Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

DEPARTMENT OF PATHOLOGY USER MANUAL

The following is a summary of changes to this edition of the document. Users are also informed of significant changes by memo. MEMO: MEM-GEN-2025-09

Significant Change Details

Revision 20: April 2025

Replaced any reference to specific sections throughout the document to live hyperlinks to ensure references are correct regardless of document updates.
Section 1.2 Updated to include the performance of user satisfaction surveys. Laboratory management shall ensure that patients' well-being, safety and rights are the primary considerations. Disclosure of relevant information to patients and health service providers including information it intends to put in the public domain and incidents causing/potentially causing harm at the discretion of the Consultant.
Section 2.3: Updated Haemovigilance Officer to Steven McAuley
Section 3: Addition of more information regarding the Phlebotomy clinic process and the facilities available.
Section 4: **Collated all GP information from the entire user manual into this section and updated with regards to the referral of GP workload to Eurofins Biomnis**
Section 4.2: Included reference to LI-GEN-0109 sign on bin at hospital entrance 'Laboratory Drop off Point' instruction for final drop off times
Section 5.2 Update to include Request forms received for the provision of medical laboratory services are considered internal SLAs between the laboratory and the users of the laboratory services.
Section 5.21 Table 4 Removed that phone number is mandatory on SARS-CoV2 / Flu /RSV test request form. Form has been updated (Rev 5) and "mandatory" is removed.
Section 7.1: Updated to state if the integrity of a sample has been compromised and there is a health risk, the organization responsible for the transport of the sample will be notified immediately and action taken to reduce the risk and to prevent recurrence.
Section 11: Added in details of the HSE "Your service your Say" for online submission of complaints/feedback and email address for submission of feedback.
Section 35.1 Updated renal profile to include eGFR formula in use - CKD-EPI 2009, removal of tests not processed in-house.
Section 35: Updated to include requirement for plasma glucose tube (grey top) to be taken at same time as CSF for correct result interpretation.
Section 36: Removed table of Biochemistry pregnancy reference intervals, link in place
Section 37: Updated to current Biochemistry critical phoning limits
Removal of Biochemistry section referencing textbooks as source of test information
Section 41.1 Table 29: Added in Red topped paired swab for CPE screening, added figure to represent swab, removed Figure for Orange Topped Nasopharyngeal Swab with Lysis Buffer & from Table 29
Section 41.16: Removed instruction for sample type for Xanthochromia referral testing and stated that this referral test it is not currently available.
Section 41.17: Updated information on CPE sampling
Section 42.1 Table 30: Highlighted "Alert Lab before sending samples" for CSFs; Removed reference to NPS with Lysis buffer for referral for SARS-C0V-2; Removed Occult Blood test is referred; updated Rectal swab for CPE/VRE; added CPE molecular test TAT; Updated that Xanthochromia referral testing is not currently available.
Section 44: Updated to omit phoning of SARS-C0V-2 to Infection control and CNM3 out of hours

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DEPARTMENT OF PATHOLOGY

1 INTRODUCTION

1.1 Scope and Purpose

The Department of Pathology is a clinical service and carries out investigations on specimens from patients as an aid to the diagnosis, management and treatment of disease. This manual is designed to give an overall view of the services available in the Department of Pathology. It is intended as a reference guide for users of the service including General Practitioners and Hospital-based personnel in Our Lady's Hospital, Navan. For ease of use, each discipline is described in a separate section of the manual.

The Department of Pathology provides a comprehensive service to Our Lady's Hospital, Navan. It includes:

- Blood Bank (Blood Transfusion Laboratory & Haemovigilance)
- Blood Sciences (Haematology and Biochemistry - described separately in this document)
- Microbiology

Any test requests that are not carried out on site are sent to appropriate referral laboratories.

1.2 Quality Assurance

The Department of Pathology services undergo continuous review through quality assurance and audit activities. The Department of Pathology is committed to performing activities in accordance with the requirements of the international standard ISO 15189.

Details of the scope of accreditation can be found on the INAB website www.inab.ie (directory of accredited bodies, registration number 215MT), or on request from the laboratory.

Laboratory management shall ensure that patients' well-being, safety and rights are the primary considerations. The laboratory is willing to co-operate with the users or their representatives in clarification of test requests. If users of the service have any queries for improvements in connection with any aspect of the service, staff members will be pleased to discuss these or alternatively the comments/ suggestions may be submitted via email to the Laboratory Manager or individual Departmental Chief Medical Scientists.

The laboratory encourages patients and laboratory users to provide helpful information to aid the laboratory in the selection of the examination methods, and the interpretation of the examination results by periodic performance of user satisfaction surveys.

The Laboratory endeavours to treat patients, and their samples, with due care and respect, upholding the rights of patients to care that is free from discrimination.

The Laboratory will ensure that relevant information is available to a patient and any other health service provider at the request of the patient or at the request of a healthcare provider acting on their behalf.

The laboratory shall inform the user and/or the patient in advance, of the information it intends to place in the public domain.

The Department of Pathology will, where appropriate and at the discretion of the Consultant, disclose to service users and any other relevant persons, of incidents that resulted or could have resulted in patient harm, and records of actions taken to mitigate those harms.

Laboratory Management is committed to staff recruitment, training and development at all levels to provide an effective and efficient service to its users.

Providing and managing resources to ensure that Laboratory examinations are processed to produce the highest quality results possible.

Reporting results in ways, which are timely, confidential, accurate and are supported by clinical advice and interpretation when required.

Implementation of internal quality control, external quality assessment, audit and assessment of user satisfaction to continuously improve the quality of the service.

The safe testing and distribution of blood and blood products.

It is Department's policy to provide education and to participate and encourage appropriate research and development. Many of the medical and scientific staff take an active part in education, research and clinical audit. If laboratory staff can contribute to educational activities or collaborate in research projects please let us know.

Disclaimer

The information provided in this manual is a broad guideline of the services provided and is correct at the time of authorization. The Department of Pathology shall not be liable to users of the manual for any consequential action taken by the user other than to request the user to utilise the manual strictly as a guide reference only. The manual will be updated periodically; therefore any unauthorized printed copies are uncontrolled and must not be used as the information may be incorrect.

1.3 Responsibility

The Laboratory Manager in conjunction with the Laboratory Director is responsible for ensuring the implementation and maintenance of compliance as described in the manual.

2 GENERAL INFORMATION

2.1 Location

The Department of Pathology is located on the ground floor of the hospital adjacent to the glass corridor linking the main hospital to the Regional Orthopaedic Unit. Access to the Department of Pathology is swipe card controlled. All visitors to the laboratory must contact the laboratory staff member whom they are meeting in order to gain access to the Department. Visitors must not enter the Department without the supervision of the relevant staff member.

2.2 Hours of Operation

A routine Department of Pathology service is available Monday to Friday during normal Laboratory hours. Outside of these hours, an emergency on-call service operates; contact with the on-call scientist can be made through the switchboard.

Table 1 - Hours of Operation

DEPARTMENT OF PATHOLOGY OPENING HOURS	
Monday- Friday	08.30 a.m. - 18.30 p.m.
On Call Service	18.30p.m. – 08.30 a.m. Monday to Friday and all day Saturday, Sunday & Public/Bank Holidays.
Phlebotomy In-Patient Service	08.00 a.m. -16.00 p.m. Monday to Friday, 08.00 a.m.– 13.00 p.m. Sat/Sun/Public Holiday
Phlebotomy Out-Patient Service	The Out-Patient Phlebotomy service is by appointment only. Appointments are made via the online service *Swiftqueue.com* Select: Navan Hospital – Adult Blood Tests Bloods can only be taken with a valid blood request form, signed by the patient's doctor.
Out-Patient Warfarin Clinic	Wednesday 8.30a.m.-11.30 a.m.

DEPARTMENT OF PATHOLOGY OPENING HOURS	
Clinical Laboratory Advice	See Table 2 for details
Medical Scientist On Call	It is the **responsibility of the requesting clinician** to make contact through the hospital switch board on 91 and speak to the Medical Scientist on-call.

2.3 Contact Details

Where scientific or clinical advice is required on medical indications and appropriate selection of available tests, the Department of Pathology welcomes any queries. Areas outside the hospital should make contact by dialling the Hospital Switchboard on 046 9021210 and then the relevant extension.

Table 2 – Contact Details

Department	Personnel	Telephone No.
Laboratory Director	Dr Su Maung	Contact via MMUH Switchboard (01 8032000)
Consultant Haematologist	Dr Su Maung	Contact via MMUH Switchboard (01 8032000)
Consultant Microbiologist	Dr Emilia Mamwa	OLH Switchboard
Consultant Clinical Biochemist	Dr Paula O'Shea	OLH Switchboard
Laboratory Manager	Ray O'Hare	Ext 2571
Blood Transfusion Chief Medical Scientist	Paulinus Okafor	Ext 2573
Haematology Chief Medical Scientist	Orla Dowling	Ext 2575
Biochemistry Chief Medical Scientist	Dervla O'Malley	Ext 2574
Microbiology Chief Medical Scientist	Carmel O'Reilly	Ext 2576
Haemovigilance Officer	Steven McAuley	Ext 2578 or 087 4101084 (In house queries only)
Quality Manager	Fiona McGough	Ext 2852
Laboratory Office	All General Enquiries	Ext 2701, 2577
Specimen Reception	Technical Enquires Only	Ext 2577
Out of Hours	Medical Scientist On-call Consultant Haematologist Consultant Clinical Biochemist Consultant Microbiologist	OLH Switchboard MMUH Switchboard (01 8032000) OLH Switchboard OLH Switchboard

Note: All numbers shown are for routine service, i.e. Monday to Friday. If contact is required outside routine service, dial 91 and ask to speak to the Medical Scientist who is providing the on-call service.

2.4 On Call Contact Details

On call staff must be contacted via the switchboard (046 9021210 or dial 91 if internal). Failure to do this may result in prolonged turnaround times for urgent requests.

2.5 Postal Address

The postal address is:

Department of Pathology

Our Lady's Hospital

Navan

Co. Meath

C15 RK7Y

3 PHLEBOTOMY SERVICE

3.1 Hours of Phlebotomy Service

The times of the Phlebotomy Service for is outlined in Table 1. Outpatients' blood tests can be booked online at *www.SwiftQueue.com*.

- Select: Navan Hospital – Adult Blood Tests
- Pick your desired timeslot to Book Online.
- Register to create an account (1st visit only)
- Arrive 5-10 minutes before your appointment

If you cannot access the online function,

- Phone 046-9078647 between the hours below ONLY:
- Monday, Tuesday, Thursday – 09.00a.m. – 13:00 p.m.

Note: This service is for patients of the Meath area. Blood requests from hospitals/clinics/GPs outside of this area must have a secure email address to forward results. Please be aware that some blood tests

not available at OLHN may be forwarded to the requesting hospital or clinic for testing. This may result in a cost to the patient.

3.2 Location of Phlebotomy Clinic

The Phlebotomy Department is located to the right inside the Main Hospital entrance. Toilets are located in hospital reception adjacent to the Phlebotomy clinic.

3.3 Phlebotomy Process

Patients must register their arrival for their phlebotomy appointment via the kiosk and take a seat in the reception area. The phlebotomist will then call each patient in turn, which may not be in order of arrival. The phlebotomist will invite the patient to the blood collection area where samples will be taken with consideration for privacy and comfort. If a patient requires an accompanying person (e.g. Guardian, Interpreter) they will also be accommodated. Patients must have a GP referral letter or a Consultants referral to attend for blood tests. Access to the phlebotomy service is restricted to patients who are ≥36 months of age.

The **Warfarin clinic** is held on Wednesday in the Out-Patient Department 8.30 a.m. - 1p.m. At weekends and bank holidays, a ward round is provided by one phlebotomist in the morning to take essential bloods. For the remainder of the time, trained nursing and medical staff perform phlebotomy. Incomplete forms will not be processed and it is the responsibility of the requesting staff member to ensure that all request forms are completed correctly.

4 INFORMATION FOR GENERAL PRACTITIONER (GPS) AND PRIMARY CARE TESTING ARRANGEMENTS

All laboratory requests from primary care are referred to an external referral laboratory, Eurofins Biomnis.

All queries regarding primary care specimens should be made to Eurofins Biomnis (clientservices@ctie.eurofinseu.com or call 1800 252 966).

Clinical advice and support is provided by Eurofins Biomnis. Consultant details are available on the website https://www.eurofins.ie/biomnis/about-us/eurofins-medical-consultants/

A GP Resource Page is available with relevant information regarding the service provided. Please refer to it and the following:

- GP requests are made via Electronic Healthlink ordering and must be received on an A4 page, accurately completed with the relevant patient, clinical and test information.
- Further specialist tests, not available on the electronic Healthlink ordering system must be made on the non Healthlink test request form, available on the GP Resource Page.
- If a specimen is urgent (e.g. potassium request) it must be placed in a red stat bag. Microbiology specimens should be placed in a Purple Microbiology bag to ensure delivery directly to Microbiology. These bags can be ordered from Biomnis Eurofins using a Consumables Order form available on the GP Resource Page.
- All other blood collection consumables continue to be ordered from OLH Navan Laboratory by sending a completed LF-GEN-0081:Laboratory Supplies Request for GPs to navan.lab@hse.ie**.** Emails will be checked every Monday, Tuesday and Wednesday @12pm Supplies will be dispatched the following week.
- For GP add-on requests, an email must be sent to clientservices@ctie.eurofinseu.com with full patient details and details of additional testing required. Laboratory staff will evaluate the samples for additional testing and inform the requestor of suitability.
- Addressograph label or handwritten samples are acceptable. The addressograph label used on the specimen must be of a size small enough to fit over the existing specimen label as generated by the Healthlink Ordering system. *Ref: LI-GEN-0106: Instructions for General Practitioners-Healthlink Ordering*
- Biomnis reference ranges are available on the reports. Information on critical results reporting and TATs can be found in the FAQ guide on the GP Resource Page.
- Results are reported via Healthlink. In addition, GPs can register for direct access to Biomnis reports via CDX connect via the GP Resource Page.

4.1 Tests available for Primary Care testing /GP's

The following table details the test available to order on the electronic Healthlink ordering system:

Biochemistry			Haematology	Microbiology/Virology
Lipid Profile	Liver Profile	HbA1c	FBC	Culture & Sensitivity
Amylase	Magnesium	HCG (Pregnancy)	ESR	Urine Microscopy
Bone Profile	NT proBNP	HCG (Tumour Marker)	Coagulation Screen PT/INR	Anti-HIV/HIV Ag
Cancer Antigen 125	Oestradiol	Iron Profile	Infectious Mononucleosis Screen	Hepatitis B surface antigen
Cortisol AM	Potassium	Valproate	Malaria Screen	Hepatitis C antibody
Cortisol Random	Progesterone	Vitamin B12	Sickle Cell Screen	Faecal Helicobacter Pylori Antigen
CRP	Prolactin	Vitamin D (IA)	**Immunology**	Chlamydia/gonorrhoeae, PCR-Urine
CK	PSA	LDH	Anti-Cyclic Citrullinated Peptide Antibody	Chlamydia/gonorrhoeae, PCR- Swab
Creatinine Clearance	Rheumatoid Factor	Lithium	Anti-Nuclear Antibodies	CMV Serology (IgG & IgM)
Digoxin	Testosterone	Glucose	Anti-Tissue Transglutaminase Antibodies (IgA)	EBV Serology (IgG & IgM)
Ferritin Level	Thyroid Profile	Urinary Albumin to Creatinine Ratio	Immunoglobulins (IgG/IgA/IgM)	Hepatitis A Serology
Folate	Total Protein	Globulin	Serum Protein Electrophoresis	Hepatitis C RNA and Viral Load
FSH and LH	Urate	U & E Profile	Cat dander (Specific IgE)	Parvovirus Serology (IgG & IgM)
			Dog dander (Specific IgE)	T. Pallidum Serology

The following specialist tests are available to order in addition to the tests above. These test should be ordered via the non Healthlink test request form. Referral specimen temperature requirements, are detailed in *LI-GEN-0002: List of referred tests*

Alpha-fetoprotein (AFP)		Serum	EB106		Anti-Endomysial ABs (IGA)	Serum	EMA	
CA 15-3		Serum	EB121		Anti-Gastric Parietal Cell ABs	Serum	EB327	
CA 19-9		Serum	EB122		Anti-Intrinsic Factor ABs	Serum	EB326	
Carbamazepine		Serum	EB130		Anti-Liver/ Kidney/Microsomal ABs	Serum	EB328	
CEA		Serum	EB133		Anti-Mitochondrial ABs	Serum	EB329	
Dehydroepiandrosterone (DHEAS)		Serum	EB162		Anti-Sm ABs	Serum	SMAB	
Direct/Conjugated Bilirubin		Serum	DBILI		Anti-Smooth Muscle ABs	Serum	SMA	
Faecal Calprotectin		Serum	CALP		Anti-Thyroid Peroxidase ABs	Serum	TPO	
Free T3		Serum	FT3		Anti-TSH Receptor ABs	Serum	EB246	
Lamotrigine		Serum	LAM		Haemochromatosis Genetic Screen	EDTA	C282Y	
Levetiracetam		Serum	LEVEN		HLA B27 Genotype	EDTA	HLB27	
Parathyroid Hormone PTH		Serum	EB212		Serum Free Light Chains -K/L Ratio	Serum	EB379	
Phenytoin Measurement		Serum	EB213		Total IgE / RAST	Serum	IGE	
Post-fractionated Prolactin		Serum	EB209		Specific IgE: Egg	Serum	EB463	
Sex Hormone Binding Glob SHBG		Serum	EB230		Specific IgE: Egg white	Serum	EB462	
Urinary Drugs of Abuse Screen		Urine	SCRIU		Specific IgE: Food Mix 15	Serum	EB476	
Urinary Spot Sodium Measurement		Urine	UNA		Specific IgE: Food Mix 5	Serum	EB475	
Haemoglobinopathy Screen		EDTA	EB317		Specific IgE: Grass Pollen Mix 3	Serum	EB477	
Clostridium difficile toxin PCR	PURPLE BAG	Stool	EB616		Specific IgE: House dust mite D1	Serum	EB467	
CPE Screen	PURPLE BAG	Stool	CRES		Specific IgE: Milk	Serum	EB471	
MRSA Screen	PURPLE BAG	Swab	EB615		Specific IgE: Nut Mix	Serum	EB479	
Mycology/Skin Scapings	PURPLE BAG	see PSM	EBFUN		Specific IgE: Peanut	Serum	EB485	
Ova and Parasites	PURPLE BAG	Stool*	OVAP		Specific IgE: Tree Pollen Mix 8	Serum	EB481	
TB Culture	PURPLE BAG	Sputum	TBCF		Specific IgE: Wheat	Serum	EB500	
Alpha 1 Antitrypsin Level		Serum	EB364		MEASLES	Serum	MEASP	
ANCA (NEUTROPHIL ABS)		Serum	EB389		MUMPS	Serum	MUMPP	
Anti Jo-1 Ab [CTD Screen]		Serum	JO1		RUBELLA	Serum	RUBP	
Anti Scl-70 Ab [CTD Screen]		Serum	SCL70		SYPHILIS	Serum	TPHAP	
Anti SSA/RO Ab [CTD Screen]		Serum	SSA		LEPTOSPIRA	Serum	LEPTP	
Anti SSB/La Ab [CTD Screen]		Serum	SSB		LYMES DISEASE	Serum	LYMEP	
Anti U1 RNP Ab [CTD Screen]		Serum	U1RNP		HERPES SIMPLEX	Vir Swab	HERPV	
Anti-centromere ABs - CTD Screen		Serum	ACAN		VARICELLA	Serum	VZP	
Anti-DS DNA ABs		Serum	ADA		*Stool or Sellotape test or Urine or Perianal swab			

4.2 Sample Collection/Delivery from External Locations

Primary Care Services provide a collection service for samples from external locations. All samples transported by road must comply with ADR transport regulations, and must be packaged as per ADR P650 Packing instructions. It is the responsibility of the sender to ensure that specimens are transported and packed in accordance with these regulations. ADR compliant packaging is provided by the Primary Care Service. Advice on compliance may be obtained from the Department of Pathology.

All histology samples to be transported in separate sealed bags. All other samples must be in transport tubs. Loose samples will not be accepted. Transport tub lids must be tightly closed. No incoming post to be included in transport tubs.

External specimens may also be deposited into a drop-off box at Hospital Reception labelled with LI-GEN-0109 stating 'Laboratory Specimens/Bloods from GPs only'. Hospital clinic bloods should not

be placed in this drop-off box. The last collection from the box is 15.30 p.m. Mon-Thurs and 12 noon on Fri. Any specimens left after these times will only be collected the next working day.

GP requests for renal function will exclude potassium by default.

Referral specimen temperature requirements, are detailed in *LI-GEN-0002: List of referred tests*

5 POLICY ON SAMPLE ACCEPTANCE

This policy applies to all specimens being submitted for analysis across all disciplines within the Department of Pathology. The purpose of the policy is to ensure:

- Standardization of requirements across all disciplines within the laboratory for compliance with INAB standards and ISO 15189
- Information on both the request form and the corresponding clinical specimen is sufficient to provide unequivocal traceability to ensure the correct results/products are issued to the correct patient
- The Department of Pathology receives adequate information so that identity and contact information of the requestor is available
- The Department of Pathology receives adequate information on the request form to permit correct analysis and interpretation of results
- The Department of Pathology records accurate and complete patient and specimen identification for each request received.

5.1 Sample Acceptance

In order for any sample to be accepted for processing, it must meet certain acceptance criteria.

Table 3 – Specimen and Request Form Acceptance

Details Required on Specimen	Details Required on Request Form
➢ Forename (unabbreviated) ➢ Surname (unabbreviated) ➢ Date of Birth ➢ MRN (If available. For Blood Transfusion, Typenex Number to be used if MRN unavailable) ➢ Date of Sample Collection ➢ Time of Sample Collection (if relevant to test) ➢ Unabbreviated specimen type and anatomical site of origin for Microbiology and Histology specimens (when several samples from the same patient are to be collected, including multiple pieces of tissue or slides) ➢ Signature of sample taker	The Request Form must contain the following details: ➢ Forename (unabbreviated) ➢ Surname (unabbreviated) ➢ Date of Birth ➢ MRN (If available. For Blood Transfusion, Typenex Number to be used if MRN unavailable) ➢ Gender The following details should be included: ➢ Patient address ➢ Clinician (including emergency contact information for reporting critical results) ➢ Source (Location where report to be sent) ➢ Date of Sample Collection ➢ Time of Sample Collection ➢ Signature or details of sample taker ➢ Requester's signature and contact number ➢ Test Request(s) ➢ Specimen type and anatomical site of origin for Microbiology and Histology specimens (unabbreviated) ➢ Clinical details/medications/antibiotic therapy/recent foreign travel if relevant

For Microbiology specimens, it is preferable to have time of collection but not critical, as turnaround times and shelf life of specimens are in days rather than hours as for other disciplines.

In some cases the test request may **reasonably** be inferred from the clinical details and/or the sample type, e.g. Nasal & Groin swab – perform MRSA screen, but otherwise the clinician can be phoned to clarify. To ensure the most appropriate microbiological investigation of samples and interpretation of results relevant clinical details and antibiotic therapy are desirable on the request form.

It is the responsibility of the person taking the sample to ensure the Department of Pathology is provided with complete and accurate patient identification details on both the sample request form and specimen container. Any deviation from the established collection procedures must be clearly recorded. Further information for each individual department is supplied in the relevant section of this manual.

5.2.1 Request Forms

It is important that the correct form is used for a particular test. There are a number of different request forms used for different analyses as outlined in **Table 4 – Request Forms**. One request may accompany multiple specimens. Each request accepted by the laboratory for examination(s) shall be considered an internal service level agreement between the laboratory and the user.

Table 4 - Request Forms

Request Form	Test Requests
GP Healthlink Requests- A4 page	Tests available for order in Healthlink Menu
Pathology General Request Form LF-GEN-0019	Haematology, Coagulation, Biochemistry & Referral Tests
Blood Bank Request Form LF-GEN-0011	ABO & Rh D Grouping, Antibody Screens, Crossmatching, Direct Coombs Test, Blood Product Requests
Troponin-I Request Form LF-BIO-0024	Troponin-I Levels
Gentamicin/Vancomycin Request Form LF-GEN-0031	Gentamicin and/or Vancomycin Levels
Microbiology Request Form LF-GEN-0023	Microbiology Tests (Tests other than SARS-CoV-2, Flu A/ B/RSV)
SARS-CoV-2 / Flu A/ B/RSV Request Form LF-GEN-0118	SARS-CoV-2, Flu A/ B/RSV
NT pro BNP request form (**All**) LF-BIO-0110	NT pro BNP levels **NTproBNP Request form**
Request for Thyroid Function Outside Routine Hours LF-BIO-0026	Thyroid function requests outside routine hours
LF-GEN-0133 Procalcitonin Request Form	Procalcitonin (PCT)

- Pathology General Request forms are designed so that completing the top copy of the request form produces multiple carbon copies underneath. Please ensure that the information

provided is legible on all copies of this form. Use of addressograph labels on Laboratory request forms is encouraged. If using an addressograph label please place a label on each copy of the request form.

- If labels are not used, the handwriting must be clearly legible (block capitals preferred) and in ball point pen to ensure the information is copied through to each part of the request form.

5.2.2 Specimen

In-house Specimens:

- The **electronic blood track system** (EBTS) Personal Digital Assistants (PDAs) are used for Our Lady's Hospital in-house sampling. PDA is a piece of equipment used to take a sample by scanning the patient's wristband which generates 2 patient labels containing all the above information that can be affixed to: (1) patient sample and (2) Sample taken by section on request form. These are the only labels that are permitted on the specimens
- **All details on the Blood Transfusion Specimens must be hand written if they have not been labelled as part of the Electronic Blood Track System. For instruction on positive patient identification and specimen labelling with Blood Track PDAs refer to HP-GEN-0001 'Requesting Blood Products' available in Blood Bank folder on the hospital shared drive.**
- If PDAs are not available, such as in Phlebotomy and Outpatients, the manual system can be used, where specimens can be handwritten with all details completed**.**

5.2 Sample Rejection

Sample requests will be rejected under the following circumstances:

- Samples do not meet the acceptance criteria for the department
- Leaking or spilled specimens
- Illegible samples
- Incorrect/insufficient/overfilled specimens
- The specimen container is out of date
- Specimens that compromise the validity of results (See Validity of Test Results)

This information will be available on the patient report, so that the reason for rejection is clear. Confirmation of rejection of samples will be made by phone if it is an urgent request.

5.3 Exceptions to Sample Rejection

Where there are problems with patient or sample identification, sample instability due to delay in transport or inappropriate containers, insufficient sample volume or when the sample is clinically critical or irreplaceable and the laboratory chooses to process the sample, the final report shall indicate the nature of the problem, and where applicable, the risk associated with sample acceptance and that caution is required when interpreting the result.

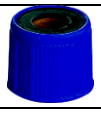
Exclusions exist for irretrievable primary specimens. These include Histology Specimens, CSF, Blood Cultures, Aspirates, Tissue Samples, Line Tips, Bronchoalveolar Lavages and Intrauterine Contraceptives. In these cases, a *QF-GEN-0047 Specimen Rejection/Amendment Form* must be completed by the sample taker to allow the specimen to be processed.

In cases where sample acceptance criteria are not fully met such as the receipt of a requests form with no test recorded, and where necessary for patient care, the laboratory will communicate with users or their representatives, to clarify the user's request.

5.4 Order of Draw of Blood Tests

Blood Tubes are available with different anticoagulants and the cap colour indicates the anticoagulant present. It is important to use the correct specimen container and to take the sample at the appropriate time. If more than one blood specimen is taken, specimens must be taken in the order below.

Table 5: Order of Draw of Blood Tests

Order	Specimen Volume	Colour	Tube Type	Assays	Special Instructions
If Blood Cultures are required, they must be taken first- see Blood Cultures for collection details					
1	3ml		Sodium Citrate Solution	PT, INR, APTT, D-Dimer, Fibrinogen Referrals: Lupus screen, Factor Assays, Thrombophilia	Fill tube to arrow line. Inadequately filled tubes cannot be used **Mix 4 times**
2	5ml		Plain Gel Sep Clot Activator	All Biochemistry and Endocrinology (except HbA1c & Glucose) e.g. TFT, Fertility, PSA, Drug Levels e.g. Digoxin, Gentamicin, NT pro BNP and PCT A separate tube required for Referral Tests for Biochemistry, Immunology, Virology, etc. See LI-GEN-0002	Tubes must be labelled with the Full Name, DOB, MRN, Date & Time of collection and The Drawers Signature. *Addressograph labels are acceptable.* **Mix 5-10 times**
3	2ml		Lithium Heparin	Contact Lab for tubes Selected referral tests e.g. Amino Acids, Carboxyhaemoglobin & Methanephrines.See LI-GEN-0002	**Mix 8-10 times**
4	3ml		EDTA	FBC including platelets*, Blood Film, Infectious Mononucleosis Screen, HbA1C, Malaria, ESR, Troponin, Hb electrophoresis Selected referral tests See LI-GEN-002	Troponin-I must be taken in EDTA unless otherwise specified **Mix 8-10 times**
5	6ml		EDTA	Group and Screen, Crossmatch, DAT, Transfusion Reaction Investigation	Tubes must be labelled with Full name, DOB, MRN, Collection Date & Time and Drawer Signature **Mix 8-10 times**
6	4ml		Fluoride Oxalate	Glucose	State Collection Time, Specify if Sample is Random or Fasting **Mix 5-10 times**
7	6ml		Na Heparin	Trace Elements only e.g. Zn, Lead etc.	Contact the Laboratory for Tubes **Mix 5-10 times**

*When platelet clumping persists **for inpatients only**, Sodium Fluoride specimen should be taken. If clumping persists, ThromboExact tube for Pseudothrombocytopenia can be used for these patients.

When using winged blood collection set (butterfly devices) the order of draw stays the same, however a discard tube must be used to prime the tubing, when the first tube to be drawn according to the order of draw is affected by the fill volume, such as Sodium citrate tubes.

5.5 Patient information on 24-hour urine collection

Important points

- Certain tests require the addition of strong acid as a preservative.
- The preservative is corrosive and can cause personal injury [burns] or damage to property. If the acid should come in contact with skin or eyes, rinse immediately with plenty of cold running water and medical advice should be sought. Keep out of reach of children. Not to be taken internally – would cause severe irritation and damage.
- Do **not** void urine directly into the 24-hour container but into a suitable clean detergent-free jug and then slowly and carefully poured into the 24-hour container.
- Ensure that the container is labelled with patient's full name, date of birth and address, date and time collection of specimen started and finished.
- A member of the Specimen reception Staff will explain the procedure and give you an information leaflet. Please read the information sheet carefully.

Procedure for 24 hour urine collection:

1. In the morning, empty your bladder into the toilet. Note the time. Only **after** this sample has been passed is the collection started. Note this time as 'Start Time' on the urine container label
2. Collect all urine on **every** occasion it is passed for the next 24 hours into a clean jug and carefully pour the urine in to the 24 hour container.
3. Between each addition, cap and mix the container. Keep the container cool at all times, refrigerate if possible.
4. The next day at the time already recorded on the container, (24 hours after the start time) empty your bladder and add this urine to the container. [If you need more time to produce this urine, then wait until you can and note this time on the container].
5. Write the finish time on the container label.
6. Ensure the container is correctly labelled with your Name and Date of Birth.
7. Please ensure that the label on the container and the request form are fully completed and that the cap is closed securely.
8. Bring the container to the laboratory as soon as possible. Keep the container cool until such a time as you can transport it to the laboratory.

Incomplete Collections:

It is very important that you collect **all** the urine that you pass during an **exact** 24-hour period. Loss of any urine, or a collection made for either more or less than 24 hours, will invalidate the test and might lead to an incorrect diagnosis.

If you forget and lose a sample down the toilet, then please throw away all the urine collected up to that time and start again the following morning. *(Tel 046 9078701)*

If you are making an acid collection, return the container with the acid to the laboratory and request a new container from the laboratory. *(Tel 046 9078701)*

5.6 Patient instructions on collection of specimens for Microbiology

Instructions for collection of Microbiology specimens are detailed in the following links:

Urines for Culture and Sensitivity
Faeces
Sputum
Genital Tract
MRSA Screening Swabs
VRE/CPE screening swabs
Upper Respiratory Swabs and Aspirates
Peri-nasal Swabs
Nasopharyngeal/Oropharyngeal swabs/Aspirates
Eye Swabs
Superficial Wound Swabs and Intravascular Cannulae Tips
Swabs and Pus from Abscesses, Post-operative Wounds and Deep-seated Wound Infections
Fluids from Sites Normally Sterile sites
Blood Cultures
CSF and Meningitis Specimens
ZN Stains/TB Culture

5.7 Laboratory Test Menu Guide

See following individual laboratory section for details of full test menu available.

For referral Test menu refer to LI-GEN-0002: List of referred tests available on Laboratory website

5.8 Validity of Test Results

It is important that specimens are received in optimum condition and with relevant clinical information in order to ensure accurate results and interpretation of same. Factors, which should be taken into account when ordering tests, include, but are not limited to the following:

- Age of sample
- Haemolysis
- Lipaemia
- Presence of clots in specimens for FBC and coagulation tests
- Icteric Samples
- Sample volume
- Container type
- Transport/Storage of sample
- Relevant clinical information
- Correct labelling of samples e.g. timed samples

5.9 Specimen Retention & Additional Testing

All specimens tested in the laboratory are retained for a minimum of 72 hours. If a specimen has been received in the department and testing for an additional parameter is required, the department should be contacted to assess the feasibility of using the initial specimen for analysis as age of specimen may affect the validity of the test results.

A request form must accompany such a request but the lack of the request form will not impede the processing of an urgent request.

Ref: *LF-HAEM-0017 Turn Around and Validity times for Haematology Specimens*
Ref: *LI-BIO-0001 Sample Stability in Biochemistry*
Ref: *LP-BT-0001 Specimen Handling in Blood Transfusion*
Ref: *LP-MIC-0063 Specimen Reception in the Microbiology Laboratory*

5.10 Reference Ranges (Biological Reference Intervals)

Reference ranges for test attributes are documented on all reports for quantitation results. Reference ranges can be age and gender specific and are supplied with each test report and are detailed in the departmental sections of this document.

6 PHLEBOTOMY GUIDELINES

The importance of collecting an appropriate sample from the correct patient cannot be over emphasised. Patient diagnosis and treatment may be based on the results of specimen analysis and the implications of error are self-evident. Analysis of blood specimens is pointless and dangerous if the original specimen has been taken from the wrong patient, has been incorrectly labelled or has been compromised by poor collection technique.

The work of the phlebotomist involves the collection of blood using aseptic techniques and strictly adhering to standard precautions as history of infectivity of the patient may be unknown. The Vacutainer System is used for drawing blood from patients.

At all times during the phlebotomy process consideration is taken for patient privacy, comfort and needs.

6.1 General Precautions

- Standard precautions must be observed when taking blood
- Disposable non-sterile gloves must be worn when taking blood and changed between patients
- Perform hand hygiene before and after the phlebotomy procedure
- When sampling blood from any patient, extreme care must be taken and every patient considered as potentially high risk
- Where a patient is in isolation, appropriate PPE must be worn. Dispose of PPE according to the correct procedure.
- All cuts and abrasions are covered with a waterproof dressing. Protective eye-ware (goggles) should be worn if deemed necessary
- Safe needle devices should be used - they should be disposed of in a sharps container. Each user of sharps is responsible for their safe and appropriate use and disposal.
- It is the policy of the Department of Pathology to treat all specimens and samples as potentially infectious or high risk. Blood stained or leaking samples will not be accepted by the department.
- Avoid spillage of blood. Should spillage occur, it should be dealt with immediately and according to *MP-GEN-0007 Staff Health and Safety Manual*
- Care must be taken to prevent needle stick injuries when using and disposing of needles

6.2 In-house Management of Materials for Blood Collection

It is the responsibility of the doctor, nurse or phlebotomist taking the sample to ensure that all appropriate equipment, including blood tubes are within date and all packaging is intact. The Blood Collection System should be stored at room temperature.

6.3 Identifying the Patient

Accurate identification of the patient is essential. The mechanism by which the specimen is associated with the patient and the request form is of utmost importance. The phlebotomist, nursing staff or clinician must ask the patient to state their name and date of birth, check the patient's wrist band/identity and the request form information are correct before collecting the specimen as per hospital policy OLN-GEN-0013: Processes and Procedures for Patient Identification at Our Lady's Hospital Navan (ED-GEN-250) and HP-GEN-0001: Requesting Blood and Blood Products.

A properly completed request form is essential. The clinical staff who request the laboratory examination of the specimen are responsible for the correct completion of the request form. The person collecting the specimen is responsible for ensuring that the container is properly labelled.

6.4 The Conscious Patient

For patients wearing ID-bands (in-house patients):

1. Ask the patient to state full name, address and date of birth.
2. Check the details given by the patient against the I.D. band and the patient's Request Form.
3. Resolve any discrepancy, no matter how trivial, before proceeding. If necessary seek assistance from nursing staff.
4. If unable to resolve discrepancies successfully, take a note and return the Request Form to the Clinical Nurse Manager or deputy for resolution.

Note: The above procedure is not applicable for patients within the Out Patients Department as they are not required to wear I.D. band. However, for day ward transfusion patients they are in possessions of an armband at the time of sampling.

For patients not wearing ID-bands (e.g. General Practitioner, OPD patients):

1. At the time of sample taking the conscious patient must be asked to identify themselves by stating first name, surname and date of birth.
2. Check the details given by the patient against the patient's Request Form.

3. Resolve any discrepancy, no matter how trivial, before proceeding

6.5 The Unconscious patient / confused patient or a patient who does not have English as their first language

1. If a patient is unconscious or confused, check the details on their ID-band against their medical notes and the Request Form and verify their identity with another trained staff member (never rely on the I.D. band or chart attached to the bed).
2. Compare the data with details in the patients chart and on the patients I.D. band
3. Resolve any discrepancies before proceeding.
4. If patient is genuinely unidentifiable, minimum identifiers acceptable are unique number and gender. An ID-band should be applied once an MRN has been allocated and patient ID status follows Surname: Unknown Navan, First Name: Male/Female, DOB: todays date.

6.6 Preparation of the Patient for Primary Sample Collection

The appropriate preparation of the patient for the requested test and that the specimen is collected correctly is the responsibility of the individual collecting the specimen.

6.7 Patient Consent

All procedures carried out on a patient need the informed consent of the patient. For most routine laboratory procedures, consent can be inferred when the patient presents himself or herself at a phlebotomy clinic with a request form and willingly submits to the usual collecting procedure, for example, venepuncture. Special procedures, including more invasive procedures, or those with an increased risk of complications to the procedure, may need a more detailed explanation and, in some cases, recorded consent.

Procedure is as follows: Introduce oneself to the patient, explain the procedure and rationale to patient answering any questions, seek consent for procedure and reassure the patient. The Laboratory assumes that specimens submitted for testing were obtained with the consent of the patient.

In emergency situations, consent might not be possible; under these circumstances it is acceptable to carry out necessary procedures, provided they are in the patient's best interest. Refer to *ED-GEN-0039 HSE National Consent Policy.*

6.8 Procedure for Taking Samples

- Perform Patient identification as per Identifying the Patient
- Ensure the Request Form is completed correctly
- Confirm if the patient is fasting, if required.
- Prepare all necessary equipment for venepuncture.
  (*See LP-PHL/GEN-0001: Blood Sampling in the Phlebotomy Department)*
- Ensure sample tubes are in date.
- Ask the patient for any relevant clinical details, such as previous pregnancies, transfusions, fasting status, medication status, time of last dose, cessation of dose.
- Sample collection at pre-determined time or time intervals must be taken into consideration.
- Perform procedure and label the sample. For Further detail see *LP-PHL/GEN-0001: Blood Sampling in the Phlebotomy Department*
- There are no special requirements with regard to timing of collection of blood transfusion samples. Samples for Blood Transfusion are valid for 72 hours from the time of collection.

CRITICAL: All details recorded on sample container must be done at the patient's bedside, immediately post sampling by the sample taker. The collection of blood, labelling of tubes and placing of tubes into request bags must be performed at the patient's bedside in one continuous, uninterrupted event. Only one patient should be bled at a time to minimise the risk of error. Do not allow yourself to be distracted during this process. Samples not conforming to form and sample labelling criteria will be discarded and a new sample will be required.

6.9 Phlebotomy Timing Requirements for certain samples

- Fasting lipids, fasting glucose; patients should be fasting for 12 hours prior to blood sample being taken. Water may be drunk as desired, but no other fluids.
- Gentamycin; Trough level should be checked 16-24 hours after the first dose.
  Ref.: OLH Policies and Procedures *OLHN Adult Gentamicin Once Daily Dosing Guideline V.3, Jul 2018* on Hospital Shared drive.
- Vancomycin: Check first trough level on Day 3 (within 1 hour before dose given)
  Ref.: OLH Policies and Procedures, *OLHN Adult Vancomycin Dosing Guideline V.4, Jul 2021* on Hospital Shared drive.

6.10 Special Precautions for In-Patients

- Do not draw from in-dwelling lines or cannula unless one is trained and authorised to do so
- Do not draw blood from an arm with an infusion in progress.
- When infusions are in place on both arms ask staff if one can be switched off to allow venepuncture to take place. Advise staff when the procedure has been completed.
- Do not perform venepuncture on a limb, which is paralysed, or on a limb with evidence of oedema, or where surgery on auxiliary lymph nodes has taken place.

6.11 Haemolysed Samples

Factors in performing venepuncture, which may account for haemolysis includes:

- Using an improperly attached needle and blood tube so that frothing occurs
- Vigorous shaking or mixing of the specimen post phlebotomy.
- Failure to allow alcohol to dry
- Very slow flow into the collection tube
- Drawing blood from in-dwelling line
- Failure to release the tourniquet
- Drawing blood from a bruised area

6.12 Actions if Patient Problems are encountered

- If an artery is entered accidentally, remove the needle and apply pressure to the site. Seek nursing/medical assistance
- If the venepuncture site continues to bleed after three minutes, apply pressure to the site. Seek nursing/medical assistance
- If patient feels weak and is sitting, loosen clothing and provide reassurance
- If patient does not respond, seek nursing/medical assistance
- Never draw blood from a patient who is standing. A standing patient is more likely to faint than a patient who is sitting or lying down
- If a patient becomes nauseous, provide reassurance, make the patient comfortable and instruct the patient to breathe deeply and slowly

- If a patient develops convulsions, prevent the patient from injuring himself/herself
- If the patient objects to tests do not argue with the patient but emphasise the tests were requested by the doctor. Do not proceed without the consent of the patient
- All complications must be reported using the appropriate National Incident Management Form. See *ED-GEN-0210 HSE Incident Management Framework*

6.13 Action to be taken after Exposure Incident/Needle Stick Injury

- Encourage the puncture site to bleed and wash area/site thoroughly with water
- Identify patient source if possible
- When a splash of blood occurs to the eyes, nose, mouth or broken skin, wash immediately with water or a normal saline solution
- Seek any treatment required
- Report the incident as soon as possible to a senior member of staff and seek medical attention in the Emergency Department.
- All incidents must be reported using the appropriate National Incident Management Form. See *ED-GEN-0210: HSE Incident Management Framework*
- Follow procedure outlined in *ED-GEN-0088: Guidelines for the Emergency Management of Injuries and Post-Exposure Prophylaxis (PEP)*

6.14 Safe Disposal of Waste Material Used in Specimen Collection

Dispose of all needles into sharps bins when finished sampling. Specimens must not be sent to the laboratory with needles attached. Materials used in specimen collection should be treated as potentially hazardous and disposed of as per current hospital guidelines for Waste Management, *ED-GEN-0035 HSE Healthcare Risk Waste Management.*

It is the responsibility of the doctor, nurse or phlebotomist taking the sample to:

- Take samples into the appropriate containers for the tests required. Blood Tubes are available with different anticoagulants and the cap colour indicates the anticoagulant present. It is important to use the correct specimen container and to take the sample at the appropriate time. If more than one blood specimen is taken, specimens must be taken in a particular order. Fill the containers in the correct order as outlined in **Table 5: Order of Draw of Blood Tests.** Never pour blood from one tube into another. The preservative in

the first tube could contaminate the second tube; this can greatly affect results and potentially compromise patient care.

- Label the specimen container and ensure that the form is completed properly

7 DELIVERY, PACKING & TRANSPORT REQUIREMENTS FOR SAMPLES

7.1 General Information

Patient privacy and confidentiality must be protected during delivery, packing and transport of samples. Specimen containers are purchased according to the guidelines issued by the Dangerous Goods Safety Advisor and comply with the U.N. Class 3373 standard. The integrity of specimen containers is considered when these are purchased, so as to minimise the risk of breakages, leakages etc.

It is the policy of the laboratory to treat all specimens as potentially infectious. Therefore, it is advisable to take universal precautions in the collection, packaging and the delivery of specimens being sent to the department for analysis.

Samples should be sent to the department as soon as possible to avoid specimen deterioration with subsequent inaccurate and possibly misleading analysis. If there is likely to be a delay between collection of samples and transport to the Laboratory seek advice from the relevant laboratory regarding sample stability.

During the out-of-hours period urgent referral of specimens can be arranged by the Medical Scientist on-call.

If the integrity of a sample has been compromised and there is a health risk, the organization responsible for the transport of the sample will be notified immediately and action taken to reduce the risk and to prevent recurrence.

Ref: *ED-GEN-0249: HSE Guidelines for the Preparation for Transport of Patient Specimens and Biological Materials*

https://healthservice.hse.ie/filelibrary/staff/preparation-for-transport-of-specimens-and-other-biological-materials.pdf

7.2 Special Handling Needs

Refer to General Precautions for PPE guidelines and best practice. Adopt scrupulous personal hygiene practices. Avoid all actions that promote contact between the hands and the eyes, nose or mouth before the hands have been thoroughly washed. Eating, drinking, chewing, smoking, the application of cosmetics or grooming in the specimen collection and processing area is forbidden. Cover any cuts, abrasions or other skin lesions to protect them against contamination before handling specimens.
Treat any puncture wounds or cuts sustained during work as per hospital sharps policy.
In the event that a glove becomes punctured, irrespective of whether a wound is sustained, remove the glove, dispose of it safely and wash hands before replacing the glove.

Gloves must be worn when there is a risk of skin contamination from the specimen. In the event that airborne droplet dispersion may occur, an appropriate containment microbiological safety cabinet should be used for specimen processing.

For transport outside the Department of Pathology, specimens are packaged in secondary packaging with a biohazard symbol and sufficient paper towels to absorb any spill and then placed in the approved container. Appropriate labelling is attached to the container box which conforms to DGP requirements U.N. 3373. The person who sends the specimen ensures that the container is appropriate, properly closed and is not externally contaminated by the contents.

The transport bag prevents the contamination of other containers, the hands of the specimen receptionist and the immediate environment. All unnecessary hand contact with the specimen containers is limited.
Specimen handling considerations are detailed in individual Laboratory sections. Refer to Patient information on 24-hour urine collection for special handling precautions on 24 Hour urine containers with added acid.

Some samples also require special handling i.e. protection from light, immediate freezing, transport within a temperature interval, within a time frame appropriate to the nature of the examination etc. If in doubt regarding the specimen container required or the special requirements when taking please refer to this document, LI-GEN-0002: List of referred tests or contact the laboratory for advice.

7.3 Sample Delivery from within the Hospital

Specimens should be placed in the sealable transport bag attached to the relevant request form as soon as the specimen has been taken. Specimens and request forms are transported as soon as possible to the Department of Pathology by doctors, nurses, phlebotomists, porters, medical scientists and laboratory attendants.

8 REPORTING OF RESULTS

8.1 Access to Results within Our Lady's Hospital

Results are available in electronic and/or hard copy format (blood transfusion only). All results are available on Ward Enquiry on APEX once authorised. Staff who require access to results will be given individual log-on and password only after the application for access has been completed and signed off by their line manager. *MF-GEN-0068 LIS (APEX) Access Request Form* is used for this purpose and available on request from the Laboratory IT Co-ordinator.

7.1.1 Patient Search Details

Using individual login, select Ward enquiry option.

Enter one of the following

For patients registered on the system with **Known MRN**

- At Patient Number: Enter the patients **MRN** prefixed with **NV,** Enter two letters of the surname.
- If the patient is registered on the system with these details the patient details will be called up.

For patients registered on the system with **Unknown MRN**

- At patient number, Enter "**U**",
- Enter two letters of the surname, Enter two letters of the forename Enter the date of birth in the format ddmmyyyy

NOTE: DO NOT enter entire forename, sex, ethnic group, location or consultant.

NOTE: DO NOT use hyphens, commas or slashes between prefix and name

8.1.2 Patient Search Results

If a patient matching the inputted criteria is found choose Option '1' Accept.

If none are found the prompt ***no matches found is displayed***.

Choose Option 2 to clear the screen and restart or option 3 to change a specific field. Choosing Swap enables the swapping of surname and forename.

- If the < **unknown>** search criteria is used and the system matches "more than one patient" a list of possible patients is displayed. Use the cursor down 🡻 / cursor up 🡹 arrow keys to locate the required patient. Full demographic details will be displayed in the patient window.

Choose the following options:

a) Select Return on the correct patient entry
b) ''1 or 'A' to Accept and confirms the correct patient. Confirm acceptance < Y> or cancels acceptance with <N.>
c) '2' or 'D' Displays display the full patient details, confirm details with <Y> or cancels details with <N>
d) '3' or 'Q' Quits or rejects the search. Confirm quit with < Y> or <N>

Results will be displayed for the discipline indicated in the discipline box. If results are required for more than one discipline, cursor to the box, press space bar to de select.

8.1.3 Result Enquiry Screen

Having selected the correct patient type 'A' at the bottom of the screen to display the most recent specimen.

The results will be displayed on the screen and use the cursor down 🡻 / cursor up 🡹 to view the bottom of a report if there are large number test results on a single report.

To move from discipline to discipline (eg from Biochemistry reports to Haematology reports) use the '**Page up'** / '**Page down'** buttons

8.1.4 Cumulative Results

To view cumulative results for a specific discipline enter "**U**" or select "**5"** from the results screen
The results are displayed in date order with the most recent result to the left. Only tests which were present in the selected specimen are displayed in the cumulative enquiry. 'X' Return brings you back to the single result screen.

Use the 'page up' and 'page down' keys to scroll previous and further reports.

8.2 Access to Results via Healthlink

Reports are available via Healthlink to participating locations. Healthlink is the electronic link system provided by a Department of Health funded project which allows electronic links to be established between General Practitioners and Hospitals to allow for the timely, secure transfer of patient related administrative and clinical data. Results are available through Healthlink as soon as they are authorised in the laboratory.

8.3 Release of Hospital Results other than APEX and Healthlink

The Laboratory does not communicate results directly to patients, results are released to confirmed clinical staff. Patient's records may be released to the patient's clinician in cases where that clinician has not been the test requestor provided the clinician has been given consent by the patient to obtain a copy.

Results may be transmitted to @hse.ie and @healthlink.ie secure email addresses. (@beaumont.ie, @mater.ie etc. for voluntary hospitals is also acceptable) via requests received to navan.lab@hse.ie
Note: @gmail @hotmail @yahoo and other personal accounts are not acceptable.

Paper reports destined for locations outside the hospital are delivered by a Primary Care Delivery Driver or sent via An Post

8.4 Reports by Telephone

It is the policy of the Department of Pathology not to give results over the telephone unless results are at a critical level or a delay in receiving the results would cause a delay in treatment. A record of all telephoned results is held by the Department of Pathology.

9 QUALITY ASSURANCE

All examination procedures carried out in the Department of Pathology are subject to strict Internal Quality Control Testing and External Quality Assurance Assessment, which verify the attainment of the intended quality of results. Where results deviate from expected results, patient results are not issued until the underlying issue is resolved and all necessary re-testing undertaken.

The Department of Pathology participates in relevant available external third party assessment schemes. This includes schemes operated by:-NEQAS (UK, National External Quality Assurance Scheme), WEQAS, RIQAS, IEQAS, QCMD and Lab Quality, Finland. The Pathology Department is committed to participating in other schemes as they become available.

10 ADVISORY SERVICES

Scientific and medical advice on issues within the Laboratory's range of interest and competence is available. Clinical advice on ordering examinations and on interpretation of examination results is available through the Consultants. Advisory services are provided to individual cases in all disciplines. Advisory services help to enhance and promote the effective utilization of the Laboratory Service within OLH Navan.

Table 6 Advisory Services

Position	Name	Ext.	Direct Line
Consultant Haematologist	Dr Su Maung		MMUH Switchboard
Consultant Microbiologist	Dr Emilia Mamwa		OLH Switchboard
Consultant Biochemist	Dr Paula O'Shea		OLH Switchboard
Laboratory Manager	Mr Ray O'Hare	2571	046-9078571

The Consultants and or Medical Scientists can provide advice on the following:

- Choice of Examination
- Use of the Service
- Required Sample Type
- Clinical Indication
- Limitations of Procedure
- Required Frequency of Testing
- Interpretation of Results
- Informed Technical Advice

11 COMPLAINTS/FEEDBACK

The goal of the Pathology Department is to ensure that our users receive accurate, reliable, meaningful and timely laboratory results. The Department of Pathology welcomes patients and laboratory users to provide helpful information to aid the laboratory in the selection of the examination methods, and the interpretation of the examination result.

If users encounter any problems with the services or have suggestions for service improvement, you can contact the appropriate laboratory section via phone or email via navan.lab@hse.ie . Alternatively, *QF-GEN-0003 User Feedback Form* - is available from the Laboratory to record complaints/comments. Submissions can also be made online through the HSE "Your service your say" feedback form (https://www2.hse.ie/services/forms/your-service-your-say/). All submissions are welcome.

Complaints are logged and handled within the Pathology Quality Management System. The laboratory will confirm whether the complaint relates to laboratory activities that the laboratory is responsible for and, if so, will endeavour resolve the complaint and provide the complainant with the outcome of the complaint.

Ref: QP-GEN-0008: Complaints Procedure

12 LABORATORY POLICY ON PROTECTION OF PERSONAL INFORMATION

The laboratory is fully compliant with the national standards on protection of personal information. It is the policy of the HSE that all data is processed and controlled in line with the principles of the GDPR and relevant Irish legislation to ensure the security and confidentiality of all personal data they collect and process on behalf of service users and employees. Data Protection rights apply whether the personal data is held in electronic format or in a manual or paper based form. Procedures are in place to detail the requirements for security, access, confidentiality and data protection, backup systems, storage, archive and retrieval and safe disposal of laboratory equipment and the pathology computerised systems. This procedure applies to any system that captures, stores, controls, manages or reports data subject to review.

Ref: *MP-GEN-0011 Management of Data and Information*

13 REPEAT EXAMINATION DUE TO ANALYTICAL FAILURE

It is the policy of the Department of Pathology in the event of an analytical failure to repeat the test using a back-up system or store the specimens in appropriate conditions until the cause of the analytical failure is identified, corrected and the test repeated. The urgency of the outstanding request/s is reviewed by the relevant Consultant / Chief Medical Scientist.

14 MEASUREMENT UNCERTAINTY

Estimates of measurement uncertainty for measurement procedures are available to service users from the department which performs the measurement upon request. See Contact Details .

BLOOD BANK

15 BLOOD BANK INTRODUCTION

The Blood Bank Department comprises of the Blood Transfusion Laboratory and the Haemovigilance and Traceability activities. Samples are subjected to stringent compatibility testing and procedures to ensure full traceability. The Blood Bank is accredited to ISO 15189 and AML-BB.

16 GENERAL INFORMATION

16.1 Services Associated with the Blood Bank

Table 7: Services Associated with the Blood Bank

SERVICE	DESCRIPTION
Blood Transfusion Laboratory	The Blood Transfusion Laboratory offers a comprehensive laboratory service for service users within Our Lady's Hospital, Navan including: • ABO & Rh D Grouping and Antibody Screening • Antibody Identification • Compatibility testing • Electronic issue • Direct Antiglobulin Test • Phenotyping (if appropriate) • Suspected Transfusion Reaction Investigation (if indicated) • Provision of Blood Components (Plasma & Platelets) • Provision of Coagulation Factors
Haemovigilance Service	The Haemovigilance Service monitors practice to ensure that "the right patient gets the right blood at the right time" and associated Haemovigilance related issues. The Haemovigilance Officer may be contacted via Ext 2578 or 0874101084. All Haemovigilance procedures and guidelines for blood and blood product requesting, prescription and administration are available for users in the hospital shared drive in Blood Bank folder
Consultant Service	Dr Su Maung may be contacted via MMUH switchboard.

16.2Blood Bank Contact Details

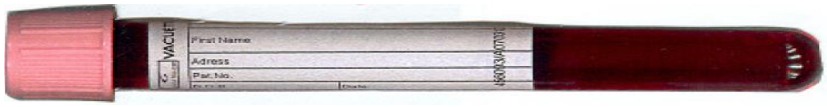
Table 8: Blood Bank Contact Details

Section	Phone Extension Inside the Hospital	Phoning from outside the Hospital
Blood Bank	2573 – Routine Hours OLH Switchboard- Out of Hours	046 9078573

17 BLOOD BANK REQUESTS AND REQUIREMENTS

17.1 Blood Bank Tests

All blood for Group & Screen, Crossmatch, Direct Antiglobulin Test, Antibody Investigation, *must be taken into a 6 ml pink top tube as shown below.*



Blood Track Labels only. Do not attach an Addressograph label to this tube.

Notes

- If blood track cannot be used to label a pre transfusion sample then the sample must be handwritten at the patient's bedside.
- For the unconscious /unidentified patient, the minimum information on the *LF-GEN-0011 Blood Transfusion Request Form* is a unique identification number (MRN assigned by IPMS) and the gender of the patient. *Request forms and samples are labelled 'Surname: Unknown Navan, First Name: male/female, DOB: todays date'.*
- IPMS downtime: The 'TYPENEX' armbands are available to identify patients who have no medical record number. (Place the band on the patients' wrist, cut off excess labels and send them to the Laboratory with the specimens). The Typenex armbands are stored in the Emergency Department, ICU.

18 SPECIMEN PROCEDURE

18.1 Specimen Requirements

- One 6ml EDTA blood specimen is required for ABO Grouping and Rh (D) Typing and Antibody Screening.
- A second sample should be requested for confirmation of the ABO group of a first time patient prior to transfusion.
- The two samples must be taken independently of each other, by different sample takers or on the next phlebotomy round.
- If red cells are required urgently, blood may be issued on the first group and a second sample sent to the laboratory as soon as it is practical.

Table 9 Requirements for Blood Bank Testing

REQUEST	SAMPLE/TEST REQUIREMENTS
Blood Group & Antibody Screen	Request Form for Blood Group and Antibody Screen (signed) and **6ml EDTA** Sample. A second *separate* sample is required to confirm blood group of a first time patient prior to transfusion.
Crossmatch of Red Cell Concentrate	Request Form for Blood Group, Antibody Screen and Crossmatch with required units of RCC and **6ml EDTA** sample. A second ***separate*** sample **IS** required to confirm blood group of a first time patient prior to transfusion. If a previous sample is within the validity period, a ***new*** Request Form stating required units of RCC and reason for transfusion is required. **Note: The Maximum Surgical Blood Ordering Schedule must be used.** For specific guidance on indications and dosage refer to *HP-GEN-0012 Blood and Blood Product Transfusion Information for Clinical Staff* available on the hospital shared drive
Emergency Issue of Red Cells	Request Form for Blood Group and Antibody Screen and **6ml EDTA** Sample. A second separate sample IS required as soon as possible to confirm blood group of a first time patient prior to transfusion.
Antibody Investigation	Request Form for Blood Group and Antibody Investigation and **6ml EDTA** Sample. (2 samples if referral to IBTS)

REQUEST	SAMPLE/TEST REQUIREMENTS
Direct Antiglobulin Test (DAT)	Request Form for Direct Antiglobulin Test (DAT)and **6ml EDTA** Sample ***or*** Sample for Blood Group and Antibody Screen from within the past 48 hours ***and*** a new Request Form for Direct Antiglobulin Test.
Investigation of Suspected Transfusion Reaction	Request Form for Investigation of Suspected Transfusion Reaction and **2 x 6ml SERUM** Sample, 3ml EDTA and 1st Urine specimen post transfusion. Contact the Clinical Haematology Team for advice as required. **Note: All suspected transfusion reactions must be reported to the Haemovigilance Officer.**
Plasma	Request Form for Blood Group and Antibody Screen (signed) and **6ml EDTA** Sample ***or*** Historic Blood Group and Antibody Screen and new Request Form with required volume/units of Plasma. For specific guidance on indications and dosage refer to *HP-GEN-0012 Blood and Blood Product Transfusion Information for Clinical Staff* available on the hospital shared drive **Contact the Haematology Team to ensure clinical validity of request for Plasma, if required.**
Issue of Platelets	Request Form for Blood Group and Antibody Screen (signed) and **6ml EDTA** Sample ***or*** Historic Blood Group and Antibody Screen and new Request Form with required volume/units of Platelets. For specific guidance on indications and dosage refer to *HP-GEN-0012 Blood and Blood Product Transfusion Information for Clinical Staff* available on the hospital shared drive **Contact the Haematology Team to ensure clinical validity of request for Platelets, if required.**
Issue of Factor Concentrates	Request Form for the required volume/units of Factor Concentrate • Prothrombin Complex (PCC) • Fibrinogen Concentrate • Factor VIII + VWF • Factor IX

REQUEST	SAMPLE/TEST REQUIREMENTS
	• Activated factor VIIa For specific guidance on indications and dosage refer to *HP-GEN-0012 Blood and Blood Product Transfusion Information for Clinical Staff* available on the hospital shared drive If patients with an inherited bleeding disorder present to the hospital the National Centre for Coagulation Disorders in St James must be contacted for clinical advice. The Consultant Haematologist in the hospital must also be informed if a patient with an inherited bleeding disorder is admitted to the hospital. **Contact the Haematology Team to ensure clinical validity of request for Factor Concentrates, if required.**
NB: SPECIMENS AND REQUEST FORMS MUST BE COMPLETED AS OUTLINED IN THIS TABLE. WHERE THESE REQUIREMENTS ARE NOT MET, THE REQUEST MUST BE DISCARDED IN LINE WITH BLOOD BANK REGULATORY REQUIREMENTS.	

18.2 Time limits for sample processing

Samples for patients for elective surgery should be received before 2p.m. on the last routine working day before surgery. Samples for same day orthopaedic surgery should be received by 8.30 a.m. Other routine samples should be received before 3.30 p.m. Otherwise the sample is centrifuged (to ensure it is not haemolysed) and refrigerated immediately at 4ºC and processed within 24 hours. All urgent samples are processed without delay.

18.3 Table 10: Working Limits for Use of Stored Whole Blood for Pre-Transfusion Testing

Patient Type	Sample Type
	Whole blood at 2-8ºC
All Patients	Up to 72 hours[1]
[1] This is the time between the sample being taken and the subsequent transfusion. 7 days may be acceptable for chronically transfused patients with no alloantibodies, following multiple repeated transfusion episodes. This should be assessed by a haematologist and recorded on the LIS and patient's record and reviewed on an annual basis or immediately in the event of a change in serological status.	

Note: If sample stored at room temperature, it is valid up to 48 hours

18.4 Maximum Surgical Blood Order Schedule

The Maximum Surgical Blood Order Schedule is a tool for maximum provision of red cell concentrate for **routine** elective surgical procedures requiring intra-operative transfusion. The Maximum Blood Order Schedule specifies the standard blood requirement for elective surgical procedures performed at Our Lady's Hospital, Navan. Deviations from this list are queried in an effort to minimize unnecessary holding of blood stock, but, will be met if clinical needs dictate, after authorization by the Clinical Haematology Team. Ref.: *HF-GEN-0003 Maximum Blood Ordering Schedule*. This document is available on the hospital shared drive.

All patients now require a second confirmatory sample for blood grouping.

19 ELECTIVE SURGERY

For patients attending the Pre-Assessment Clinic, a sample for group and antibody screen will be taken at the clinic and a second sample will be taken on admission.

Please note that elective requests cannot be processed on-call.

19.1 Reservation Period for Cross-matched Red Cell Concentrates

Cross-matched blood is reserved for a minimum of 24 hours from the required date as indicated on the request form. The Blood Transfusion Laboratory should be notified if reservation > 24hours is required. As per the BSH Guidelines, the sample is valid for 72 hours. As antibodies may develop in the patient's plasma post-transfusion, it is necessary to re-crossmatch units to be transfused beyond 72 hours after sample phlebotomy.

Table 11: Storage Conditions and Retention Times of Examined Specimens

Specimen Description	Storage Requirement	Storage Location	Minimum Retention Period
Red cells for group/antibody/crossmatch	2-8 ˚C	Blood Bank fridge	7days

20 FURTHER EXAMINATION OF THE PRIMARY SPECIMEN

Table 12: Rationale for additional Testing Initiated by the Blood Transfusion Laboratory

Test/Profile	Rationale for Additional Testing
Direct Antiglobulin Test	Investigation of Autoantibody; Investigation of Suspected Transfusion Reaction; Investigation of an incompatible crossmatch.
Antibody Investigation	Where a positive antibody screen is detected, an antibody investigation is carried out to identify the antibody or antibodies present in the patient's plasma.
Antigen Typing	Confirmation of identity of antibody detected

20.1 Additional Testing Initiated by the Blood Transfusion Laboratory

Where further testing is relevant to the investigation it is the policy of the Blood Transfusion Laboratory to perform additional tests using the primary specimen if possible. The ward or the requesting clinician will be contacted if an additional sample is required.

20.2 Additional Testing Initiated by the Requestor

Where a clinician requires further testing to be carried out on a primary sample, this will be carried out where a request form detailing the requirements is sent to the Blood Transfusion Laboratory and where the current sample is suitable for further testing as described in Table 13 *Requirements for Additional Blood Bank Testing Initiated by the Requestor*

Table 13: Requirements for Additional Blood Bank Testing Initiated by the Requestor

Test/Profile	Requirements for Further Testing
Crossmatch of Red Cell Concentrate	Most recent sample (<72 hours after collection time) for Blood Group and Antibody Screen and additional request form signed by the requesting doctor
Direct Antiglobulin Test	Most recent sample for ABO & Rh D Group must be <48 hours old.
Issue of Plasma	Any historic ABO & Rh D Group and Antibody Screen.
Issue of Platelets	Any historic ABO & Rh D Group and Antibody Screen.
Issue of Factor Concentrates	Blood Group not required.

21 EXTERNAL LABORATORY TESTING

Additional samples may be requested for referral to the Irish Blood Transfusion Service (IBTS) if results obtained in this laboratory prove inconclusive.

22 EMERGENCY OUT OF HOURS SERVICE

It is hospital policy to avoid routine transfusions out of hours. The out of hours transfusion service provided only applies to emergencies and to situations where patients cannot wait until the next routine period.

22.1 Emergency Issue of Blood

- In the event of an emergency, the Medical Scientist should be alerted to the nature of the emergency immediately by telephone.
- Verbal/telephone requests alone are not accepted. Requests must be made using an *LF-GEN-0011 Blood Transfusion Request Form.*
- Samples must be sent to the Blood Transfusion Laboratory as soon as possible.
- If blood is required immediately, consider the use of 2 Emergency Issue, O Negative uncrossmatched red cells on the top shelf of the 17-BT-005 Issue Fridge in the Blood Transfusion Laboratory.
- It is the requesting doctors' decision to use uncrossmatched blood.
- The *LF-BT-0022 Compatibility Report Form* containing the details of the 2 Emergency Issue, O Negative units of red cells is filed in the *LF-BT-0021 Compatibility Report Form Folder* located on the desk in the centre of the Blood Transfusion Laboratory.
- The person removing the O Negative Emergency Issue blood must verify removal of the red cells using Blood Track Kiosk. Refer to *HP-GEN-0002 Collection of Blood Products*.
- It is the responsibility of the doctor or nurse to inform the Medical Scientist of the removal of the 2 Emergency Issue, O Negative units of uncrossmatched red cells, so that replacements can be arranged.
- Refer to *HP-GEN-0003 Administration of Blood and Blood Products*.

- In the event of a suspected serious adverse reaction or serious adverse event, refer to *HP-GEN-0005 The Identification, Investigation, Management and Local Reporting of a Serious Adverse Reaction or Serious Adverse Event*

23 TURNAROUND TIME (TAT)

Most requests will be dealt with on the same day but where problems arise e.g. patients with atypical antibodies or special blood requirements this may take longer. Where these problems are known to exist, the Blood Transfusion Laboratory should be notified in advance.

To ensure that an urgent request is processed immediately upon receipt, the urgency must be communicated to the Blood Transfusion Laboratory by telephone.

Table 14: TAT for Requests Received in the Blood Bank

Test/Blood Products Requests	TAT (routine)	TAT (Urgent)
Blood Group and Antibody Screen +/- Crossmatch*	Same Day	1 Hour
Emergency Issue of blood	N/A	10 minutes
Antibody Identification	Same Day	2 Hours
Suspected Transfusion Reaction Investigation	Same Day	Same Day
Blood Products	See Blood Products/Components	See Blood Products/Components
Direct Antiglobulin Test	Same day	30 minutes

*Patients that are eligible for **electronic issue** of red cells may have units available in a shorter timeframe. Contact the Blood Transfusion Lab to check patients' eligibility.

Electronic issue (EI) is the selection and issue of red cell units where compatibility is determined by the Laboratory Information System (LIS) without serological testing (serological crossmatch) of donor cells against patient plasma. The ability to perform EI depends on robust IT rules and laboratory processes and on patient transfusion history and sample criteria as specified in international guidelines *(BSH IT and BSH Guidelines for pre-transfusion compatibility procedures in blood transfusion laboratories).*

Laboratory staff will advise on whether urgent requests for blood can be made available rapidly by EI.

24 BLOOD PRODUCTS/COMPONENTS AVAILABLE FROM BLOOD TRANSFUSION

Table 15: Blood Products/Components available from the Blood Transfusion Laboratory

Blood Product	Details
Red blood cells	Stock item
Plasma	Stock item
Prothrombin Complex Concentrates	Stock item
Fibrinogen	Stock item
Platelets	Must be ordered from the IBTS through the Medical Scientist
Factor Concentrates	Stock item
Irradiated, CMV negative, or washed products	Must be ordered from the IBTS through the Medical Scientist

24.1 Plasma

- Preparation / Thawing of plasma takes approximately 40 minutes.
- Once thawed the plasma should be used immediately. If delay is unavoidable, the plasma is stored in the blood transfusion laboratory at 4^0C and must be used within 5 days. Once thawed it cannot be refrozen.

24.2 Prothrombin Complex Concentrates (PCC)

Please refer to *HF-GEN-0055 Prothrombin Complex Concentrate reconstitution guide* Octaplex details of dosage and administration, available on the hospital shared drive.

24.3 Platelets

Platelets must be ordered through the Medical Scientist who will order directly from IBTS.

25 REPORTING OF TEST RESULTS

25.1 Reporting of Results

Only trained and competent Medical Scientists are authorised to release results. All results, once authorised, are available on the Laboratory Information System (LIS). Hard copies are released when printed and are sent to pathology reception for delivery to the hospital wards.

25.2 Telephoned Reports

It is the policy of this laboratory to telephone reports only when results for specific clinical parameters have reached critical levels:

- If an antibody is detected in a patient's specimen and that patient requires immediate surgery/blood transfusion but compatible blood is not available, the requesting doctor shall be immediately informed of the problem. The Consultant Haematologist shall also be contacted.
- Specimen and request form issues when critical shall be reported immediately to holder of bleep identified on the request form, or alternatively to nurse/ patient location.

Requests for verbal reports are discouraged. Results of patients groups are not given over the telephone. A written copy of the result can be issued if required.

26 ADVISORY SERVICES

- The Blood Transfusion laboratory and Haemovigilance Officer may be contacted for advice during routine hours. The on call medical scientist may be contacted through the OLH switchboard out of hours.
- Clinical queries may be addressed by contacting the Consultant Haematologist. Any queries 9:00a.m.-5p.m. (Mon-Fri) should be directed to Dr Su Maung, Consultant Haematologist **or** MMUH Haematology Registrar covering lab/consult (bleep 2925) through MMUH switchboard (01 8032000).
- Out of hours advice may be sought from on call Consultant Haematologist **or** MMUH Haematology Registrar covering lab/consult (bleep 2925) through MMUH switchboard (018032000).
- If Dr Maung is on leave, on call Consultant Haematologist can be contacted through MMUH switchboard for advice

27 FALSE MEDICINES DIRECTIVE

The EU Falsified Medicines Directive (FMD) is a Directive that safeguards public health by protecting the pharmaceutical supply chain from infiltration by falsified (or counterfeit) medicines. All medicines received need to be verified (Decommissioned) with the Irish Medicines Verification Organisation (IMVO) before supply to a patient. This process also applies to many blood products namely Plasma, PCC and Factor Concentrates.

HAEMATOLOGY

28 HAEMATOLOGY INTRODUCTION

28.1 Service Description

Haematology comprises the study of blood disorders which affect blood cells, haemoglobin, blood proteins and the mechanism of coagulation.

28.2 Contact Details

Section	Phone Extension Inside the Hospital	Phone Number from Outside the Hospital
Haematology/ Coagulation	2575 - Routine Hours OLH Switchboard- Out of Hours	046-9078575

29 HAEMATOLOGY TEST INDEX

29.1 Routine and Urgent Haematology Tests

Samples labelled urgent, samples from ICU, ED, MAU, MIU, samples marked as oncology and urgent phone call requests from clinicians are classified as urgent and given priority. Samples for ESR Analysis are batch tested and therefore, an urgent request for ESR analysis must be followed by a phone call classifying the request as urgent.

The turnaround times shown in **Table 16 – Haematology Tests and Table 17 – Coagulation Tests** are for routine samples. Urgent samples are processed within 1 hour of receipt in the laboratory.

Table 16 Haematology Tests

Test	Specimen Type	Additive Required	Volume Required ml	Container Type	Sample Validity & Other Considerations	Turnaround Time
FBC	Blood	K-EDTA	3.0	Blood Tube (Purple)	Must be <24 hrs old. For WCC, RBC HB and Platelet count only reported, < 48hrs.	Same Day
Blood Film	Blood	K-EDTA	3.0	Blood Tube (Purple)	Must be <24 hrs old State Clinical Details	48 hours (M-F) If Consultant Review referral, 10 days
Reticulocytes	Blood	K-EDTA	3.0	Blood Tube (Purple)	Must be <24 hrs old	Same Day
ESR	Blood	K-EDTA	3.0	Blood Tube (Purple)	Must be <24 hrs old on refrigerated specimen	Same Day
Sickle Cell Screen	Blood	K-EDTA	3.0	Blood Tube (Purple)	State Clinical Details, sample can be tested up to 2 weeks if refrigerated	24 hours
Infectious Mononucleosis Screen	Blood	K-EDTA or Gel Tube	3.0	Blood Tube (Purple)	State Clinical Details, Stored at 4-8°C, EDTA sample validity of 2 days, and 3 days if Serum/Plasma sample	24 hours
Malaria Screen Malaria Blood Film	Blood	K-EDTA	3.0	Blood Tube (Purple)	State Clinical Details Validity < 4hrs old	Same Day

This is the sample tube used for Haematology Tests as Listed in Table 16

Table 17 Coagulation Tests

Test	Specimen Type	Additive Required	Volume Required ml	Container Type	Sample Validity & Other Considerations	Turnaround Time
Prothrombin Time (PT/INR)	Blood	Sodium Citrate	3.0	Blood Tube (Light Blue Top)	Samples must be <24hrs old and filled to the fill mark	Same day
Activated Partial Thromboplastin Time (APTT)	Blood	Sodium Citrate	3.0	Blood Tube (Light Blue Top)	Samples must be <4hrs old and filled to the fill mark	Same day
Fibrinogen	Blood	Sodium Citrate	3.0	Blood Tube (Light Blue Top)	Samples must be <4hrs old and filled to the fill mark	4 hours
D-Dimer	Blood	*Sodium Citrate	3.0	Blood Tube (Light Blue Top)	**Samples must be <4hrs old and filled to the fill mark	4 hours

***** Haematocrit (HCT) results of > 0.55 L/L (Ratio) may lead to spurious coagulation results. The usual 3ml Coagulation tube has 0.3ml anticoagulant and 2.7mls blood i.e. 1:9 ratio anticoagulant to blood. Coagulation testing for PT/INR/APTT on Patients with Haematocrit result of >0.55 L/L (Ratio) from FBC sample, within 24hrs of Coagulation request, will need adjustment of the volume of anticoagulant in the Coagulation tube. This adjustment is done prior to phlebotomy for the coagulation test, by the laboratory staff, in the laboratory. The tube is then collected from the laboratory/delivered to the requesting department, for phlebotomy.

****** Indication for the D Dimer test and Well's score **must be** written on the request form. Analysis will only be performed according to the following Indications:

Indications for D-Dimer Analysis

- Suspected DVT with Wells score of 1 or less
- Suspected PE with Wells score of 4 or less
- Confirmed or suspected COVID
- Covid Positive **In-Patients**, analysis twice weekly only
- Requested by Consultant Haematologist or haematology team in MMUH

This is the sample tube used for the Coagulation Samples

29.2 On-Call Haematology Tests

The following tests are performed on-call. The urgency of the request should be agreed by telephone with the Medical Scientist on-call.

Table 18 Haematology On-Call Tests

Haematology On-Call Tests	
Full Blood Count (FBC)/Blood Film	Erythrocyte Sedimentation Rate (ESR) (If Query temporal arthritis)
Prothrombin Time /INR Ratio	Malaria Screen
Activated Partial Thromboplastin Time	Sickle Cell Screen
D-Dimer	Infectious Mononucleosis Screen (If indicated clinically and by FBC/blood film results)
Fibrinogen Levels	Reticulocyte Count

30 HAEMATOLOGY TEST INFORMATION

There is a vast range of Haematology tests available and information on the requesting and interpretation of these tests for use in the diagnosis and treatment of disease is well documented in scientific literature.

31 HAEMATOLOGY AND COAGULATION REFERENCE RANGES

Table 19: **Full Blood Count Reference Range Taken from LI-HAEM-0028**

Parameter	Units	2 – 6 years	6 – 12 years	Adult Male	Adult Female
RBC	**x 10^{12}/L**	4.0 – 5.2	4.0 – 5.2	4.5 – 5.5	3.8 – 4.8
Haemoglobin	**g/dL**	11.0 – 14.0	11.5 – 15.5	13.0 – 17.0	12.0 – 15.0
Hct	**L/L(Ratio)**	0.34 – 0.40	0.35 – 0.45	0.40 – 0.50	0.36 – 0.46
MCV	**fL**	75 – 87	77 – 95	83 – 101	83 – 101
MCH	**pg**	24 – 30	25 – 33	27 – 32	27 – 32
MCHC	**g/dL**	31 – 37	31 – 37	31.5 – 34.5	31.5 – 34.5
WBC	**x 10^9/L**	5 – 15	5- 13	4.0 – 10.0	4.0 – 10.0
Neuts	**x 10^9/L**	1.5 – 8	2 – 8	2 – 7	2 – 7
Lymphs	**x 10^9/L**	6 – 9	1 – 5	1 – 3	1 – 3
Monocytes	**x 10^9/L**	0.2 – 1.0	0.2 – 1.0	0.2 – 1.0	0.2 – 1.0
Eosinophils	**x 10^9/L**	0.1 – 1.0	0.1 – 1.0	0.02 – 0.5	0.02 – 0.5
Basophils	**x 10^9/L**			0.02 – 0.1	0.02 – 0.1
Platelets	**x 10^9/L**	200 – 490	170 – 450	150 – 410	150 – 410
RDW	**%**			11.6 – 14.0	11.6 – 14.0
Reticulocytes	**x 10^9/L**	30-100	30-100	50 - 100	50 - 100

Source: *Dacie and Lewis Practical Haematology 12th Edition*

Table 20: Pregnancy Reference Ranges LI-HAEM-0028

Parameter	Units	1st Trimester	2nd Trimester	3rd Trimester
WBC	X 109/L	5.7-13.6	6.2-14.8	5.9-16.9
Haemoglobin	g/L	11.0-14.3	10.0-13.7	9.8-13.7
MCV	fl	81 - 96	82 - 97	91 - 99
HCT	L/L(Ratio)	0.31 – 0.41	0.30 – 0.38	0.28 – 0.39

Reference: Haematological Values during Pregnancy (Blood Cells. A Practical Guide. Barbara J. Bain; third Edition)

Table 21: Coagulation Reference Ranges LI-HAEM-0028

Reference Range Source: **PT, APTT & Fibrinogen**: Locally established. **D-Dimer**: Instrumentation Laboratory Expected values Documentation & *ED-HAE-0175 BMJ 2013:346 Age related D-Dimer Ref Ranges*

PT/INR	PT 10.1 – 12.9 Secs INR*
APTT	25 – 36.5 Secs **
D-Dimer **	Up to 50 yrs <500 ng/ml FEU 51 to 60 yrs <600 ng/ml FEU 61 to 70 yrs <700 ng/ml FEU 71 yrs & over <800 ng/ml FEU Results higher than 128,000, **report as >128,000** Results <215, **report as <215**
Fibrinogen	1.7 – 4.5 g/l **

*INR. Please refer to clinical guidelines for the INR target for a given clinical condition
** These tests for Our Lady's Hospital patients only

Table 22: ESR Reference Ranges LI-HAEM-0028

ESR	UNITS	<17YRS	17-50YRS	51-60YRS	61-70YRS	>70YRS
MALE	**mm/hour**	**0-12**	**0-10**	**0-12**	**0-14**	**0-30**
FEMALE	**mm/hour**	**0-12**	**0-12**	**0-19**	**0-20**	**0-35**

Reference Range Source: Dacie and Lewis Practical Haematology

32 COMMUNICATIONS OF CRITICAL RESULTS

Table 23: Haematology Phoning Results, Adding Blood Films Classification of Critical Results:
RED – Communication required within **2 hours** **YELLOW** – Communication required within **24 hour**
Ref.: *ED-GEN-0246: National Laboratory Handbook: Communication of Critical Results for Patients in the Community*

TEST	PHONE	ADD FILM
Haemoglobin g/dl	**<5** If Hypochromic /Microcytic **<7** If Normochromic /Normocytic ≥20	**Male: <10g/dl** **Female: <9g/dl** (if not post-op) **>18g/dl**
MCV fl	NA	**<70** or **>105 fl**
MCHC g/dl	NA	**>37** make film on warmed sample if result persists after warming sample.
Platelets x10^9/L	≤**50** or ≥600 ≤30	Platelet Count: <100 or >750 x10^9/L
RDW%	NA	>16 if Hb & MCV **Normal** >24 if Hb & MCV **Abnormal**
White Cell Count x10^9/L	**<2**or ≥**30x**10^9/L	**<2**or **>20x10^9/L**
Neutrophils x10^9/L	≤**1.0** ≤**0.5**	**<1.5** or **>20x10^9/L**
Lymphocytes x10^9/L	NA	**>5.0x10^9/L**
Monocytes x10^9/L	NA	**>1.5x10^9/L**
Eosinophils x10^9/L	NA	**>2.0x10^9/L**
Basophils x10^9/L	N/A	**>0.25**
COAG		
PT/INR**	**PT >115 Seconds** **INR >5.0**	NA
Please refer to Clinical Guidelines for the INR target for a given clinical condition		
APTT	**≥50 Seconds**	N/A
D-Dimer	**>7,650** If no previous test	N/A
Fibrinogen	**<1.5**	N/A
OTHER		
ESR	If Query temporal arthritis	>100 mm/hr
Infectious Mononucleosis Screen	Positive	**Add Film**
Sickle Cell Screen	Positive	**Add Film**
Malaria Screen	Positive	**Add thick and thin blood films**

33 ADVISORY SERVICES

Where there is uncertainty over the requesting or interpretation of Haematology Tests, the Haematology Department should be contacted for advice. Clinical queries may be addressed by contacting the Consultant Haematologist(s). All special Haematology Requests should be made in consultation with the Haematology Consultant(s). The Haematology Clinical Team in the Mater Hospital should be contacted by the Haematology Department if any patient has unexplained extremely critical results, such as a Platelet count of $<10x10^9$/L, Neutrophils <0.5, Pancytopenia, new suspected Acute Leukaemia or other Haematological Disorders.

- Any urgent haematology consultations during 9:00am-5pm (Mon-Fri) should be directed to Dr Su Maung, Consultant Haematologist **or** MMUH Haematology Registrar covering lab/consult (bleep 2925) through MMUH switchboard (018032000)
- Routine consultations should be discussed over the phone to MMUH Haematology Registrar covering lab/consult or Dr Su Maung, Consultant Haematologist through switchboard
- Consultations can also be requested by filling out the *LF-HAEM-0145 Request for In-patient Haematology Consultation* form. The form should be left at the reception for Dr Maung.
- If Dr Maung is on leave, on call Consultant Haematologist can be contacted through MMUH switchboard for advice
- Referrals for new haematology outpatient clinic will be triaged and all new patients will be seen in MMUH.

BIOCHEMISTRY

34 BIOCHEMISTRY INTRODUCTION

34.1 Service Description

The Biochemistry Department is responsible for measurement of routine clinical chemistry and endocrinology assays. The results from these tests are used not only in the diagnosis of disease, but also in monitoring the course of disease, the effect of treatment, prognosis and screening

34.2 Contact Details

Section	Phone Extension Inside the Hospital	Phoning from Outside the Hospital
Biochemistry	(Technical Queries only) 2574 - Routine Hours OLH Switchboard- Out of Hours	046 9078574

35 BIOCHEMISTRY TEST INDEX

35.1 Routine Biochemistry Tests:

NOTE: In house urgent requests have a turnaround time of 90 minutes

Table 24: Routine Biochemistry Tests

Test/Profile	Specimen Type	Additive Required	Volume Required	Container Type	Turnaround Time
Clinical Chemistry					
Renal Profile Sodium, Potassium*(* in house only), Chloride, Creatinine, Urea , eGFR (CKD-EPI 2009 formula)	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	Same day
Liver Profile Total Bilirubin, ALT,AST, ALP, GGT, Total Protein, Albumin	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	Same day
Bone Profile Calcium, Phosphate, ALP, Mg, Albumin, Adjusted Calcium	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	Same day
Iron Profile Iron, transferrin saturation, transferrin, ferritin	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	Same day
GP Profile RFT, LFT, Calcium , Lipids	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	Same day
Fasting GP Profile RFT, LFT, Calcium, Fasting Lipids	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	Same day
Fasting Lipid Profile Cholesterol, Triglyceride, HDL, calculated LDL ,Total cholesterol:HDL ratio	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	Same day
Troponin-I (In-patient only)	Blood	EDTA	4.0 ml	Purple Top Tube	90 minutes
Glucose	Blood	FC Fluoride Oxalate	4.0 ml	Grey Top Tube	Same day
Procalcitonin	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	2 Hours
Total Protein/ALB/LDH	Fluids	None	1.0 ml	Universal Container	Same day
Glucose & Protein ***Plasma glucose tube required to be taken at same time as CSF for correct result interpretation***	CSF	None	0.5 ml	CSF tubes & FC sodium fluoride tube for plasma glucose (grey tops)	2 hours
Amylase	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	Same day
Magnesium	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	Same day
Uric Acid	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	Same day

Test/Profile	Specimen Type	Additive Required	Volume Required	Container Type	Turnaround Time
HbA1c	Blood	EDTA	4.0 ml	Purple Top Tube	48 hours
Vitamin D	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	24 hours
Specific Proteins					
C-Reactive Protein-CRP	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	Same day
Rheumatoid Factor (RA)	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	Same day
NT-pro BNP	Blood	Serum	5.0 ml	Separate Red/Yellow Top Gel Separator Tube	1 Day
Endocrinology					
Thyroid Stimulating Hormone (TSH)	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	24 hours
Free T4 (T4)	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	24 hours
Follicle Stimulating Hormone (FSH	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	24 hours
Luteinising Hormone (LH)	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	24 hours
Oestradiol	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	24 hours
Cortisol	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	24 hours
Prostatic Specific Antigen (PSA)	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	24 hours
Progesterone	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	24 hours
Prolactin **Please note Macroprolactin reflexed on** **Female samples with prolactin >600 m IU/L** **Male samples with prolactin >550m IU/L**	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	24 hours
B-HCG	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	24 hours
Haematinics					
B12	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	24 hours
Folate	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	24 hours
Ferritin	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	24 hours
Drugs					
Lithium	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	Same Day

Test/Profile	Specimen Type	Additive Required	Volume Required	Container Type	Turnaround Time
Paracetamol	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	Same Day
Antibiotic Therapies					
Gentamycin	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	Same Day
Vancomycin	Blood	Serum	5.0 ml	Red/Yellow Top Gel Separator Tube	Same Day
Urinary Chemistries					
Sodium	Random Urine 24 Hour Urine	None	10-20mls Urine	Universal Container	24 hours
Microalbumin Albumin/Creatinine Ratio	24 Hour Urine	None	24 Hour Urine Collection	24 Hour Urine Container	24 hours
Protein	24 Hour Urine	Acidified Container	24 Hour Urine Collection	24 Hour Urine Container	24 hours
Creatinine Clearance	Random Urine 24 Hour Urine	None	10-20mls Urine	Universal Container	24 hours

This is the Red/Yellow top Gel Separator Serum tube used for Biochemistry Tests.

This is the grey top FC Fluoride Oxalate tube used for Blood Glucose Tests.

This is the purple top EDTA sample tube used for Troponin Tests

35.2 On-Call Biochemistry Tests

The following tests are performed on-call. The urgency of the request should be agreed by telephone with the on-call Medical Scientist.

Table 25 On-Call Biochemistry Tests

On-Call Biochemistry Tests	
COMMON REQUESTS	**RARE REQUESTS**
Renal Profile	**Uric Acid**
Liver Function Tests	**CSF Glucose & Protein**
Bone Profile	**Cortisol**
Amylase	**Gentamycin/Vancomycin**
C-Reactive Protein	**Lithium**
Creatine Kinase (CK)	**Paracetamol**
LDH	**HCG**
Glucose	**TSH (requires Consultant Clinical Biochemist approval)**
Troponin -I	

36 REFERENCE RANGES

Age and sex specific reference ranges for all tests performed in the Biochemistry laboratory are included on test reports.

Information on the source of these reference intervals are available from the laboratory, if required.

Pregnancy related reference ranges have been sourced from http://perinatology.com/Reference/Reference%20Ranges/Reference%20for%20Serum.htm

37 COMMUNICATION OF CRITICAL RESULTS

Classification of Critical Results:
Category **A** – Communication required within **2 hours**
Category **B** – Communication required within **24 hours**
Category C **–**Communication by the next working day deemed satisfactory

Analyte	Units	Reference Interval	Critical Phone limit	Category	*Notes*
Albumin	g/L	35-50	**<20**	A	*Rule out spurious/dilution error* *Phone on first occurrence*
ALT	IU/L	F (0 - 30) M (0 - 42)	**≥ ULN x15 or 450**	B	*+ Phone if ↑ pregnancy*
AST	IU/L	F (0 - 30) M (0 - 35)	**≥ ULN x15 or450**	B	*+ Phone if ↑ pregnancy*
ALP	IU/L	Age-specific	***≥1000**	C	**Based on local communications*
Amylase	IU/L	30 – 110	**≥ULN x5 or 550**	A	
Adj. Calcium	mmol/L	2.20– 2.55	**≤ 1.8 or ≥ 3.5**	A	*If ↓↓↓ Query EDTA contamination*
			3.0 – 3.5	B	
CK (Total)	IU/L	(F) 25 - 200 (M) 40 - 320	**>5000**	A	
Creatinine	µmol/L	(F) 49 - 90 (M) 64 - 104	**≥ 354** **(*≥200 if <16yrs)**	A	*New/significant increase in non-dialysis patient* **RCPath UK*
eGFR	mL/min/1.73m^2	>90	**≤ 15**	A	*New presentation*
CRP	mg/L	< 5.0	**≥ 300**	A	*All & on first occurrence in-patients*
Glucose	mmol/L	Fasting 3.9 - 5.5	**≤ 2.5 or ≥ 25** **(*≥15 if <16yrs)**	A	*For GPs and OPD, upper cut point of 30 mmol/L in known T2DM may be more appropriate.*RCPath UK*
Magnesium	mmol/L	0.7 – 1.0	**≤ 0.4 or *≥ 2.0**	A	**Based on local communications*
LDH	IU/L	125 - 220	***≤ 30 or *≥ 750**		**Based on local communications*
Potassium	mmol/L	3.5 – 5.5	**≤ 2.5 or ≥ 6.0**	A	**RCPath UK **≥ 6.5*** *Exclude haemolysis/old samples/EDTA contamination first.*
Phosphate	mmol/L	0.80 – 1.50	**≤ 0.30 or *≥ 2.50**	A	**Based on local communications*
			≤ 0.45	B	
Protein (Total)	g/L	60-80	**≥90**	C	*Electrolytes should be measured by direct ISE (ABG)* *Put for Consultant Review.*
Sodium	mmol/L	135-145	**≤ 120 or ≥ 155** **(≤130 if<16yrs)**	A	*Note particular concern of risk of death in children with hyponatraemia* *Results between 150 & 155 require discussion (*RCPath UK **≥ 160**)*
Triglyceride	mmol/L	Fasting <1.7 Non-fasting <2.0	***≥ 10**	B	**>10mmol/l risk of pancreatitis* *>4.5 mmol/L unable to calculate LDLc (Friedewald)*
Urate	µmol/L	`(F) 140 - 360 (M) 200 - 430	**340**		*Ante-natal indications only*
Urea	mmol/L	2.5 – 7.8	**≥ 30** **(*≥10 if < 16yrs)**	A	*New/significant increase in non-dialysis patient*RCPath UK*
Vitamin T.B12	ng/L	211-760	**≤ 100** **<148*	B	**LoQ TB12 Alinity is 148ng/L*

Drugs	Units	Therapeutic Range	Critical Phone limit	Category	*Notes*
Iron	µmol/L	(F) 9- 30 (M) 11 -31	**≥50**	B	**Based on local communications*
Lithium	mmol/L	0.4-0.8	**≥ 1.5**	B	*Severe toxicity likely if level >2.0*
Paracetamol	mg/L	Not applicable	*All detectable levels*	A	*Phone all detectable levels*
Antimicrobials	**Units**	**Therapeutic Range**	**Critical Phone limit**	**Category**	***Notes***
Gentamicin	mg/L	<1.0	**>1 (*>2)**	B	*Phone Ward *& Consultant microbiologist*
Vancomycin	mg/L	15-20	**>20 (*>25)**	B	*Phone Ward *& Consultant microbiologist*
Immunoassay	**Units**	**Reference Interval**	**Critical Phone limit**	**Category**	***Notes***
Troponin I	ng/L	*≥99th percentile*	**(F) ≥16 (M) ≥34**	A	*Greater than or equal to the sex-specific 99th percentile*
Cortisol	nmol/l		***<100**	A	**Based on local communications **RCPath UK ≤50 nmol/L unless part of dexamethasone suppression test*
Cortisol (SST 30min)	nmol/L	****≥470**	***<350**	A	**RCPath UK **SST Cut-off specific to Abbott Alinity assay*
Free T4	pmol/L	9 – 19	***<6.0 ≥50**	C	**Based on local communications*
TSH	m U/L	0.35-4.94	***>100 *<0.01**	C	**Based on local communications*
Prolactin	mU/L	(F) 109-557 (M) 75-407	***>1000**	C	**Based on local communications On first elevation, suggest screening for Macropro*
			***>3000**	A	**Based on local communications Phone Ward & Consultant Clinical biochemist On first elevation, suggest screening for Macroprolactin*
CSF	**Units**	Range	**Critical Phone limit**	**Category**	***Notes***
CSF Glucose	mmol/L	Typically 2/3 concomitant venous plasma glucose value	**<2.6**	A	
CSF Protein	g/L	0.15 – 0.45	**>0.45**	A	

38 BLOOD GAS ANALYZERS

Blood gas analyzers are placed in strategic locations in the hospital. If the analyzer is mal-functioning in a particular area, contact the Biochemistry Department to log the fault. The analyser that is designated as the back-up analyser for the particular area may be used in the interim time period.

Table 28: Location of Blood Gas Analysers and the Designated Back-up

Area	Designated Back-up
Accident & Emergency Department	ICU
ICU	Accident & Emergency Department

39 ADVISORY SERVICES

If advice is required on the appropriate selection of tests and interpretation of results, the Biochemistry Department should be contacted. The staff in the Biochemistry Department have access to the advisory services of Dr Paula O'Shea, Consultant Clinical Biochemist and the query can be re-directed to Dr Paula O'Shea if it is not possible to clarify the request locally.

MICROBIOLOGY

40 INTRODUCTION

40.1 Service Description

The Microbiology Department offers a range of diagnostic services in Microbiology. It is also involved in the reporting of notifiable diseases in conjunction with the Surveillance Scientist to the Health Protection Surveillance Centre (HPSC), Ireland's specialist agency for the surveillance and control of communicable diseases.

40.2 Contact Details

Location	Number
Microbiology Department	046 9078576 (extn 2576) - Routine Hours OLH Switchboard- Out of Hours
Microbiology Consultant	Contact through OLH Switchboard

41 SPECIMEN COLLECTION

Microbiology results depend largely on the type and quality of the specimen received. Therefore they should be both representative and fresh for optimum results. It is imperative that Microbiology specimens are delivered to the Laboratory immediately, delay may result in invalid results. With the exception of blood cultures, specimens not dispatched on same day should be stored at 4°C before analysis, Refer to Table 25 for special considerations.

Where possible, collect specimens before commencement of anti-microbial therapy. Please send an adequate amount of specimen. Please provide adequate clinical details and highlight if special or additional test required. Contact the Consultant Microbiologist if clinical discussion is required.

In the case of > 2 tests ensure relevant request forms and sufficient samples are sent.

Specimens that are not processed on day of receipt should be stored at 4°C.

Samples are rejected and not processed in the following circumstances:

- Samples that do not comply with the labelling criteria
- Leaking specimens that would pose a health and safety risk to staff
- Incorrect specimens for test requested
- Duplicate samples (on advice from Consultant Microbiologist/ in accordance with established procedure)
- Samples are too old for processing- > 4 days for swabs; > 4 days for urine in boric acid (green top); > 3 days for urine in monovette (yellow top); NPS > 48 hours at RT for SARS-CoV-2/ Flu A, B/ RSV when 4 plex kit available;

Unrepeatable samples: Amendments to these samples must be approved by the patient's Consultant, Register or Team. The sample taker must then attend the Laboratory and complete the *LF-GEN-0047 Sample Amendment Form.*

41.1 Microbiology Specimens and Sample Containers

Table 29: Microbiology Specimen and Sample Containers

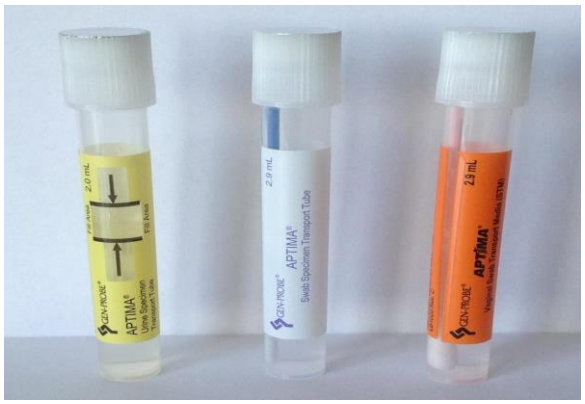
Sample/ Test	Container Type
Urines for Microscopy, C&S	Green Topped Boric Acid Monovette 10ml Tube
Small volume urine (< 2mls)	Yellow Topped Monovette 10ml Tubes – Bulk Packed
CSU for Microscopy, C&S	Yellow Topped Monovette 10ml Tubes – Sterile Packed
Faeces, Sputa, Joint, Ascetic & Plural Fluids, CSF	Universal Container – White Topped Tube 50mls
Collection of specimens from genital tract, wounds, throat, MRSA- Nasal Groin; VRE- Rectal swab	Transport Swab – Blue (Contain transport medium)
Screening for CPE, VRE- Rectal swab	Red Topped Copan Paired swab
Blood	Blood Culture Bottles: Aerobic – Green, Anaerobic – Orange
CSF for Xanthochromia (Not currently available)	Brown Plastic Tube – 10ml
Bordella pertussis	Peri-nasal swabs – Blue Top
Viral Culture	Viral Swabs – Pink Top
Adult Urine or Urethral Swab, ECS	Chlamydia Aptima Kits
Saliva (Mumps)	Oracol Saliva Collection System
SARS-CoV-2 /Influenza /RSV (Molecular) In-patients, admissions, staff, pre electives where required	Nasopharyngeal Swab (NPS)(red top with viral transport media) Ref.:*ED-MIC-078 Nasopharyngeal Specimen Collection*
Extended respiratory panel	Red topped NPS-
Influenza (GPs for referral)	Throat swab +/ Nasal swab

Monovette Containers: Urine Specimens for Culture Only

Sterile Universal Containers – All Other Urine Samples, Faeces, Sputum, Aspirates

Transport Swabs – Throat, Wound, Ulcer, Abscess, Sinus Swabs

Aptima Swabs – HVS/Urethral Swabs for Chlamydia and Gonorrhea



Viral Transport Swabs for Culture

Red Topped Universal or Viral Transport Medium with Nasopharyngeal /Oropharyngeal Swabs for Flu, RSV, SARS-Co-V2 (Molecular Testing only)

Blood Culture Bottles for In-Patients Only

CPE/ VRE Copan Paired swab

Mumps Swabs (Available on Request from the Laboratory)

41.2 Urines for Culture & Sensitivity

Mid-stream Urine (MSU): Avoiding the first part of voided urine and without interrupting the flow, approximately 20ml is collected into a sterile universal. An aliquot is then transferred to the Boric Acid Monovette up to the mark (10ml). Small samples (< 2ml) from babies/ children should be transferred to the yellow topped monovette without boric acid.

Clean Catch Urine: Thorough peri-urethral cleaning is recommended. The whole specimen is collected into a sterile container and then an aliquot is sent for examination.

Bag Urine: A sterile bag is taped over the freshly cleaned and dried genitalia and the collected urine is transferred to the specimen container

Catheter Specimen of Urine: This is collected into an individually wrapped yellow topped monovette by attaching directly to the catheter tube.

41.3 Faeces

The specimen may be passed onto a clean, dry, disposable bed-pan or similar container and a representative sample is transferred into the sterile faeces container.

Due to nature of faecal samples, it is not conducive to split these into representative samples where requests for multiple tests are received e.g. requests for C&S, Ova and Parasites, and Calprotectin. Note that Calprotectin samples are referred to an external laboratory and must be tested within 24 hours, ideally the sample should be delivered to the laboratory by 11 am for optimal processing.

41.4 Sputum

Sputum should be expectorated from the lower respiratory tract by deep coughing. When the cough is dry, physiotherapy, postural drainage or inhalation of an aerosol before expectoration may be helpful.

41.5 Genital Tract Specimens

Vaginal Specimens: These specimens should be taken with the aid of a speculum avoiding vulval contamination. The swab should be rolled firmly over the surface of the vaginal vault. For Trichomonas, the posterior fornix, including any obvious plaques should be swabbed.

Cervical Specimens: These specimens should be taken with the aid of a speculum avoiding vulval contamination. The swab should be rotated inside the endocervix.

Urethral Specimens: Contamination with micro-organisms from the vulva or foreskin should be avoided. For male urethra, if discharge is not apparent, attempts should be made to "milk" exudates

from the penis. The patient should not have passed urine for at least one hour. The swab is passed gently through the urethral meatus and rotated.

41.6 MRSA Screening Swabs

For admission or ward screening, nasal and groin swabs are required for routine adult screening. If it is clinically or epidemiologically indicated, swabs can be taken from abnormal skin lesions (e.g. eczema, dermatitis, psoriasis, wounds, burns), manipulated sites (e.g. intravenous lines and urinary catheters) etc. Moisten swab in a small amount of sterile water or saline in a Universal Container before swabbing site.

Nasal Swab: Insert swab onto the lower end of the nostril. Swab the skin just inside the nostril by rubbing three times clockwise and three times anti-clockwise.

41.7 VRE/ CPE Screening Swabs

Peri- Rectal swabs are used for screening CPE / VRE .A stool sample may also be used but CPE direct testing assay (Genexpert) will not be available. The standard MW120 blue swab may also be used for VRE testing

41.8 Upper Respiratory Swabs and Aspirates (Ear, Nose, Throat, Gum, Mouth, Tongue, Antral Wash-out, Endotracheal Tube)

Throat Swab: Sample the tonsillar area or posterior pharynx avoiding the tongue and uvula.

Nasal Swab: Sample the anterior nares by gently rotating the swab over the mucosal surface.

Mouth Swab: Sample any lesions or inflamed areas. The use of the tongue depressor or spatula will aid vision and avoid contamination from other parts of the mouth.

Aspirates: A minimum of 1mL is required for aspirates.

41.9Peri-nasal Swabs

This type of swab is required for investigation of *Bordetella pertussis* (Whooping Cough). The specimen can be obtained using a flexible wire swab. Bend the flexible wire of the swab in the shape of an arc. With the tip directed downwards, pass the swab gently along the floor of the nose for about two inches until it meets the resistance of the posterior wall of the nasopharynx. Allow the swab to remain in the nasopharynx for a moment so that secretions are absorbed onto the swab.

41.10 Nasopharyngeal / Oropharyngeal Swabs/ Aspirates (Flu/RSV/SARS-CoV-2)

Nasopharyngeal: Insert the swab into either nostril, passing it into the posterior nasopharynx. Rotate swab by firmly brushing against the nasopharynx several times

Oropharyngeal: Swab the posterior, tonsils and other inflamed areas. Avoid touching the tongue, cheeks and teeth with the swab when collecting specimens.

In both cases, remove and place the swab into the tube containing clinical/viral/molecular transport medium. Break swab at the indicated break line and cap the specimen tube tightly.

Nasal Aspirates: Transfer 600μL of the sample into the tube containing 3mL viral transport medium using a sterile pipette, cap the tube tightly.

Ref: https://www.cdc.gov/coronavirus/2019-nCoV/lab/guidelines-clinical-specimens.html

41.11 Eye Swabs

Retract the lower eyelid and stroke the tarsal conjunctiva with a swab and remove all purulent material.

41.12 Superficial Wound Swabs and Intravascular Cannulae Tips

Superficial Wound Swabs: Sample a representative part of the lesion. Soak the swab well in any pus or exudates. Samples of pus, if present, are preferred to swabs.

Intravascular Cannulae Tips: disinfect the skin around the cannula entry site. Remove the cannula using aseptic technique and cut approximately 4cm of the tip into a sterile container using a sterile scissors.

41.13 Swabs and Pus from Abscesses, Post-operative Wounds and Deep-seated Wound Infections

Aspirate pus and transfer to sterile Universal Container. If swabs are used, sample the deepest part of the wound to avoid superficial colonising microflora. Swabs must be well soaked in pus.

41.14 Fluids from Sites Normally Sterile

Sterile fluid specimens are collected by aseptic percutaneous aspiration or intraoperatively and transported in a clean, sterile container. Please alert laboratory if urgent gram stain is required. Collect also in EDTA Sample Tube specifically if cell count is required.

41.15 Blood Cultures

The optimal time for collection is before anti-microbial therapy for adults and during temperature spike. Two BacT/ALERT culture bottles are required, an aerobic bottle (green cap) and an anaerobic bottle (orange cap). It is essential that great care is taken in the collection of blood for culture to ensure no contaminant is introduced that may be misinterpreted as a significant isolate.

Firstly prepare the skin

- Perform hand hygiene
- Apply a clean tourniquet if applicable to identify a vein
- Select a suitable venepuncture site
- Disinfect the skin at the venepuncture site for about a minute with a single wrapped alcohol swab.
- **Allow the skin to dry**; this will take a few minutes.
- Decontaminate hands again and apply clean gloves
- Avoid touching the venepuncture site after disinfection
- Follow the principles of Aseptic Non-Touch Technique (ANTT) Blood cultures should be performed aseptically.

Bottle preparation and venepuncture

- Perform hand hygiene
- Carefully remove the plastic cap from each blood culture bottle and avoid touching the rubber septum.
- Disinfect the septum with a single wrapped alcohol swab and **allow to dry**.
- Place the adapter cap over the blood culture bottle and press straight down to pierce the septum.
- Insert a needle or collection device.
- Hold the blood culture bottle upright and below the level of the draw site when filling with blood.
- Inoculate the blood into each bottle through the rubber septum.
- Collect aerobic (green) bottle first, then aerobic (orange) bottle.
- Withdraw **5-10mL** of blood in each bottle.
- Release the tourniquet and withdraw the needle and syringe.

- If a central line is present, withdraw the blood from the central line and from a peripheral vein also.
- Changing needles between venepuncture and inoculation of the bottles is not recommended as this carries the risk of needle stick injury.
- Mix gently by swirling bottles.
- Discard sharps and/or collection equipment into a sharps bin.
- Remove gloves and decontaminate hands.

Label the bottles appropriately using blood track labels, or by hand. Small addressograph labels may be used. Do not cover any part of the barcode label on the bottles.

Transport to the laboratory as soon as possible and within 4 hours from collection.

41.16 CSF and Meningitis Specimens

Specimens are collected preferably before initiation of antimicrobial therapy. Please alert laboratory before sending sample-both during routine hours and on call

The following specimens should be collected:

CSF: Collect aseptically in sequence into Universal Containers labeled 1, 2 and 3 for C&S. Please provide relevant clinical details if viral and/or bacterial PCR requested. Always send blood culture also when lumbar puncture performed.

EDTA Blood: This may be required for bacterial PCR.

Please note: Xanthochromia referral testing is not currently available.

CSF should always be dispatched to the laboratory immediately. Cells in CSF disintegrate and any undue delay may produce a cell count that does not reflect the clinical situation of the patient.

Ensure samples are handed directly to a Medical Scientist at Laboratory Specimen Reception.

41.17 ZN Stains/TB Culture

All ZN stains and TB cultures are performed in the Irish National Mycobacterium Reference Laboratory (INMRL) St James's Hospital. Samples are sent from the Microbiology Department by courier daily Monday to Friday.

Turnaround Times: ZN Stain – 24 hours; TB Culture – 7 weeks final negative result;

TB Sensitivity – 21 days from positive.

Specimen Collection

Take into an appropriate sterile specimen container and tighten the lid firmly. A separate sample and request form is required for TB/ZN and routine C&S.
Sputum samples should be from deep in the lungs (not saliva), 2-5mLs, procured on 3 consecutive days. Urine samples are only acceptable when a diagnosis of renal or milliary TB is suspected, an early morning MSU or CSU should be taken in 3 consecutive days and relevant clinical details must be provided. Actual pus samples are more appropriate than pus swabs.

Reporting of Results for TB

All positive ZN smears or TB culture reports will be telephoned directly to the Microbiology Department. The Consultant Microbiologist, the clinical team and the IPCT are informed. Mycobacterium results are now available on CIDR and as such are communicated to the Public Health in this manner. Negative results will not be telephoned. Printed copies of ZN, TB culture, identification and susceptibility results will be sent out as soon as they become available.

42 MICROBIOLOGY TEST INDEX

42.1 Routine Microbiology Tests

Table 30 Routine Microbiology Tests

Specimen	Test	Specimen Volume/ Type	Special Precautions/ Sample Stability	Turnaround Time
Abscess Fluid	C&S	Representative Sample	-	5 working days
Abscess Swab	C&S	Transport Swab	Maximum of 4 days old	5 working days
Anorectal Swab	GBS Screen	Transport Swab	Maximum of 4 days old	5 working days
Arterial Line Tip	C&S	4cm approximately	-	5 working days
Ascites Fluid	C&S, Microscopy Gram & Diff if indicated	2-5mL	For >1 department e.g. Biochemistry, Cytology, a separate form and increased volume is required **Less than 4hours, otherwise refrigerate**	5 working days
Broncho-alveolar Lavage	C&S, Gram	Total Sample	Where possible all specimens should be fresh and taken before antimicrobial treatment	5 working days

Specimen	Test	Specimen Volume/ Type	Special Precautions/ Sample Stability	Turnaround Time
			is started	
Bile Fluid	C&S, Gram	2-5mL	**Less than 4hours, otherwise refrigerate**	5 working days
Blood	C&S	510mLAnaerobic/ Aerobic	Do not remove or cover barcode labels on bottles. Do not refrigerate Deliver to laboratory as soon as possible but within 4 hours from collection.	Negative- 6 Positive-4
Bronchial Aspirate	C&S, Gram	Total Sample	**Less than 4hours, otherwise refrigerate**	5 working days
Bronchial Washings	C&S, Gram	Total Sample	Where possible all specimens should be fresh and taken before antimicrobial treatment is started	5 working days
Central Line Tip	C&S	4cm approximately	-	5 working days
Cerebrospinal Fluid (CSF) ***Please phone Microbiology before specimen is taken***	Microscopy, Differential, Gram stain, Protein, Glucose C&S Xanthochromia Meningococcal / Bacterial PCR Viral PCR Oligoclonal Bands TB PCR	3 Numbered Samples Brown Plastic Tube for xanthochromia- (not currently available) Minimum 1mL + EDTA Blood + Serum sample Minimum 500µL Minimum 500µL	**Alert Lab before sending samples** Minimum Volume: 1ml x 3 samples. 1ml Essential for test-Referred Clinical Chemistry, Beaumont MMRL, Temple St Special request form NVRL SJH SJH	Microscopy-2 hours Culture- 4 days 2 days-Consultant request for urgent 7 working days 7 working days 7 working days See below
Cervical Swab	C&S, Gram (Wet Prep if appropriate)	Transport Swab	Inappropriate specimen pre puberty – take a vaginal swab	5 working days
Corneal Scrapings/Intraocular Fluids	Parasitology	Sterile Container	Contact consultant Microbiologist in advance	5 working days
CVP Line Tip	C&S	4cm approximately	-	5 working days
Ear Swab	C&S	Transport Swab		5 working days
Endotracheal Tube	C&S, Gram	Total Sample	-	5 working days
Eye Swab	C&S	Transport Swab	Maximum of 4 days old	5 working days
Eye Swab	*Neisseria gonorrhoeae*	Aptima Swab	Sent to the NVRL	7 working days
Eye Swab	*Chlamydia*	Aptima Swab	Sent to the NVRL	7 working days

Specimen	Test	Specimen Volume/ Type	Special Precautions/ Sample Stability	Turnaround Time
	trachomatis			
Faeces	Aerobic, C&S	Representative Sample	Do not overfill sample container	5 working days
Faeces	Occult Blood	Samples on 3 consecutive days	Point of care test available.	5 working days
Faeces	*C.difficile* Screen	Representative Sample		1 working day
Fluids	C&S	Sterile Container	**Less than 4hours, otherwise refrigerate**	5 working days
Fluids	Microscopy	Sterile Container	**Less than 4hours, otherwise refrigerate**	1 day
Genital Swab	C&S	Transport Swab	Maximum of 4 days old	5 working days
Hair	Fungal Culture, Microscopy	Representative Sample	Sent to St James's Hospital	14-28 working days
HVS	C&S, Gram Stain, GBS, Hay's Criteria	Transport Swab	Aptima collection swab is recommended for detection of *Neisseria gonorrhoeae* & *Trichomonas vaginalis*	5 working days
Joint Aspirate	C&S,Microscopy, Gram & Differential Cell count if indicated	2-5mL	**Less than 4hours, otherwise refrigerate** -	5 working days
Mouth Swab	C&S, Gram Stain	Transport Swab	Maximum of 4 days old	5 working days
MRSA Swab [Nasal, Groin }	MRSA Screen	Transport Swab	Maximum of 4 days old -	4
Nail Clippings	Fungal Culture, Microscopy	Representative Sample	Sent to outside Laboratory	14-35 working days
Nasal Swab	C&S	Transport Swab	Maximum of 4 days old	5 working days
Nasopharyngeal Aspirate (NPA)	Extended Respiratory Virus Screen (referred) SARS CoV-2 /Flu /RSV	Red Topped 3mL Clinical Transport Media(CTM	48 hours at room temperature (RT) 10 days at 2-8 °C ***(OLHN patients only)*** ***Additional tests requests referred***	**In –house** 1 **Referrals to NVRL** 3-4 working days
Nasopharyngeal/ Oropharyngeal swab	SARS-CoV-2/ Influenza /RSV	Red Topped 3mL Clinical Transport Media(CTM)	Stable x 48hrs@ RT; 7 days at 2-8 ˚C;	**9hours**
Perineal Swab	C&S	Transport Swab	Maximum of 4 days old -	5 working days

Specimen	Test	Specimen Volume/ Type	Special Precautions/ Sample Stability	Turnaround Time
Pernasal Swab **Query Pertussis**	*Bordetella pertussis*	Use Perinasal Swab	Do not use ordinary transport swab	5-10 working days
Pleural Fluid	Microscopy Culture	2-5mL	**Less than 4hours, otherwise refrigerate** -	1 working days 5 working days
Pus	C&S, Gram Stain	Ideally, a minimum volume of 1mL of pus should be submitted.	Collect specimens before antimicrobial therapy where possible -	5 working days
Rectal Swab	VRE/CPE CPE (molecular)	Red topped paired Swab	Maximum of 4 days old	4 24 hrs
Sinus Aspirates	C&S	Sterile Container	**Less than 4hours, otherwise refrigerate**	5 working days
Skin Scrapings	Fungal Culture, Microscopy	Representative Sample	Referred to SJH	14-28 working days
Skin Swab	C&S	Transport Swab	Maximum of 4 days old	5 working days
Sputum	Aerobic C&S, Gram Stain	Representative fresh sample taken before antimicrobial treatment is started	Where possible all specimens should be from deep in the lungs, no salivary samples	5 working days
Sputum	Mycobacteria	Representative Sample	Please see TB Guidelines below	Referral to SJH Up to 8 Weeks
Throat Swab	C&S	Transport Swab	Maximum of 4 days old	4 working days
Tips	C&S	Sterile Container Cannulae should be collected in appropriate CE marked leak proof containers	Collect specimens before starting antimicrobial therapy where possible, transported and processed as soon as possible	5 working days
Tissue to include Bone, Biopsy, Joint Prosthesis & Bone Marrow	Gram stain Culture &S Enrichment Culture,	Representative Sample No larger than 2 cm^2 in size. (3 - 6 samples recommended).	Collect specimens before starting antimicrobial therapy where possible	1 5 9
Ulcer	C&S	Transport Swab	Maximum of 4 days old	5 working days
Urethral Swab	C&S, Gram Stain,	Transport Swab	Aptima collection swab is recommended for detection of *Neisseria gonorrhoeae* Maximum of 4 days old	**<u>Referrals to NVRL</u>** 1-6 working days
Urine	*Chlamydia trachomatis*	Aliquot of first void specimen	Aptima kits available from Microbiology	**<u>Referrals to NVRL</u>** Up to 7 working days
Urine	Microscopy Culture & S	Representative mid-stream sample at least 2mLs Yellow top < 2mls	Shelf-life is 96 hours in Monovette with Boric Acid (green top); 72 hours in Monovette without Boric Acid (yellow top).	Microscopy: 1 working day Culture: 5 working days
Urine	Pneumococcal and Legionella Antigen	Representative Sample Minimum 5 mL	-	1 working day
Urinary Catheter	Unsuitable Specimen	-	-	Not processed
Vaginal Swab	Hays Criteria Culture & S	Transport Swab	Maximum of 4 days old	5 working days

Specimen	Test	Specimen Volume/ Type	Special Precautions/ Sample Stability	Turnaround Time
Viral Swab	Viral Culture	Pink Top Viral Swab	Sent to the NVRL	Up to 7 working days Request if urgent
Viral -Throat/ Nasal Swab	Influenza/ Respiratory screen	Pink Top Viral Swab	Sent to the NVRL	Up to 7 working days
Vomitus	Unsuitable	-	-	Not processed
Vulval Swab	C&S, Gram Stain	Transport Swab	Maximum of 4 days old	5 working days
Wound Swab	C&S, Gram Stain	Transport Swab	Maximum of 4 days old	5 working days

*** When received over lunch-time without advance notice**

- TATs given are for processing of specimens from date of receipt **Monday-Friday** within the Microbiology Laboratory
- Additional 48/72 hours must be added for TAT to include a week-end or Bank Holiday respectively.

42.2 On-call Microbiology Tests

The tests listed in Table 32 are performed on-call.

Table 31: On-call Microbiology Tests

Microbiology On-Call Multi-Disciplinary Tests
Blood Cultures: Blood Cultures received & incubated; Positive Blood Cultures- Gram Stain read and reported; Culture plates set up.
CSF: Performed in-house on call -TAT 2 hours
SARS-CoV-2/ Flu A/B & RSV : 9 hours SARS-CoV-2, Flu A/B & RSV will be tested during Flu/RSV season & as clinically required
Unspecified/other Emergency Microbiology Specimens: Consultant Microbiologist on-call must approve e.g. Joint-fluid, Gram stain &set up culture

42.3 Additional Request Form

An additional request form is required for add on test requests.

43 SPECIMEN RETENTION TIME

The retention times for Microbiology specimens are listed below. Occasionally additional analyses may be required but may not always be possible due to the specimen processing procedure in Microbiology. In all cases, please contact the Microbiology Department for advice.

Table 32: Specimen Retention Time

Sample Type	Retention Time
CSF	3 months
Fluids & Tissues	7 days
Positive Blood Cultures	7 days
Significant Culture Plates	3 days
Sputum	7 days
Swabs for culture	7 days
Swabs (Molecular)	7 days
Urines	<2 days

44 COMUNICATION OF CRITICAL RESULTS

All CSF and urgent results will be phoned to the requesting clinician or ward. All significant results will be phoned to the relevant ward or doctor and the Consultant Microbiologist or Infection Control as appropriate.

Infection control results will be communicated using the daily Infection Control print out. Notifiable diseases are reported to the Health Protection Surveillance Centre (HPSC). It is the legal responsibility of the requesting clinician to report all notifiable diseases. In OLHN, it is the responsibility of the surveillance scientist to notify HSE via CIDR of any notifiable diseases.

Table 33 Communication of Critical Results

Result	Communicated to :			ID/ Sens where applicable Communicated within: (hrs)
	IPCT (in-patient)	**Consultant Microbiologist (in-patient)	Ward/Requesting Clinician	
To be communicated within hours of receiving sample				
Positive Legionella Ag		√	√	**2**
Positive Gram stain on CSF		√	√	**2**
Sterile Fluid Gram stain (theatre)		√	√	**2**
C. difficile Toxin A/B Detected or PCR Positive	√	√	√	**4**
Positive *Norovirus*	√		√	**4**
Positive Pneumococcal Ag		√	√	**4**
To be Communicated within hours of getting result				
Probable CPE	√	√	√	**2**
Positive CSF culture	√	√	√	**2**
Sterile Fluid/Tissue Culture positive		√	√	**4**
Positive Blood culture ID :- Staph aureus/ Yeast/ *L.monocytogenes*/Strep/Salmonella and if in doubt		√	√	**2**
Blood Culture Gram stain -Yeasts/ GPC in chains/diplococci, GNB, GNCB.		√	√	**2**
Blood culture Positive meningococci (both in case of Gram-stain and culture result)	√	√	√	**2**
Blood Culture Gram stain positive – GPC clusters, diphtheroids, Other.			√	**4**
Group A Strep – in normally sterile sites	√	√	√	**4**
*Positive referred test- VTEC/TB/Bordetella (Stain and culture)	√	√	√	**4**
*Positive referred test- CPE	√	√	√	**4**
Positive SARS Co V2 , Flu A and B, RSV	√		√	**2**
To be communicated As soon as possible where necessary				
Sterile culture sensitivity releasing		√	√	**24**
**Any unexpected result/ unusual pathogen or MDRO where result would impact clinical management of patient		√	√	**24**
Positive referred test- other		√ **(if required)**	√	**24**

Ref. LP-MIC-0085 Communication of Significant Results in Microbiology

45 ADVISORY SERVICES

Contact the Microbiology Department for any queries in relation to any aspect of the service. The Consultant Microbiologist is available by telephone 24/7 via main hospital switchboard.

REFERRAL TESTS

46 INTRODUCTION

Many laboratory tests are performed in the Department of Pathology in Our Lady's Hospital, Navan. However, a number of specialised tests are sent to Referral Laboratories for processing.
This may be due to the requirement of:

- A unique or unusual service
- A service not available in Our Lady's Hospital, Navan
- A Specialist Service
- Confirmation of initial unusual findings
- Back-up service in the event of an unplanned interruption of the service

47 REQUESTING REFERRAL TESTS

Most referral tests should be requested on the 'Other Tests' section of the *LF-GEN-0019 Pathology General Request Form*.
Patients requiring genetic testing or any associated genetic tests should be referred to specialised centres or consultants for such screening and counselling

Genetic tests require completion of specific forms depending on the referral laboratory used. Note that many genetic tests are only completed upon request from a specialist service e.g. Cancer Molecular Diagnosis. Contact Specimen Reception extn 2577 for further information. Please note the Laboratory does not provide a genetic counselling service for any referral genetic examinations,

External Tests (not available via Healthlink ordering) must be requested on a separate Request Form with separate Blood Tubes.

- Please phone the Laboratory if in any doubt over sample requirements and sample type. Refer to Special Handling Needs for requirements for biological specimens.
- It is not possible to add an additional test request to a sample which has already been dispatched to a Referral Laboratory.
- Sufficient specimens **must** be provided for referral tests as multiple test requests may be sent to different laboratories. It is not feasible to use specimens already provided to the Biochemistry/ Haematology Department for other tests as these specimens are retained in that Department for a specified period of time should re-testing be required. It is not safe practice to split specimens from the original container.

The temperature requirements of referral specimens are available in the Hospital shared drive and the OLHN Pathology Services website as recorded on

LI-GEN-0002: List of referred Tests

Specific tests details are available at

https://www.hse.ie/eng/services/list/3/acutehospitals/hospitals/navan/radiologyservicesatourladyshospitalnavan.html

48 SELECTION OF REFERRAL LABORATORIES

In order to ensure that a Referral Laboratory can provide a quality service, a number of areas are explored before selection of a particular laboratory including:

- Accreditation Status
- Turnaround Times
- Irish Reference Centre
- Test Profile
- External Quality Assurance Scheme Performance
- Cost

Ref.: *MF-GEN-0049 Evaluation of Supplier Form*

49 MAINTAINING A RECORD OF ALL REFERRED SPECIMENS

Details of the specimens are recorded in APEX and relevant referral logs as appropriate

APPENDIX 1: DEFINITIONS

ADR: Carriage of Dangerous Good by Road

ALB: Albumin

ALP: Alkaline Phosphatase

ALT: Alanine Transaminase

APTT: Activated Partial Thromboplastin Time

AST: Aspartate Amino Transferase

BB: Blood Bank

B-HCG: Beta Human Chorionic Gonadotropin

BIO: Biochemistry

BT: Blood Transfusion

CIDR: Computerised Infectious Disease Reporting - National IT System to manage surveillance and control of Infectious Diseases

CK: Creatine Kinase

CMV: Cytomegalovirus

CRF: Chronic Renal Failure

CRP: C - reactive protein

C&S: Culture and Sensitivity

D & C: Dilation and Curettage

DCT: Direct Coombs Test

DOB: Date of Birth

ED: External Documents

ESR: Erythrocyte Sedimentation Rate

FBC: Full Blood Count

FSH: Follicle Stimulating Hormone

FT3: Free T3

FT4: Free T4

GEN: General

GGT: Gamma-Glutamyl Transferase

GP: General Practitioner

G&S: Group and Screen

HbS: Haemoglobin S

HCT: Haematocrit

HDL: High Density Lipoprotein

HF: Haemovigilance Form

HIV: Human Immunodeficiency Virus

HP: Haemovigilance Procedure

HPSC: Health Protection Surveillance Centre

HSE: Health Service Executive

HVS: High Vaginal Swab

IBTS: Irish Blood Transfusion Board

ICU: Intensive Care Unit

ID: Identity

IgA: Immunoglobulin A

IgG: Immunoglobulin G

IgM: Immunoglobulin M

INAB: Irish National Accreditation Board

INMRL: Irish National Mycobacterium Reference Laboratory

INR: International Normalised Ratio

IBTS: Irish Blood Transfusion Service

IT: Information Technology

LDH: Lactate Dehydrogenase

LDL: Low Density Lipoprotein

LF: Laboratory Form

LH: Luteinising Hormone

LIS: Laboratory Information System

LP: Laboratory Procedure

MCH: Mean Cell Haemoglobin

MCHC: Mean Cell Haemoglobin Concentration

MCV: Mean Cell Volume

MIC: Microbiology

MF: Management Form

MMUH: Mater Misericordiae University Hospital

MP: Management Procedure

MRN: Medical Record Number

MRSA: Methicillin-Resistant Staphylococcus aureus

MSU: Mid-Stream Urine

NPS: Nasopharyngeal swab

NVRL: National Virus Reference Laboratory

OLH: Our Lady's Hospital, Navan

PCC: Prothrombin Complex Concentrates

PCR: Polymerase Chain Reaction

PCT: Procalcitonin

PSA: Prostate Specific Antigen

PT: Prothrombin Time

QF: Quality Form

RA: Rheumatoid Arthritis

RBC: Red Blood Cell

RDW: Red Cell Distribution Width

RIQAS: Randox International Quality Assurance Scheme

SD: Solvent Detergent

TAT: Turnaround Time

TB: Tuberculosis

TSH: Thyroid Stimulating Hormone

UKNEQAS: United Kingdom & International External Quality Assessment System

VRE: Vancomycin-Resistant Enterococci

WEQAS: Welsh External Quality Assurance Scheme

ZN: Ziehl Neelsen