal swab for PCR	Serology more useful for ongoing symptoms and no vaccinations	1 week	M	**Microbiology Dept, CHI, Crumlin**	No
***Campylobacter* typing**	TYPE	Stool Sample Campylobacter isolate (send on Amies swab)	Typing	1 week	M	**Public Health Laboratory (Cherry Orchard)**	Yes Available through website: www.hse.ie (Services – Public Health – Public Health Lab – Cherry Orchard – Request Forms)
***Candida* species**	CANS	Pure subculture on Nutrient agar slope	Susceptibility and M.I.C. tests	3 days	M	**Microbiology Laboratory, SVUH**	No
***Candida* DNA**	CAND	Ocular fluid, CSF, EDTA Only send after approval by Consultant Microbiologist	PCR	10 days	M	**Micropathology Ltd.**	Yes www.micropathology.com
Carbapenamase Producing Enterobacterales	TYPE	Pure subculture on Nutrient agar slope	Confirmation of CPE results	≤15 working days	M	**Carbapenemase Producing Enterobacterales (CPE) Reference Laboratory**	Yes Available through website: www.saolta.ie
Chlamydia trachomatis DNA	CHLD	Ocular fluid, dry corneal swab	PCR	10 days	M	**Micropathology Ltd.**	Yes www.micropathology.com

Test	Code	Container Type/ Sample requirements	Investigation required	TAT	Lab Series	Referral Centre	Specific Form Required and Location
***Clostridium difficile* Typing**	TYPE	Stool Sample	Typing	1 week	M	**Public Health Laboratory (Cherry Orchard)**	Yes Available through website: www.hse.ie (Services – Public Health – Public Health Lab – Cherry Orchard – Request Forms)
CMV DNA	CMVD	Ocular fluid	PCR	10 days	M	**Micropathology Ltd.**	Yes www.micropathology.com
COVID 19	NCOV	Red respiratory viral transport media	PCR	48-72 hours	M	**National Virus Reference Laboratory**	No
***Cryptococcus neoformans* DNA**	CRYD	CSF, EDTA Only send after approval by Consultant Microbiologist	PCR	10 days	M	**Micropathology Ltd.**	Yes www.micropathology.com
Cryptosporidium	CRYP	Stools	Identification by Staining methods	3 days	M	**Public Health Laboratory (Cherry Orchard)**	No
EB Virus (EBV) DNA	EBVD	Ocular fluid	PCR	10 days	M	**Micropathology Ltd.**	Yes www.micropathology.com
***E. coli* 0157 (Bloody stools or clinical H.U.S)**	E157	Stools	Culture for 0157	4 days	M	**Public Health Laboratory (Cherry Orchard)**	Yes Available through website: www.hse.ie (Services – Public Health – Public Health Lab – Cherry Orchard – Request Forms)

Test	Code	Container Type/ Sample requirements	Investigation required	TAT	Lab Series	Referral Centre	Specific Form Required and Location
***E. coli* PCR**	ECOP	C.S.F .400 µL	P.C.R. Urgent send ASAP within working day or refrigerate immediately if at the weekend	Verbal: Same day, available if received before 11am Written: 6 Days	M	**Irish Meningococcal and Sepsis Reference Laboratory**	Yes www.cuh.ie – Healthcare Professionals – Departments – Laboratory – IMSRL Request Form
Enterovirus DNA	ENVD	Ocular fluid, dry corneal swab	PCR	10 days	M	**Micropathology Ltd.**	Yes www.micropathology.com
Epidemiological testing	TYPE	Pure subcultures on slopes	Isolates for confirmation of outbreak	As per HPA reference laboratory	M	**Reference Laboratories with Specialist Expertise in the Diagnoses and Characterisation of Particular Micro organisms. See www.hpa.org.uk for individual laboratory contact details**	Yes Through website: www.hpa.org.uk/SRMTests for various request forms
Faecal Occult Blood (FOB)	FB	Stool	Test for FOB	1 week	M	**Biochemistry, SJH**	No
Fungi	FUN	Scrapings, nail, lesions	Isolation and identification of fungi from clinical samples	Microscopy: 10 days. Culture: 5 Weeks	M	**Microbiology Laboratory, SVUH**	No
Fungal isolate	SJHF	Pure subcultures on SDA agar seal with parafilm	*Aspergillus* identification only.	≤2 weeks	M	**Microbiology, SJH**	No

Test	Code	Container Type/ Sample requirements	Investigation required	TAT	Lab Series	Referral Centre	Specific Form Required and Location
			Other fungal isolates and *Aspergillus* for AST refer to Bristol				
Fungal and non-Candida yeast isolate	BRIF	Pure subcultures on nutrient agar slope	Identification and susceptibility testing (all fungi)	≤2 weeks	M	**PHE Mycology Reference Laboratory (Bristol)**	Yes Through website: www.gov.uk/government/publications/mycology-identification-and-susceptibility-testing-request-form
G.B.S. PCR	GBSP	C.S.F .400 µL EDTA samples 1 ml	P.C.R. Urgent send ASAP within working day or refrigerate immediately if at the weekend	Verbal: Same day, available if received before 11am Written: 6 Days.	M	**Irish Meningococcal and Sepsis Reference Laboratory**	Yes www.cuh.ie – Healthcare Professionals – Departments – Laboratory – IMSRL Request Form
Group A / B *Streptococci* DNA	GABS	CSF, EDTA/citrated whole blood, tissue	PCR	10 days	M	**Micropathology Ltd.**	Yes www.micropathology.com
***Haemophilus influenzae* DNA**	HINP	C.S.F .400 µL EDTA samples 1 ml	PCR	Verbal: Same day, available if received before 11am Written: 6 Days	M	**Irish Meningococcal and Sepsis Reference Laboratory**	Yes www.cuh.ie – Healthcare Professionals – Departments – Laboratory – IMSRL Request Form

Test	Code	Container Type/ Sample requirements	Investigation required	TAT	Lab Series	Referral Centre	Specific Form Required and Location
Hepatitis DNA	HED	Ocular fluid, dry corneal swab	PCR	10 days	M	**Micropathology Ltd.**	Yes www.micropathology.com
HSV DNA	HSVD	Ocular fluid, dry corneal swab	PCR	10 days	M		
Influenzae surveillance and typing	TYPE	Red respiratory viral transport media	PCR	1 month	M	**National Virus Reference Laboratory**	No Use surveillance sticker on form
Invasive isolates of Anaerobes for AST	ANES	Pure subculture on blood agar plate	Susceptibility testing	10 working days	M	**Microbiology Laboratory, SVUH**	No
Invasive Isolates Of *Haemophilus influenzae*	TYPE	Pure subculture onto choc agar slope.	Serotyping	10 working days	M	**Irish Meningococcal and Sepsis Reference Laboratory**	Yes www.cuh.ie – Healthcare Professionals – Departments – Laboratory – IMSRL Request Form
Invasive isolates of *Streptococcus pneumoniae*	TYPE	Pure subculture on Chocolate agar slopes	Serotyping	7 working days	M	**Epidemiology and Molecular Biology Unit (CHI, Temple St.)**	No
Isolate Identification	MAL1, ID 2, 3…7	Pure subculture on suitable agar plate In event VITEK MS Maldi-TOF out of service, back up provision for organism identification	Organism identification	2 days	M	**Microbiology Laboratory, SVUH**	No
Legionella Antigen	LEG	Urine	Immunochromatography	2 working days	M		
***Listeria* species**	TYPE	Pure subculture on nutrient agar slope	Typing	1-2 weeks	M	**NSSLRL**	Yes Through website: http://www.nuigalway.ie/salmonella_lab

Test	Code	Container Type/ Sample requirements	Investigation required	TAT	Lab Series	Referral Centre	Specific Form Required and Location
***Listeria monocytogenes* DNA**	LIMD	CSF, EDTA	PCR	10 days	M	**Micropathology Ltd.**	Yes www.micropathology.com
Meningitis / Encephalitis FilmArray Panel	FAME	CSF	PCR	3 days	M	**Microbiology Dept, CHI Temple Street**	No
Meningococcal PCR	MENP	CSF - 400µl EDTA – 1ml	Collect specimen as close to time of onset and prior to antibiotic administration Urgent send ASAP within working day, store at 4˚C if delay in transporting	Verbal: Same day, available if received before 11am Written: 6 Days	M	**Irish Meningococcal and Sepsis Reference Laboratory**	Yes www.cuh.ie – Healthcare Professionals – Departments – Laboratory – IMSRL Request Form
MRSA Isolates	MRST	Pure subculture on nutrient agar slope.	Typing and confirmation of Methicillin resistance	2 weeks	M	**National MRSA Reference Laboratory**	Yes Through website: http://www.stjames.ie/nmrsarl/index.html
***Mycoplasma pneumonia* Antibody**	MPAB	Serum sample	Serology	3 working days	D	**Eurofins Ireland**	No
***Neisseria gonorrhoeae* DNA**	NEGD	Ocular fluid, dry corneal swab	PCR	10 days	M	**Micropathology Ltd.**	Yes www.micropathology.com

Test	Code	Container Type/ Sample requirements	Investigation required	TAT	Lab Series	Referral Centre	Specific Form Required and Location
Neisseria gonorrhoeae	NESS	Pure subculture on chocolate agar.	Susceptibility testing	1 week	M	**Microbiology, SJH**	Yes www.stjames.ie Healthcare Professionals – Referral Forms - Laboratory
Neisseria meningitidis	NESS	Pure subculture on chocolate agar	Susceptibility testing	1 week	M	**Irish Meningococcal and Sepsis Reference Laboratory**	Yes www.cuh.ie – Healthcare Professionals – Departments – Laboratory – IMSRL Request Form
Neisseria meningitidis	TYPE	Pure subculture on chocolate agar	P.C.R.	Samples are run each day 11am Mon-Fri. Results in late p.m.	M	**Irish Meningococcal and Sepsis Reference Laboratory**	Yes www.cuh.ie – Healthcare Professionals – Departments – Laboratory – IMSRL Request Form
Ova and parasites	OAP	Stools	Test for ova and parasites	1 week	M	**Microbiology Laboratory, SVUH**	No
Pneumococcal PCR	PNEP	C.S.F or EDTA	P.C.R.	Verbal: Same day, available if received before 11am Written: 6 Days	M	**Irish Meningococcal and Sepsis Reference Laboratory**	Yes www.cuh.ie – Healthcare Professionals – Departments – Laboratory – IMSRL Request Form
Pneumoncoccal Antigen	PNEU	Urine	Immunochromatography	2 working days	M	**Microbiology Laboratory, SVUH**	No
***Propionibacterium* DNA**	PROD	Ocular fluid	PCR	10 days	M	**Micropathology Ltd.**	Yes

Test	Code	Container Type/ Sample requirements	Investigation required	TAT	Lab Series	Referral Centre	Specific Form Required and Location
***Pseudomonas* DNA**	PSAD	Ocular fluid	PCR	10 days	M		www.micropathology.com
Rubella DNA	RUBD	Ocular fluid	PCR	10 days	M		
***Salmonella* species**	TYPE	Pure subculture on nutrient agar slope	Serotyping and identification	1 week	M	**NSSLRL**	Yes Through website: http://www.nuigalway.ie/salmonella_lab
***Shigella* species**	TYPE	Pure subculture on nutrient agar slope	Typing	1-2 weeks	M		
Specimen for routine culture and susceptibility	SPRC	Any specimen type not performed in NMH for routine culture and AST e.g. lymph nodes, pleural fluid, sputum when bloodstained / for TB also	Culture and Sensitivity	≤ 2 weeks	M	**Microbiology Laboratory, SVUH**	No
Specimen for Referral	REFL	For sample types, tests , isolates rarely tested for in most laboratories	Any	Up to 1 month	M	**Relevant centre for where tests required are performed.** See Q:\2 Microbiology\Referral labs "Referral labs for unusual organisms" for any that have been previously sent/used for details. Add any new cases to this.	
***Staphylococcus* DNA**	STGD	Ocular fluid	PCR	10 days	M	**Micropathology Ltd.**	Yes www.micropathology.com
***Streptococcus pneumoniae* DNA**	SPND	Ocular fluid	PCR	10 days	M		
T.B.	TB	Sputa, tissue samples (all neck nodes) and urine	Z.N. or auromine-phenol stain and culture	Microscopy in 4 days. Culture in 6-8 weeks	M	**Microbiology Laboratory, SVUH**	No

Test	Code	Container Type/ Sample requirements	Investigation required	TAT	Lab Series	Referral Centre	Specific Form Required and Location
TB DNA	TBD	Ocular fluid	PCR	10 days	M	**Micropathology Ltd.**	Yes www.micropathology.com
Toxocara	TOXC	Ocular fluid	IgG / Western Blot	1 Week	M	**Health Services Laboratory**	Yes \\nm100\Qpulse\2 Microbiology\Referral Labs\Health Services Laboratories (Parasitology Request Form)
Toxoplasma gondii DNA	TOGD	Ocular fluid	PCR	10 days	M	**Micropathology Ltd.**	Yes www.micropathology.com
***Treponema pallidum* DNA**	TREP	Ocular fluid	PCR	10 days	M		
Trichomonas vaginalis	MCGT	Urine Only refer when possible *Trichomonas* seen in the urine microscopy for confirmation (*Set CT/NG to 'returned' on LIS prior to sending*)	PCR	1 week	W	**National Virus Reference Laboratory**	No
Varicella zoster DNA	VZVD	Ocular fluid	PCR	10 days	M	**Micropathology Ltd.**	Yes www.micropathology.com

REFERRAL CENTRE	ADDRESS		PHONE NUMBER	
Carbapenemase Producing Enterobacterales (CPE) Reference Laboratory	**Carbapenemase Producing Enterobacterales (CPE) Reference Laboratory, Department of Medical Microbiology University Hospital Galway, Galway**		**091 544 - 570/628/429**	
Epidemiology and Molecular Biology Unit (CHI, Temple St.)	**Epidemiology and Molecular Biology Unit, The Children's University Hospital, Temple St. Dublin 1**		**01 878 4875 / 01 878 4858**	
Eurofins Biomnis Ireland	Unit 3 Sandyford Business Park, Burton Hall Road, Sandyford Business Park, Dublin 18, D18 E528	Three Rock Road, Sandyford Industrial Estate, Dublin 18, D18 A4C0	1800 303 349	01 295 8545
Irish Meningococcal and Sepsis Reference Laboratory	**Irish Meningococcal and Sepsis Reference Laboratory The Children's University Hospital, Temple St. Dublin 1**		**01 878 4875 / 878 4858**	
Microbiology Dept, CHI, Crumlin	**Microbiology Dept, Children's Health Ireland (CHI), Crumlin, Dublin 8**		**01 409 6424 / 6426**	
Microbiology Dept, CHI, Temple Street	**Microbiology Dept, CHI at Temple Street Temple Street Dublin 1**		**(01) 878 4266**	
Microbiology SJH	**Microbiology St. James's Hospital Dublin 8**		**01 416 4209**	
Microbiology Laboratory, SVUH	**Microbiology Laboratory, St. Vincent's University Hospital, Dublin 4**		**01 221 4470**	

Micropathology Ltd.	**Micropathology Ltd. University of Warwick Science Park, Venture Centre, Sir William Lyons Road, Coventry, CV4 7EZ, United Kingdom**	**0044 247 632 3222**
National MRSA Reference Laboratory	**National MRSA Reference Laboratory St. James's Hospital St. James's Street Dublin 8**	**01 410 3662 / 3 /4**
National Salmonella, Shigella, Listeria Reference Laboratory (NSSLRL)	**NSSLRL, Medical Microbiology Dept, U.C.H, Galway**	**091 221 4470**
National Virus Reference Laboratory	**National Virus Reference Laboratory UCD, Belfield, Dublin 4**	**01 716 4401**
Health Services Laboratory	**Department of Clinical Parasitology, Hospital for Tropical Diseases, University College London Hospitals 3rd Floor Mortimer Market Centre, Mortimer Market, London WC1E 6JB, England**	**0044 (0)20 7307 9400**
Public Health Laboratory (Cherry Orchard)	**Public Health Laboratory, Cherry Orchard Hospital, Ballyfermot, Dublin 10**	**076 695 5175 / 076 695 5176**
PHE Mycology Reference Laboratory National Infection Services (Bristol)	**PHE Mycology Reference Laboratory National Infection Services, PHE South West Laboratory, Science Quarter, Southmead Hospital, Bristol, BS10 5NB**	**0044 0117 414 6222**

17.3 Reference Ranges and Critical Alert Ranges

Generally Biological Reference Intervals do not apply to Microbiology, however, please see below for exceptions. Clinical decision values are listed below for both the NMH and RVEEH.

Figure 34: Normal values for WBC, RBC, Protein and Glucose for Various Age Groups in CSF

Leucocytes	Neonates	less 28 days	0-30 cells x 10^6/L
	Infants	1 to 12 months	0-15 cells x 10^6/L
	Children/Adults	1 year +	0-5 cells x 10^6/L
Erythrocytes	No RBCs should be present in normal CSF		
Glucose	Neonates	less 28 days	1.94-5.55 mmol/L
	Infants	29 to 58 days	1.55-5.55 mmol/L
		2-12 months	1.94-5.0 mmol/L
	Children/Adults	1 year +	2.22-4.44 mmol/L
Proteins	Neonates	less 28 days	0.65-1.5 g/L
	Infants	29-56 days	0.5-0.9 g/L
	Children	2 months to 18 years	0.05- 0.35 g/L
	Adults	over 60	0.15-0.6 g/L
		18 to 60	0.15-0.45 g/L

Figure 35: Microbiology Critical Alert Ranges

NMH			
Organism	**Notify**	**When**	**Notes**
MRSA	Con Microbiologist / SpR Infection Control	**Inpatient:** Notify at presumptive and when confirmed **Outpatient**: Notify when confirmed	Consultant will decide action of "presumptive MRSA". Strongly consider infection control precautions if presumptive MRSA case is an in-patient. List of positives pulls daily into Excel sheet for Infection Control
	Relevant Unit/ Clinic	**Inpatient: NICU:** Notify at presumptive and when confirmed **All others:** Notify when confirmed **Outpatients:** Notify when confirmed	
VRE CPE ESβL Gentamicin-Resistant Enterobacterales	Con Microbiologist / SpR Infection Control Relevant Unit/ Clinic Surveillance Scientist	**Inpatient:** Notify at presumptive and when confirmed **Outpatient**: Notify when confirmed	List of positives pulls daily into Excel sheet for Infection Control
Group A Streptococci Listeria monocytogenes Neisseria gonorrhoeae		Notify when confirmed	List of positives pulls daily into Excel sheet for Infection Control
Group B Streptococci	Relevant Unit/ Clinic	**Adult:** Isolated for the first time from antenatal/peripartum inpatient **Neonates:** All patients or isolated from maternal samples that can impact neonate e.g. EBM	
	Unit 3	All 'Detected' results from Rapid GBS test	By routine and on-call staff
Pseudomonas aeruginosa	Consultant Microbiologist / SpR Relevant Unit/ Clinic Surveillance Scientist	Any neonate or eye sample	
Faecal pathogens	Con Microbiologist / SpR Infection Control Relevant Unit/ Clinic Surveillance Scientist	All 'Detected' result from FilmArray GI Panel	List of positives pulls daily into Excel sheet for Infection Control
Influenza A/B RSV SARS-CoV-2		All 'Detected' results	**On-call**: Phone to relevant unit /clinic only List of positives pulls daily into Excel sheet for Infection Control

NMH			
Sample Type	**Notify**	**When**	**Notes**
Blood cultures	Consultant Microbiologist / SpR	Any positives	By routine and on-call staff

		On-Call: Send pseudo-anonymised text message with positive Gram stain and photograph of FilmArray result to Consultant Microbiologist.	If unable to interpret the Gram stain contact the Consultant Microbiologist by phone. If locum is covering - text message not required – clinical staff may phone locum
	Infection Control	Any positive **adult** blood cultures	List of positives pulls daily into Excel sheet for Infection Control
	Relevant Unit/ Clinic	**Adults:** Phone relevant unit during routine hours. On-Call bleep Obs/Gyn Reg (1st) or Obs/Gyn SHO (2nd) **Neonates:** Bleep Paeds reg (1st) or Paeds SHO (2nd) during routine hours and on-call. If no answer Bleep ADOM	By routine and on-call staff **Exception:** When Gram stain = No Organisms Seen, telephoning result is not required.
CSF	Consultant Microbiologist / SpR	Cell Count**:** WCC ≥ 20 (neonate), WCC ≥5 (adult) Gram stain positive Culture / DNA positive	By routine and on-call staff
	Relevant Unit/ Clinic	Always phone cell count and gram stain regardless of positive/negative Culture positive Bleep relevant Reg (1st) / SHO (2nd) for paeds/Obs If no answer bleep ADOM	
Faecal Occult Blood	Relevant Unit/ Clinic	Any positive result	

RVEEH			
Organism	**Notify**	**When**	**Notes**
MRSA	Infection Control	**Inpatient:** Notify at presumptive and when confirmed **Outpatient**: Notify when confirmed	Notify Infection Control team by email
	Relevant Unit/ Clinic	**Inpatient:** Notify at presumptive and when confirmed	
VRE CPE ESβL	Consultant Microbiologist / SpR Infection Control Relevant Unit/ Clinic Surveillance Scientist	Notify when confirmed	Notify Infection Control team by email
Group A Streptococci Listeria monocytogenes Neisseria gonorrhoeae		Notify when confirmed	Notify Infection Control team by email
Pseudomonas aeruginosa	Consultant Microbiologist / SpR	Any eye sample, presumptive ID	
	Relevant Unit/ Clinic		
Acanthamoeba	Consultant Microbiologist / SpR	All 'Detected' results	
	Relevant Unit/ Clinic		
Faecal pathogens	Consultant Microbiologist / SpR Infection Control Relevant Unit/ Clinic Surveillance Scientist	All 'Detected' result from FilmArray GI Panel	Notify Infection Control team by email
Influenza A/B RSV SARS-CoV-2		All 'Detected' results	**On-call**: Phone to relevant unit /clinic only Notify Infection Control team by email
Sample Type	**Notify**	**When**	**Notes**
Blood cultures (including ocular fluids in blood culture bottles)	Consultant Microbiologist / SpR	Any positives **On-Call:** Send pseudo-anonymised text message with positive Gram stain and photograph of FilmArray result to Consultant Microbiologist.	By routine and on-call staff If unable to interpret the Gram stain phone the Consultant Microbiologist. If locum is covering, a text message not required – clinical staff may phone locum
	Relevant Unit/ Clinic	Phone in-patient ward (634 3655 / 3657) with any positives and Gram stain. If no reply, contact the Consultant Microbiologist 24/7.	By routine and on-call staff **Exception:** When Gram stain = No Organisms Seen, telephoning result is not required.
Corneal Scrapings Vitreous/Aqueous Fluids	Consultant Microbiologist / SpR	Positive Gram Stain Culture positive, once preliminary ID available	
	Relevant Unit/ Clinic		
Faecal Occult Blood	Relevant Unit/ Clinic	Any positive result	
Environmental Screening	Pharmacy	**Clean Room:** >20 CFU of any type on settle plate **Glove, isolator, finger dab:** >5 CFU of any type on settle plate	

Unless otherwise indicated, all results are phoned by Microbiology scientific staff. NMH results are reported to the infection control nurse via a protected shared Excel sheet. RVEEH results are reported to the infection control nurse by e-mail. Any other clinically significant organisms may also be telephoned as required.

Significant isolates in other specimens and from known ill patients are telephoned to the Consultant Microbiologist before susceptibility tests are finalised. In the event of the NMH Consultant Microbiologist being on leave, locum cover is provided as arranged by NMH Consultant Microbiologist. Advise the person taking the result that NMH Consultant Microbiologist is on leave, that cover is in place and that they may be contacted if required.

Out of hours, the scientist On-Call is not required to contact the locum Consultant Microbiologist covering as per protocol above, informed clinical staff that NMH Consultant Microbiologist is on leave, that cover is in place and they may be contacted if required.

Record all evidence of phoning results in the telephone log on the LIS as per LP-GEN-TELREP.

17.4 Mandatory Reporting

The Microbiology laboratory reports all significant isolates and diagnoses from referral laboratories in accordance with the Infectious Diseases (Amendment) Regulations2020 (S.I. No. 53/2020). The surveillance scientist in conjunction with the Consultant Microbiologist keeps a record of all infections reported by the laboratory.

17.5 Requesting Additional Examinations/Tests

- Additional tests may be requested by clinical staff and added onto some samples. The ability of the Microbiology laboratory to perform these additional tests depends on the test being requested and viability of the sample for that test.
- Additional examinations, if possible, may be requested following consultation with consultant microbiologist or senior scientific staff. All add on requests are entered in the laboratory information system.
- Post processing of samples in Microbiology:
    - CSFs are kept for 1 month refrigerated.
    - All other samples are kept for 1 week at room temperature. Due to the storage conditions of these samples, it is generally **NOT** possible to perform additional testing when the sample is >24 hours old from time processed.
    - Please check with the Microbiology department prior to ordering additional tests if possible to perform.
- Additional examinations also may be initiated by Consultant Microbiologist or senior scientific staff based on the results of initial examinations.

18 Specimen Referral/Dispatch

18.1 Specimen Referral

Where an investigation is not available in the Department of Pathology and Laboratory Medicine at the NMH, it may be referred to a third party laboratory for testing. Where possible, work is referred to INAB or CPA accredited laboratories. Referral occurs in cases where there is a request for:

- The provision of a unique or unusual service.
- Provision of a service not available in the NMH.
- Confirmation of initial findings.
- Backup service in the event of an unplanned interruption of the service.
- Where a Consultants second opinion in Histopathology and Cytology is required.
- It is policy to refer certain investigations to reference laboratories.

18.2 Reports from Referral Laboratories

Reports from referral laboratories are managed in accordance with MP-GEN-RESREL, the procedure for the Review and Release of Results:

1) Test results are received in the Pathology Department of the NMH from the referral laboratory.
2) Results are logged into the LIS and an added comment identifies the referral laboratory. Tests that have been performed by the referral laboratory are highlighted within the NMH report. The referral/back up laboratory report number is recorded internally on Winpath for reference.
3) Where possible results are received electronically via Medibridge.
4) Results of external examinations entered into Winpath are authorised by scientific or medical staff. Additional comments may be added by senior or Consultant staff if appropriate. This authorisation process is controlled.
5) Where the referral laboratory report is sent by the laboratory to the ward, a copy of the report is kept in the department. This may be in hardcopy, electronic copy or transcribed into Winpath.
6) Genetic reports received from a referral laboratory are not entered into Winpath due to the complexity of the report. The following comment is attached to all results in Winpath: '*The original report has been sent to the requesting doctor or consultant or may be together with the patient's chart. To retrieve a file/report, please contact chart retrieval on extension 3421/3422 or medical records officer on extension 3208. Or alternatively contact the appropriate referral laboratory.*
7) The original report is sent to the requesting clinician and/or unit and filed in the patient's chart. A copy is retained in the laboratory.

19 Virology Referral

Requests must be from a hospital clinic or Consultant, and must be submitted on the appropriate form with clinical details and signature. Requests should be classified as follows:

- Routine (before 30 weeks' gestation): 1-2 weeks reporting time.
- Late booking (after 30weeks' gestation): Within 48 hours reporting time.
- Urgent: Verbal 4 hours reporting time (HIV) or within 24 hours (Hepatitis B, Varicella IgG, source blood from needle stick injury).
- The laboratory should be contacted when urgent specimens are being sent. **Note:** The urgent category has significant staff and cost implications for the National Virus Reference Laboratory (NVRL) and must only be used where necessary.
- See SI-NOT-GEN1 and SI-NOT-GEN2 for Order of Draw charts on Q-Pulse

Figure 36: Referred Test for Serology/Virology

Test	Code	Tube type	Special Requirements	Referral Centre
Adenovirus PCR	**ADEN**	**Eye / CSF / Swab / Nasal Aspirate / EDTA / Serum**	Change sample type on WinPath to suit specimen type received. For Nasal Aspirates: Part of standard panel in NVRL with Enterovirus, Parechovirus, CMV, respiratory virus.	**NVRL**
Anti-Hep B Core Total	**HBC**	**Adult: Serum gel**		
Anti-Pertussis Toxin IgG	**COMS**	**Adult: Serum gel**	Clinical details are required (whooping cough). Refer to WI-CS-SR-3 for details for PCR testing.	**Microbiology, CHI Crumlin**
Atypical Pneumonia	**ATYA**	**Adult: Serum gel**	Mycoplasma IgM	**NVRL**
		Paed: Serum		
Booking: Rubella, Syphilis, HBsAg, HIV, Hep C Abs	**BKBB**	**Adult: Serum gel**	When gestation >38 weeks or if requested urgently by phone enter Urgent comment in the clinical details field of LIS and phone NVRL to inform them it's en route. Send on same day where possible. Otherwise keep in fridge and send the following day first thing. For urgent booking bloods – Refer to WI-CS-SR-4 for criteria	
Booking: Rubella, Syphilis, HBsAg, HIV, Hep C Abs, Varicella	**BKBA / BKBV**			
Brucella (RVEEH Only)	**BRUC**	**Serum**	Spin to separate from cells. Stable on gel. Separate + fridge if storing over the weekend	**Eurofins Biomnis**
Cat Scratch Serology (Bartonella) (RVEEH Only)	**CATS**	**Serum**		
Chlamydia and Gonorrhoeae	**MCG**	**Eye Swabs (non-genital sites)**	White APTIMA specimen collection kit gen probe for RNA testing ***Green top viral swabs are not suitable.***	**NVRL**

Test	Code	Tube type	Special Requirements	Referral Centre
+Trichomonas vaginalis (for all genital / urinary specimens only)	**MCGT**	**Urine Genital Swabs**	• Urine: ○ First catch urine required, mid-stream urine unsuitable. ○ Transfer from urine jar to Chlamydia / Gonorrhoea transport containers within 24 hours. • Use relevant APTIMA Specimen collection kit gen probe for RNA testing ○ Endocervical / Urethral: White APTIMA swab ○ HVS: Orange APTIMA swab • In Winpath enter sample type: ○ Endocervical: ***ECS*** ○ Urethral: ***US*** ○ Urine: ***U*** ○ Vaginal Swab: ***HVS, LVS or VS*** (as indicated)	
+Trichomonas vaginalis and Mycoplasma genitalium when: ○ From Preterm Surveillance Clinic ○ Clinical details are Pelvic Inflammatory Disease (PID), Tubo-Ovarian Abscess (TOA), Epididymorchitis ○ When M. genitalium specifically requested (for genital specimens only)	**MCGP**	**Genital Swabs**		
CMV IgG and IgM	**CMBL**	**Adult: Serum gel**		**NVRL**
CMV PCR	**CMVP**	**Urine, Saliva, EDTA, CSF, Amniotic Fluid**	• **<u>For EDTA samples</u>**: They stable at room temperature for 24 hours from collection. Samples are sent to the NVRL as soon as possible (reach NVRL with 24 hours of blood draw). • If samples cannot be sent to the NVRL within 24 hours, they must be separated, frozen and transported at -20°C. • All samples can be sent with the next scheduled courier. • Change sample type on WinPath screen to suit specimen type received.	
CSF Viral Screen: HSV, Varicella, CMV, Enterovirus, Parechovirus and Human Herpes Virus 6 PCR	**MCSF**	**Paed: CSF / EDTA / viral swab**	• When CSF / EDTA received and 24 hours to next routine day, please freeze sample (CSF) or separate and freeze at -20°C (EDTA). • For HHV 6 PCR paediatric plasma and serum can also be accepted. • Viral swabs, enter relevant sample site e.g. rectal swab, nasal swab etc. • If all tests on the panel are not required, *see note at end.	
Enterovius PCR (e.g. hand, foot + mouth, also known as Coxsackie, Echo)	**ENTV**	**Faeces / Rectal / Throat Swabs / CSF / Serum**	Always order ENTV on Meconium samples. Change sample type on request screen to suit specimen. For PM samples: Part of standard panel in NVRL with Parechovirus and Adenovirus.	

Test	Code	Tube type	Special Requirements	Referral Centre
Epstein Barr Virus Screen	**EBVS**	**Serum / Plasma**		
Eye and Ear Viral Screen	**RVEE**	**Viral Eye Swab**	Green top viral swab • If all tests on the panel are not required, *see note at end.	
Helicobacter pylori Abs (IgG) / Ag	**REFL**	**Faeces (Ag only)** **Serum (IgG only)**	• Faeces: Freeze when >72 hours before sending • Record in internal notepad in Results Entry, test(s) sample referred for	**Eurofins Biomnis**
Hepatitis A IgG / IgM	**HEPA**	**Adult: Serum Gel**		**NVRL**
		Paed: Serum		
HBsAg (Hep B screen)	**HBSC**	**Adult: Serum / EDTA plasma**	• When gestation >38 weeks or if requested by phone urgently. Enter Urgent in the clinical details of the LIS and phone NVRL to inform them it's en route. Send on same day where possible. Otherwise keep in fridge and send the following day first thing. • Hepatitis C antigen: Request if clinical details of exposure to bodily fluids (e.g. blood donation, drug user) or if specifically requested.	**NVRL**
		Paed: Serum / EDTA plasma		
Hepatitis C Antigen	**HCRT**	**Serum Gel**		
Hepatitis Screen (Hep B (HBsAg) + Hep C)	**HEPN**	**Adult: Serum gel**		
		Paed: Serum		
Hepatitis B Antibody Titre	**HTIT**	**Adult: Serum gel**		
Hepatitis B PCR / Viral Load	**HBPC**	**Adult: EDTA**	• Samples are stable at room temperature for 24 hours from collection. Samples are sent to the NVRL as soon as possible (reach NVRL with 24 hours of blood draw). • If samples cannot be sent to the NVRL within 24 hours, they must be separated, frozen and transported at -20°C. • EDTA is the preferable sample for both paeds and adults however serum is accepted by NVRL.	
		Paed: EDTA		
Hepatitis C PCR / Viral Load	**HCPC**	**Adult: EDTA**		
		Paed: EDTA		
Hepatitis B or C Genotying	**HBGT** **HCGT**	**EDTA Plasma**		
Hepatitis B and C Serology Work-Up (RVEEH Only)	**HBC** **HEPN**	**Adult: Serum**	The following tests should be given; Anti Hep B core Total, Hep B s Surface Antigen and Hep C antibodies.	

Test	Code	Tube type	Special Requirements	Referral Centre
Hepatitis C Abs	HCSC	**Adult: Serum Gel / EDTA Plasma** **Paeds: Serum / EDTA Plasma / Lit Hep Plasma**		
Hepatitis D (Delta) Screen	HEPD	**Adult: Serum Gel**	Spin to separate from cells. Stable on gel. Separate + fridge if storing over the weekend	
Hepatitis E Screen	HEPE	**Adult: Serum Gel**	Spin to separate from cells. Stable on gel. Separate + fridge if storing over the weekend	
Herpes Simplex Virus 1 + 2 PCR	HERP	**CSF / EDTA** **Paed: Serum sample is acceptable**	• **Urgent** send CSF ASAP within working day or freeze immediately if at the weekend. Change sample type on request to suit specimen. • **For EDTA:** If samples cannot be sent to the NVRL within 24 hours, they must be separated, frozen and transported at -20°C.	**NVRL**
	SHSV	**Viral Swab (genital / eye) / Fluid**		
Herpes Simplex Virus Serology	HSER	**Adult: Serum** **Paed: Serum**		
HIV Antigen / Antibody	HIV	**Adult: Serum Gel** **Paed: Serum**		
HIV PCR / Viral Load	HIVP	**Adult: EDTA** **Paed : EDTA**	• Samples are stable at room temperature for 24 hours from collection. Samples are sent to the NVRL as soon as possible (reach NVRL with 24 hours of blood draw). • If samples cannot be sent to the NVRL within 24 hours, they must be separated, frozen and transported at -20°C. • NB: If any EDTA sample received for NVRL, check with requesting unit if for PCR (in case EDTA sample taken in error), if so, spin, separate and freeze. EDTA samples are generally for PCR.	

Test	Code	Tube type	Special Requirements		Referral Centre
HIV, Hepatitis Screen, Hep B Core	IVF	Adult: Serum Gel			
HTLV Screen (1 + 2)	HTLV	Adult: Serum Gel / EDTA / Plasma Paed: EDTA / Plasma			
Immunoblot BORC (Confirmation Test for Lyme Disease)	COMS	Adult: Serum	In the result entry field type the following " Test being carried out"		
Leptospira IgM (Leptospira screen)	LEPS	Adult: Serum			
Lyme Disease (also known as Borrelia) (RVEEH and NMH Requests)	LYME	Adult: Serum			NVRL
Measles and Mumps	MMSC	Adult: Serum			
Measles Screen	MEAS	Adult: Serum			
Measles RNA PCR	MEPH	Oracol Swab			
Mumps Screen	MUMS	Adult: Serum			
Mumps RNA PCR	MPCR	Oracol Swab			
Monkeypos	OPOX	Viral Swab			
Needle Stick Source	NSS	Adult: Serum	Refer-to WI-CS-SR-4 for criteria, hours testing available.	In LIS, in clinical details field of the source's request entry, enter laboratory accession number of the recipients sample and vice versa.	
Needle Stick Recipient (Hold)	HOLD	Adult: Serum			
OHD SCREEN (Rubella, Anti-HBs Ab Titres, HBsAg, Anti-HB Core Total, Varicella, Measles + Mumps)	OHDS	Adult: Serum Gel	• If all tests on the panel are not required, *see note at end.		
IVS (Sample ID Validated by OHD)	IVS	Adult: Serum Gel	Only order if written on OHD forms. Brings in comment: SAMPLE ID VALIDATED BY OCC HEALTH		

Test	Code	Tube type	Special Requirements	Referral Centre
Parvovirus B19 Screen	**PARV**	**Adult: Serum Gel Paed: Serum / Plasma**	If requested urgently by phone, send ASAP. Otherwise send with next courier. When requested as an add-on test, relevant clinical details must be provided e.g. exposure If specimen received on a foetus, book in as per section 2.2.2 in PP-CS-LM-4.	
Parvovirus B19 DNA	**MPAR**	**Adult: Amniotic Fluid / EDTA Paed: EDTA, Serum**		
Parechovirus	**PARE**	**Green Viral Throat or Rectal Swab / Faeces / CSF / Serum**	Part of standard panel in NVRL with Adenovirus and Enterovirus.	**NVRL**

Quantiferon (TB)	**QUTB**	**Special blood tubes (x4) from Biomnis**	• Quantiferon TB Gold kits are stored @RT.
			• Quantiferon TB Information form stored in Specimen Reception with the kits, where sign for "SWABS AND BOTTLES" is.
			• Fill out form fully with all patient information (the bottom part will be completed by the referral laboratory), and send with sample with routine courier.
			• Sample storage:
			  ○ Routine hours: Keep at RT and send with the next available courier.
			  ○ OOH: Incubate samples at 37°C for 16 – 24 hours. Centrifuge at 3,000rpm for 15 minutes (centrifugation must be completed within 3 days).
				Eurofins Biomnis

Respiratory Panel (Sars-CoV-2, Influenza, RSV, Parainfluenza, Metapneumovirus, Mycoplasma pneumonia, Chlamydphila pneumonia, Rhinovirus, Enterovirus, Adenovirus, Coronavirus, Bocavirus)	**MRSC**	**Green Viral Swab / E.T. Secretions / UTM swab**	Influenza, RSV and SARS CoV2 testing is available in NMH; Refer full respiratory panel to NVRL	**NVRL**
RSV Screen	**RSVS**	**UTM or green viral swab**		
Rubella IgG	**RUBN**	**Adult : Serum gel**		

Test	Code	Tube type	Special Requirements	Referral Centre
Rubella RNA	MRUB	Oral fluid Oracol swab		
Rubella IgM Screen	RUB	Adult : Serum gel / Paed : Serum		
Syphilis (Also Known as RPR, TPPA , VDRL, Treponema pallidum)	WRO	Adult : Serum gel / Paed : Serum		
Torch + Syphilis (Maternal): Toxoplasma IgM / IgG, Rubella IgG, CMV IgM / IgG, T. pallidum, Parvovirus IgG / IgM	TORM	Adult: Serum gel Plasma (Lit Hep)		
Torch + Syphilis (Paed): *Rubella RNA, CMV, Toxoplasma, T. pallidum*	TORP	Paed : Serum		NVRL
Toxocara Abs (RVEEH Only)	TOCA	Serum	Spin to separate from cells. Stable on gel. Separate and fridge if storing over the weekend.	Eurofins Biomnis
Toxoplasmosis (Swansea)	SWTS	Serum Amniotic Fluid	Consult with the Consultant Microbiologist Complete the Toxoplasma reference form – Available on https://phw.nhs.wales/services-and-teams/reference-laboratories-and-specialist-services/toxoplasma-reference-unit/	Toxoplasma Reference Unit, Public Health Wales
Toxoplasmosis Screen	TOX.	Adult : Serum gel	Most requests are sent to NVRL. If mother and baby paired samples – send to **Toxoplasma Reference Laboratory, Swansea, UK.**	NVRL
Varicella Screen (Also Known as Chickenpox or Shingles or Varicella Zoster Virus)	VARS	Adult: Serum Gel Paed: Serum	For urgent varicella – Refer to WI-CS-SR-4 for criteria When requested as an add-on test, relevant clinical details must be provided e.g. exposure	
Varicella PCR	SVZV	Viral swab		
Viral Culture	VCUL	Viral swab (Green Lid)		
Viral PCR / PM Culture	VCUL	Tissue in viral transport medium	Green top swab required for NMH (Viral swab).	
RVEEH Viral Screen (swab): HSV, Varicella, Adenovirus	RVEE	Viral Swab (Green Lid)	• Eye swabs or skin • If all tests on the panel are not required, *see note at end.	

Test	Code	Tube type	Special Requirements	Referral Centre
Viral Panel (RVEEH Only)	**TOX HSER VARS WRO CMBL EBVS**	**Adult: Serum**		
Zika Virus RNA	**ZIKA**	**Serum EDTA Urine**	• Change sample type on request entry. • ***NB:*** Relevant travel and clinical details are mandatory prior to referring of sample. Location and dates of travel **MUST** be included. Contact Consultant Microbiologist if no relevant information. • Serum is the preferred specimen of choice. • Separate and freezer serum / plasma within 24 hours (or aliquot of)	**NVRL**

Note: All request forms received out of hours must be date and time stamped.
When a number of tests are requested that form part of a profile, and is easier to request the profile test code than the tests individually, any parameter of the profile that is not required can be set 'returned' (ctrl + R) in Results Entry prior to sending requests to the referral laboratory and 'Not Tested' for the parameter(s) in question.

MOLECULAR TESTING

Test	Code	Tube Type	Special Requirements	Referral Centre
Cystic Fibrosis	**TDL**	**EDTA**	Enter sample type on WinPath to suit specimen type received. Retain a scan of the request form. If sent outside of routine hours, date and time stamp form and store at room temperature.	**TDL Genetics**
Cytogenetics (e.g. PCR, Karyotype)	**TDL**	**CVS** **Amniotic Fluid**	To be accompanied with a Maternal EDTA sample for maternal cell contamination (MCC) Enter sample type on WinPath to suit specimen type received. Retain a scan of the request form. If sent outside of routine hours, date and time stamp form and store at room temperature.	
Cytogenetics (e.g. Karyotype)	**TDL**	**Heparin 4ml**	Enter sample type on WinPath to suit specimen type received. Retain a scan of the request form. If sent outside of routine hours, date and time stamp form and store at room temperature.	

Cytogenetics (e.g. Karyotype)	**TDL**	**Products of Conception (POC)** **Buccal swab**	Enter sample type on WinPath to suit specimen type received. Retain a scan of the request form. If sent outside of routine hours, date and time stamp form and store at room temperature.	
DNA Storage	**TDL**	**EDTA or Heparin 4ml**	Enter sample type on WinPath to suit specimen type received. Retain a scan of the request form. If sent outside of routine hours, date and time stamp form and store at room temperature.	
Molecular Genetics (e.g. Microarray)	**TDL**	**EDTA**	Enter sample type on WinPath to suit specimen type received. Retain a scan of the request form. If sent outside of routine hours, date and time stamp form and store at room temperature	
Other genetic testing	**COMS**		Samples may be referred to other laboratories on the request of a medical Consultant.	

Molecular Genetics:

- Specimens for cytogenetics are handled by Specimen Reception and enquiries should be directed to Ext: 3178/3545.
- Samples are sent to the referral centre the same day (Monday–Thursday) if received in the laboratory before **10:30 am**. On Friday, samples can be received up until **12:00**. Samples received after this time will be sent the following routine working day. Our courier provides a next day delivery to the referral centres.
- All samples must be sent with a completed request form.
- No samples for molecular genetics should be sent outside of routine hours (Monday-Friday 08:00-17:00).
- Please contact specimen reception for further information on specimen requirements for molecular genetics.

REFERRAL LABORATORY DETAILS

REFERRAL CENTRE	ADDRESS		PHONE NUMBER	
Children's Hospital Ireland (CHI), Crumlin	Microbiology, Children's Hospital Ireland, Crumlin, Dublin 12		01 409 6970	
Eurofins Biomnis	Unit 3 Sandyford Business Park, Burton Hall Road, Sandyford Business Park, Dublin 18, D18 E528	Three Rock Road, Sandyford Industrial Estate, Dublin 18, D18 A4C0	01 293 3690	01 295 8545
NVRL	UCD, Belfield, Dublin 4		01 716 4415	
TDL Genetics	TDL Genetics, The Doctors Laboratory, 60 Whitfield Street, London, W1T 4EU		0044 207 307 7373	
Toxoplasma Reference Unit, Public Health Wales	Toxoplasma Reference Unit, Public Health Wales Microbiology, Singleton Hospital, Swansea, SA2 8QA		0044 (0)1792 285 055	

For other virology requests, please consult WI-CS-SR-2 or The NVRL User Manual at the following link: http://nvrl.ucd.ie/routine
If both serology and molecular test requests are made, please collect a separate specimen for each request.

19.1 Retrospective Requesting/Additional Requests

Samples are sent to NVRL and not retained in Specimen Reception. Additional tests may be requested within a year period by completion of a Serology request. Highlight on the form that it is add on request to a previous sample sent to the laboratory and send form to the Specimen Reception department. Samples are stored in the NVRL for 12 months. All add on requests are entered into the LIS.

20 Appendices

20.1 Appendix 1: Useful Referral Contact Numbers

Referral Laboratory	Address	Phone/Fax Number
Haematology Laboratory Children's Health Ireland at Crumlin	Children's Health Ireland at Crumlin Dublin 12	Phone:01-4096432 Fax: 01-4559014
Haemolytic Laboratory	Central Pathology Dept St James Hospital Dublin 8	Phone: 01-4162394 01-4162909
Special Coagulation Laboratory (NCHCD)	Central Pathology Dept St James Hospital Dublin 8	Phone: 01-4162956
St. James Immunology Dept	Central Pathology Dept St James Hospital Dublin 8	Phone: 01-4162925 Fax: 01-4113008
St. Vincent's Haematology Laboratory	St. Vincent's University Hospital Elm park Dublin 4	Phone: 01-2774280
St. Vincent's Coagulation Laboratory	St. Vincent's University Hospital Elm park Dublin 4	Phone: 01-2774395
St. Vincent's Immunology Laboratory	St. Vincent's University Hospital Elm park Dublin 4	Phone: 01-2774598 01-2773825
St. Vincent's Biochemistry Laboratory	St. Vincent's University Hospital Elm park Dublin 4	Phone: 01-2214550
Nuclear Medicine Department	St. Vincent's University Hospital Elm park Dublin 4	Phone: 01-2214378
St. James Nutrition Laboratory	Central Pathology Dept St James Hospital Dublin 8	Phone: 01-4162394
Cancer Molecular Diagnostics Laboratory	Central Pathology Dept St James Hospital Dublin 8	Phone: 01-4103588
National Virus Reference Laboratory(NVRL)	University College Dublin, Belfield, Dublin 4	Phone:01 7164414 Web: www.ucd.ie/nvrl
TDL	The Doctors Laboratory, 60 Whitfield Street, London W1T 4EU	Phone: 00442073077409 00442073077373
Children's Health Ireland at Temple Street Biochemistry: (Lactate, Organic Acids, Amino Acids)	Children's Health Ireland at Temple Street Children's HospitalDublin 1	Phone: 01 878 4272 / 4273 / 4458
Biomnis Laboratories	Three Rock Road, Sandyford Industrial Estate, Foxrock	Phone: 01 - 2944108
The Rotunda Hospital	Parnell Square, Dublin 1	01-8171700

20.2 Appendix 2: Uncertainty of Measurement

Performance specifications and indications of uncertainty of measurement for internal tests are recorded in the laboratory form RF-CS-LM-90, Calculated Uncertainty of Measurement for Laboratory Procedures, and are available from the individual laboratories (where appropriate) on request.