Tallaght University Hospital | Ospidéal Ollscoile Thamhlachta

An Academic Partner of Trinity College Dublin

Department of Laboratory Medicine
Tallaght University Hospital
Tallaght
Dublin 24

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Introduction and Scope

The laboratory medicine user manual is a guide for users of the laboratory service. It contains information on all disciplines; Haematology, Microbiology, Blood Transfusion, Clinical Chemistry, Cellular Pathology, POCT and Adult Phlebotomy. The manual is intended for internal customers and external customers i.e. General Practitioners. It is published on the Hospitals intranet and internet web sites

Tallaght University Hospital | Ospidéal Ollscoile Thamhlachta

An Academic Partner of Trinity College Dublin

Tallaght University Hospital (TUH)

LABORATORY MEDICINE USER MANUAL

Edition 10.1

VALID UNTIL NEXT RELEASE
AUTHORISED BY MR. CIARAN LOVE
MINOR UPDATES WILL BE MADE TO THE .PDF VERSION LOCATED ON THE INTRANET/INTERNET.

Use of the guide

Every effort has been made to ensure accuracy of the content of this guide to our services. It is written for clinical staff that use the Laboratory at Tallaght Hospital (TUH). From time to time, it is necessary to update the content for operational reasons. This will lead to new version of the manual being published online normally on a twice–yearly basis.

This edition (10.1) is valid from July 2025. The volume is published in .pdf format.
CHANGES TO THE PREVIOUS EDITION ARE LISTED IN AMENDMENT SECTION
AND MUST BE CHECKED PRIOR TO USING THE MANUAL

Responsibility

The primary responsibility for follow up action on any laboratory test result rests with the person who requested the test. Prior to requesting a test, the practitioner is responsible for ensuring that a process is in place to ensure that they or another competent team member, is available to receive and act on the result when it becomes available. The requestor is also responsible for giving the laboratory a clear indication if there is exceptional urgency or importance associated with processing a particular sample. The timeframe within which they, or a team member, follows up to seek the test result should take account of their clinical assessment of the need for urgency and the time within which a result is likely to be available.[ref:HSE Guideline 2025 Communication of Laboratory Results Likely to Require Urgent Action]

Consent

Consent for individual investigations may require prior agreement with the patient or guardian (e.g. for genetic testing (section 1.11) and in-house post mortems). For most routine laboratory procedures, consent can be inferred when the patient willingly submits to the sample collecting procedure, for example, venepuncture. If obtaining consent is not possible in emergency situations, the laboratory may carry out necessary procedures, provided they are in the patient's best interest. Users of the Laboratory Medicine Service are advised to familiarise themselves with the publication – HSE National consent policy NOHREP-CONS-001 available on Q-pulse.

Samples submitted for analysis may be used anonymously for quality control purposes following completion of testing.

Confidentiality & Impartiality

All investigations and results produced by the laboratory are of a confidential nature in line with respecting the privacy of the patient / doctor relationship and the needs of the clinical staff providing the care. Patient/Non patient confidentiality policy [ORG-POL-30] is available on Q-pulse.
The Code of Conduct (HSE) Human resources policy [HR-POL-078] is available on Q-pulse and iPassport and covers employees' impartiality and confidentiality obligations. Access to testing information and results should be on the basis of need only. Strict access and usage criteria are enforced with prevailing Data Protection Legislation.

IVDR Regulations

Laboratory Medicine TUH are currently aligning with EU IVDR regulations. To date >90% of tests are IVDR compliant. TUH is expected to be IVDR compliant by May 2028. See Table in Appendix 2.0 for tests not currently IVDR compliant. The remaining 10% of tests require further investigation and clarification with IVDR guidelines to confirm status.

Table of content

LABORATORY MEDICINE DEPARTMENT QUICK DIRECTORY

 POSTAL ADDRESS:

Department of Laboratory Medicine,
Tallaght Hospital (TUH)
Dublin 24
Ireland
D24NR0A

 Prefix (01) 414 for direct access from outside the hospital

Laboratory Medicine	Contact no.	Opening Hours	Sample Deadlines
Main Office	3918/4703/4875	Mon-Fri 9am-5pm	
Central specimen reception	3917	Mon-Fri 9am-5pm Sat 9am-11:30am	Mon-Fri GP samples must be received by 1pm
Team Leader Porter	Access switch at 2000 for Bleep 6232		
Phlebotomy	3040	Refer to section 7.8	
Near Patient Testing	3609	Mon-Fri 9am-5pm	
Mortuary	2593 Bleep 7079		

LABORATORY MEDICINE DIRECTORY OF SENIOR STAFF

Clinical Director of Laboratories	Dr. Ronan Desmond	4132
Chief Scientist / Laboratory Manager	Mr. Ciaran Love	3905
Laboratory Administration Officer	Ms. Gillian Maguire	3918
Phlebotomy Manager	Ms Deborah Ennis	3040 / bleep 6249
Near Patient Testing (NPT) Manager	Ms. Phyllis Reilly	3609
Quality Manager	Ms. Fionnuala O'Dwyer	3380
Quality Innovation Manager	Dr. Ann Leonard	3968
Clinical Chemistry		
Consultant Chemical Pathologist	Dr. Gerard Boran	3911
Consultant Chemical Pathologist (NPT)	Dr. Ana Rakovac	
Clinical Chemistry Registrar		3930 Bleep 7285
Chief Medical Scientist	Mr. Eoin Begley	3908
Haematology		
Consultant Haematologist(Adult)	Prof. Helen Enright	3912
Consultant Haematologist(Adult)	Dr. Johnny McHugh	3913
Consultant Haematologist(Adult)	Dr. Ronan Desmond	4132
Chief Medical Scientist	Ms Lorraine Mc Mahon	3909
Senior Registrar Adult Haematology		3937 Bleep 7025
Registrar Adult Haematology		3937 Bleep 6258
Blood Transfusion		
Consultant Haematologist (Adult)	Prof. Helen Enright	3912
Consultant Haematologist (Adult)	Dr. Johnny Mc Hugh	3913
Consultant Haematologist (Adult)	Dr. Ronan Desmond	4132
Chief Medical Scientist	Ms. Alison Harper	3910
Registrars		3937 #7025 #6258

Microbiology		
Consultant Microbiologist	Dr. Susanna Frost	3919
Consultant Microbiologist	Dr. Jerome Fennell	3936
Consultant Microbiologist	Dr. Anna Rose Prior	3920
Consultant Microbiologist	Dr Sarah Bergin	3936
Consultant Microbiologist	Dr Daniel Hare	3919
Chief Medical Scientist	Donal Smith	3906
Microbiology Registrar		4707/2733/2455
Infection Prevention & Control Assistant director of nursing	Ms Shaini Paul Matthews	2061

Cellular Pathology (Histopathology and Cytopathology)		
Consultant Histopathologist	Dr. Kevin O'Hare	3914
Consultant Histopathologist	Dr. Michael Jeffers	3921
Consultant Histopathologist	Dr. Dorinda Mullen	3929
Consultant Histopathologist	Dr. Stephen Crowther	3991
Consultant Histopathologist	Dr. Paul Crotty	3921
Consultant Histopathologist	Dr Peter De La Harpe Golden	3915
Consultant Histopathologist (Paediatric)	Dr. Maureen O'Sullivan	3929
Consultant Neuropathologist	Dr. Francesca Brett	3929
Consultant Histopathologist On-Call		Contact Switch
Chief Medical Scientist	Sarah Delaney	3992

Discipline contact numbers:

Clinical Chemistry	Contact no.	Opening Hours	Sample Deadlines
Results and enquiries	3952/3954	Mon-Fri 8am-8pm & Sat 9am-12:30pm	**Mon-Fri** Routine service 8am to 8pm. All in-house samples on OCS will be processed in this timeframe. After 8pm Emergency on-call service available Samples from Primary Care and OPD received after 15:00hrs may be held until next working day **Saturday morning** Specimens for general chemistry, in Lab by 11:00am on Saturday will be reported by 12:30pm Between 12:30pm Saturday to 8am Monday (8am Tuesday if bank holiday) Emergency on-call service available.
Clinical Chemistry Laboratory: scientific enquiries	3951		
Endocrinology lab	3955		
Sweat test appointments	3952/3954		
STAT lab	3951		
Medical scientist On-Call (Ring STAT lab in first instance otherwise, On-Call)	Bleep 7283		

Routine samples arriving after the stated deadlines will be analysed the next routine working day

Outside these hours an emergency on-call service is available for all urgent requests, see section 5.5

Urgent samples from inpatients (including Peamount Healthcare) must be delivered directly to the Clinical Chemistry laboratory

Haematology	Contact no.	Opening Hours	Sample Deadlines
Results enquiries	3932/3959	Mon-Fri 8am-8pm Sat 9am-12:30pm	**Mon-Fri:** Routine testing on samples received by 3:30pm. Between 8am-9am and 5pm-8pm only emergency samples will be processed **Saturday morning:** Routine testing on samples received by 11:30am Between 12:30 Saturday to 8am Monday (8am Tuesday if bank holiday) only emergency samples will be processed
Registrars	3937 (Bleep 6258/7025)		
Routine lab	3961/3962/2966		
Coagulation	3963/2296		
Special Haematology	3960		
Medical Scientist on call	Bleep 7282		

Outside these hours an emergency on-call service is available for all urgent requests, see section 6.4.
Non-urgent requests will be stored at 4^0C (if applicable) and processed the following routine morning

Blood -Transfusion	Contact no.	Opening Hours	Sample Deadlines
Routine Lab Enquires	3964/3965	Mon-Fri 8am-8pm Sat 9am-12:30pm	Routine testing is carried out 9am-5pm Mon-Fri. Routine samples must be received by Blood Transfusion Laboratory no later than ***3:45pm***) Routine samples must be received by Blood Transfusion Laboratory no later than ***11:00***

All samples received after stated cut off times will be processed by 12pm on the next routine working day. Between 8am–9am and 5pm–8pm Mon to Fri only emergency samples will be processed and telephone queries will be taken.

Medical Scientist on call	Bleep 7281	**Outside routine hours an emergency on-call service is available for urgent requests**
Blood Delivery Porter	Bleep 7266	
Haematology Team Registrars	3937 (Bleep 6258/7025)	Contact Via switch during on call hours.
Haemovigilance Officers	Ext: 2372/2437 Bleep: 2110/2111	Hours of work Mon-Fri 8:00 to 16:00

Microbiology	Contact no.	Opening Hours	Sample Deadlines
Results, enquiries	3934/3935	8am-8pm Mon-Fri	Deadline for reports by 5pm Specimens in Lab by 4:30pm Antibiotic assays in Lab by 3pm
Registrar	4707/2733/ 2455		
Microbiology Main Laboratory Specimen Reception	3940		
Main Microbiology lab	3942		
Blood cultures/ Antibiotic assays	3939		
TB lab	3944	Sat 9am-12:30pm	Deadline for reports by 12:30pm Specimens in Lab by 11:30am Antibiotic assay in Lab by 11:00am
Medical scientist on-call	Bleep 7280		
Routine samples arriving after the stated deadlines will be analysed the next routine working day			

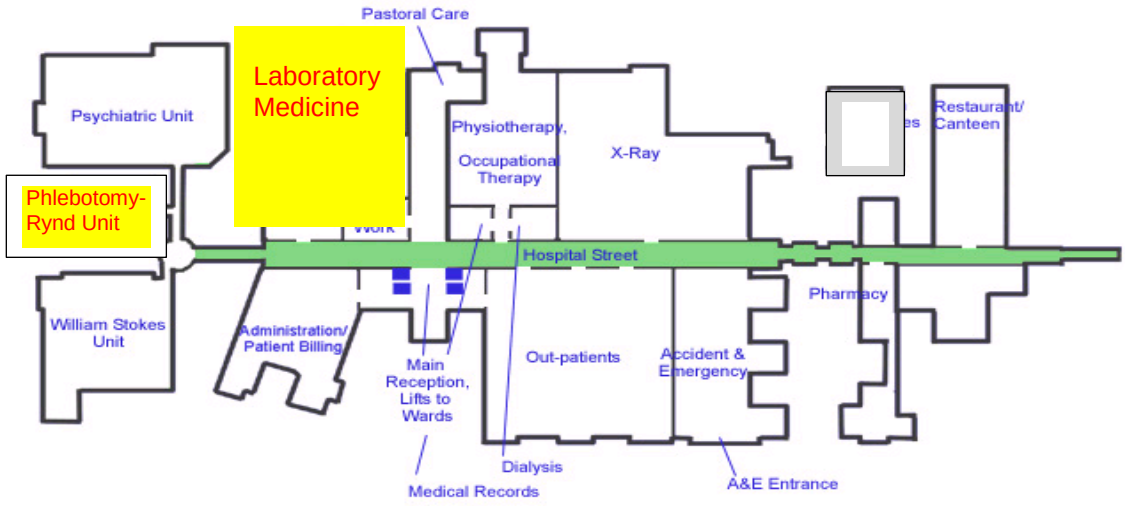
Cellular Pathology	Contact no.	Opening Hours	Sample Deadlines
Enquiries	3929/3928/3985 or cellular.pathology@tuh.ie	Mon-Fri 9am-5pm Sat 8am-11:30am	Deadline for receipt of specimens in lab **Mon-Fri: 16:30** **Sat: 11:00**
Registrars	3922		
Routine Laboratory	3973		
Specimen reception	3925		
Frozen sections	3973		

1.0 INTRODUCTION

This user manual is intended as a guide to services provided by the Department of Laboratory Medicine, Tallaght Hospital (TUH) and is available on the hospital internet at www.tuh.ie. It is also available on the Hospital intranet page. There is a separate guide available on www.tuh.ie called "Information for GPs using the Laboratory Medicine Service in TUH".

LOCATION OF THE LABORATORY

The department is located on the ground floor of the main hospital building to the left of the main atrium. Access is via security card controlled double doors from the main Hospital Street. Phlebotomy is located at the end of Hospital Street as indicated on the diagram. Secure access to the Department facility is provided to hospital staff.



The Laboratory Medicine Department is the Pathology Diagnostic Department for all clinical activity in the hospital and provides services to the community of General Practitioners supported by the hospital, and to other Health Care Institutions. There are 5 disciplines - Blood Transfusion (including Haemovigilance), Cellular Pathology, Clinical Chemistry, Haematology and Microbiology. The Laboratory Medicine Department also provides core adult phlebotomy services, near patient testing service and an external test referral for Immunology & Constitutional Genetics testing.

2.0 QUALITY MANAGEMENT SYSTEM

The Department of Laboratory Medicine is committed to providing a high quality, efficient and comprehensive service to our patients and clinical users. Patients' well-being, safety and right to care, that is free from discrimination, are the primary considerations. The Laboratory is committed to treating patients, samples and /or remains with due care and respect. Central to these commitments is the Quality Management System (QMS). The Laboratory is accredited by the Irish National Accreditation Board (INAB) to *ISO 15189:2022 Medical laboratories — Requirements for quality and competence* and is compliant with the requirements of EU Blood directive 2002/98/EC. The laboratory maintains a strong focus on continuous quality improvement for all aspects of its service.

INAB have granted Clinical Chemistry, Haematology, Near-patient testing and Cellular Pathology departments the ability to mark selected tests as INAB accredited using their Flexible scope policy. (Refer to www.inab.ie INAB PS11 Document) The list of tests accredited using this policy is available from the Laboratory on request.
A full list of Laboratory Medicines accredited tests is published by INAB and publicly available on the INAB website using reference code 330MT. This list includes Technique, Range of Measurement and Method. Other information is available from the Laboratory on request. All tests which are not within the scope of INAB accreditation are clearly identified on the final report.

Each written test request received by the laboratory shall be considered an agreement. A written request is also required for any add-on tests.

The quality of results is of fundamental importance and the laboratory operates to strict scientific and management standards. Results are authorised within a framework of comprehensive internal and external quality control and quality assurance.

The Laboratory Medicine Department Quality Policy is displayed in the department and available at www.tuh.ie/laboratory/.

The laboratory identifies potential risks to patient care in the pre-examination, examination and post-examination processes. These risks are assessed and mitigated to the extent possible. Residual risk is considered a low to medium risk from Laboratory processes provided hospital policies and procedures are adhered to. Information on residual risk to patient care is available from each discipline if required and if appropriate.

We currently are unable to release results directly to patients. Results can only be communicated to the requesting clinician. It is the requesting clinician's responsibility to communicate with the laboratory regarding requested tests & results. Laboratory results can be requested by clinicians by emailing gplabqueries@tuh.ie.

Patients can request results from their GP or directly through a freedom of information (FOI) request to the ROI office in TUH. Email Roi@tuh.ie with photo identification.

TUH is a publically funded entity so laboratory closure, acquisition or merger is extremely unlikely. In the event that the service moves to another location, or is managed by another authority, the current Laboratory Management team will ensure the ongoing integrity of patients' samples (if applicable) and availability of patients' records.

Related documents on Q-pulse\iPassport:

ADM-POL-24 Information governance Data protection impact assessment and data processing agreements
ICT-POL-61 Information governance –Data security incident policy
ORG-POL-15 HSE National Consent Policy
ORG-POL-30 Confidentiality policy
ORG-POL-33 Protected disclosure policy
ORG-POL-34 Record retention and destruction policy
ORG-POL-37 Risk & Incident Management Policy
ORG-RA-GUI-001 Guidelines on obtaining patient consent

ORG-POL-2 Internal Incident Response Plan
ORG-MD-POL-004 TUH Major Emergency Plan
ORG-PRT-9 QSRM Notifying Serious Reportable Events Protocol
PPC-DG-POL-022 Positive patient identification in the Adult services of TUH
PPC-POL-21 Clinical practitioners undertaking venepuncture policy
PPC-POL-53 Safer mobility policy
PPC-POL-132 Blood Transfusion - Management of a Serious Adverse Event, Near Misses and Rapid Alert Notification in Adults and Paediatrics Policy
PPC-POL-135 Phlebotomists Undertaking Blood Sampling from Central Venous Access Devices in the Adult Services Policy
PPC-PRO-151-Positive Patient Identification in Tallaght University Hospital Procedure
PPC-PRO-311 Blood Transfusion -Blood Track Personal Digital Assistant (PDA) and Printer Use in Clinical Areas of Tallaght University Hospital Procedure
H&S-POL-3 Hospital Safety Statement
H&S-POL-19 Chemical Safety Policy
HR-POL-30 Mandatory Education & Training Policy
HR-POL-78 Code of Conduct (HSE) Human resources policy
ADM-PAO-POL-005 Patient complaint policy
ADM-POL-5 Ionising Radiation Local rules
ENV-POL-17 IPC - Infection Prevention and Control Policy
ENV-GUI-10 IPC - Infection Prevention & Control Guidelines for Blood Culture Specimen Collection"
ENV-GUI-21 Facilities Estates - Infection Control Guidelines for the Management of Healthcare Waste
ENV-GUI-34 IPC - Management of Patients who require Transmission Based Precautions
HR-POL-75 Health & Wellbeing Policy
ORG-POL-6 HSE Charter - You and Your Health Service - What you can expect from your health service and what your health service can expect from you
ADM-PRO-9 Registering a Compliment and/or a Complaint received into the Patient Advice & Liaison Services (PALS) Department Procedure.
PPC-PRO-118 Radiology Services - Reporting of Ionising Radiation Incidences of patient, member of the public and staff Procedure
H&S-POL-3 Safety Statement
PPC-DG-POL-022 Positive patient identification in the Adult services of TUH

LM-UM-0046 2025 HSE Guideline Communication of Laboratory Results Likely to Require Urgent Action

3.0 USER FEEDBACK

Patients and users can access the “How to give positive feedback” form on the TUH website. Feedback can be emailed to pals@tuh.ie

Suggestions for improvements to the Laboratory service can be emailed directly to the Laboratory manager. ciaran.love@tuh.ie. Suggestions in relation to examination methods and interpretation of results will be directed to Consultant Head of Departments listed above.

Patients and users wishing to make a complaint about the Laboratory service should email the Laboratory manager or Quality manager directly. ciaran.love@tuh.ie or fionnuala.odwyer@tuh.ie

If it is not possible to solve the problem at department level, patients and users can also access the “How to make a formal complaint form” on the TUH website. A summary of the complaint with the user’s details and desired outcome can be emailed to pals@tuh.ie

User satisfaction is monitored in a variety of ways:

User focus groups e.g. GP Liaison Committee
User satisfaction surveys
Multidisciplinary team meetings
Clinical liaison
Hospital groups and committees
Ward rounds by Laboratory Clinicians
Response to user feedback
Review, analysis and monitoring of incidents and complaints

Communication with users is achieved by various means:

Laboratory Medicine User Manual & GP User manual
Laboratory Web page on TUH Intranet
GP Newsletter
Lectures and seminars
Grand Rounds
User focus groups e.g. GP Liaison Committee
Multidisciplinary team meetings
Clinical liaison
Hospital groups and committees
Ward rounds by Laboratory Clinicians

4.0 ORDERING TESTS \ORDER COMMUNICATIONS SYSTEM (OCS)

It is the policy of the department that the order communications system called ICE is the primary means by which tests (other than blood transfusion) are requested. We maintain a manual requesting process for backward compatibility only and it is being presently phased out. The ICE system between Clinical areas and the Laboratory is in place for both routine and urgent requesting.
Electronic result reporting from Disciplines in the Laboratory to all clinical areas is operational. Thus, any report that is generated electronically on the Laboratory computer system will be available after authorisation on the ICE system, provided it is not a restricted test or that the sample originates in another hospital.

Significant advantages accruing from electronic ordering include:

- Replacement of the need to write request forms.
- Availability of a pre-printed specimen barcode label that removes the need to write on specimen tubes.
- Status indicators for outstanding requests – these are available on-line.
- The system contributes substantially to improved patient safety by reducing sample and request identification errors.

For full details of the operational policy for the OCS system (ICE), please refer to the ICT policies on QPULSE (hospital users only).

REMEMBER:
Log off when leaving the computer
For training, fault logging, etc. please contact the ICT Helpdesk (ext. 2041/2042)
DO NOT GIVE OUT YOUR PASSWORD TO ANYONE!!

4.1 SAMPLE LABELLING REQUIREMENTS

For Blood Transfusion request form and sample labelling please refer to section 10.5 and 10.6 of this manual.

Cellular Pathology; Clinical Chemistry; Haematology; Microbiology Laboratories, Laboratory Medicine (Immunology and Genetics) and NPT ABG samples

REMEMBER: Positive Patient Identification MUST be confirmed before a sample is taken

In patients & OPD

Sample/ Test Request	Minimum Sample Labelling Requirements	Minimum Request Form Requirements (Use ICE if possible)
Primary labelling requirements	- First name and surname (correct spelling, in the correct order, no abbreviations) - Date of Birth - First line of address -Date and time of sampling - Type and/or site of non-blood sample -Signature of sample taker	-- First name and surname (correct spelling, in the correct order, no abbreviations) - Date of Birth - Gender (state if transgender) -- Address (if this has changed provide both addresses) - Location of patient -Date and time of sampling - Type and/or site of non-blood sample -Signature of requesting Doctor -contact number or bleep number
Additional	Tests requested Priority status	Tests requested Priority status Relevant clinical information

Failure to provide the correct patient information will result in the rejection of the test request.

Test requests will be rejected if the following situations apply:

- Incorrectly labelled or unlabelled samples are not acceptable and will result in specimen rejection. A repeat sample will be required which inconveniences your patients and delays test results.
- Blank or incomplete request forms are not acceptable and will result in test request rejection
- Samples that do not have at least two acceptable identifiers.
- Significant differences between patient identifiers on sample and corresponding request form.
- Significant differences between patient details and previous patient record in TUH

4.2 SPECIMEN TRANSPORT and SAFETY

The hospital safety statement is available on Q-pulse. The laboratory safety statement is available on request.

THE LABORATORY USES STANDARD PRECAUTIONS WHEN HANDLING ALL PATIENT SAMPLES.

4.2.1 General Safety Guidelines

1. Always use approved sample collection containers and ensure lids are securely closed
2. Observe Standard Precautions when taking patient samples. Please ensure that you are familiar with the Infection Control and Prevention Guidelines pertinent to specimen collection which are available on QPULSE (see hospital intranet website)
3. Always dispose of sharps appropriately and according to the hospital waste disposal policy.
4. Samples must be placed in approved biohazard bag with request form (if available) placed separately in the pouch provided.
   DO NOT PLACE SAMPLE AND FORM TOGETHER IN SAME POUCH OF BIOHAZARD BAG
5. Always supply clinical information including known infection risk with each request.
6. Any spills must be dealt with in accordance with hospital spill procedure. Please ensure that you are familiar with the Infection Control and Prevention Guidelines pertinent to spill management which are available on QPULSE (see hospital intranet website)

4.2.2 Radiation Safety

The procedure for managing 'hot' samples from patients who have received a radioactive imaging material or radiopharmaceutical material is available in Ionising Radiation Local Rules ADM-POL-5, located on the hospital QPULSE system.

Patient samples must be transported safely and efficiently in order to:

1. Ensure safe custody and integrity of the sample which must reach the laboratory in proper condition and as quickly as possible
2. Ensure the safety of staff transporting samples
3. Ensure the safety of other staff, patients and members of the public

Please Note:

THE PNEUMATIC TRANSPORT SYSTEM (PTS), (*IF APPROPRIATE TO THE SAMPLE TYPE),* IS THE PREFERRED METHOD OF DELIVERY OF SAMPLES TO THE LABORATORY.

THE PTS IS NOT TO BE USED FOR CELLULAR PATHOLOGY SPECIMENS, CSF FOR MICROBIOLOGY EXAMINATION-THESE MUST BE DELIVERED TO THE LABORATORY BY HAND.

Some useful hints for getting your specimens safely to the laboratory:

1. Use approved in-date sample collection containers
2. Use approved sample collection biohazard bags which can contain any spills or leaks within the bag when properly sealed
3. Use the PTS sample transport system where available and if appropriate to sample type
4. Use sample transport boxes (closed) where appropriate
5. Do not try to carry multiple specimens by hand
6. Do not leave samples in other locations *en route* to the laboratory
7. If there is doubt about the safe packaging / presentation of samples for transport, ask a supervisor for advice
8. Do not transport broken or leaking samples from their source – report to supervisor
9. Report any spills or breakages to supervisory staff
10. If required, follow appropriate spill procedures as provided by the hospital ICP guidelines on QPULSE
11. Ensure that samples transported to the Laboratory are in line with prevailing ADR regulations
12. Please ensure that samples are transported in the correct condition to the Laboratory. In general, samples at room temperature that are transported without delay are acceptable. However, there are important exceptions and users are referred to individual disciplines for guidance.

Refer to specific instructions in individual department sections for transport of samples which require special conditions or handling. If in any doubt please contact the relevant department by telephone.

Brief PTS Operating Instructions are located on laminated cards at each Ward PTS station and a summary is available in Appendix 1.

NOTE: in general the vast majority of samples processed by the Laboratory are Category B. However, in particular instances (such as threatened outbreaks such as EBOLA) samples may be category A and require packing and transport arrangements appropriate to the transport of category A specimens.

4.3 LABORATORY MEDICINE SPECIMEN RECEPTION/SUPPLIES

The specimen reception area in the Laboratory provides the following functions:

1. Supply of containers, request forms, urine dipsticks, FOB kits and pregnancy test kits. This service is available Mon – Fri 9.30 a.m. to 11.30 a.m.
2. Reception, collation and registration of specimens from GP patients. Refer to section 2.6
3. Dispatch of referral samples *via* courier to other institutions within Ireland.
4. Dispatch of referral samples to international destinations

4.4 REPORT DELIVERY

The following reporting arrangements stand:

1. The primary reporting mechanism for all reports from the laboratory is to the electronic **OCS database (ICE)**. Access is widely available throughout the hospital.
2. GPs may access their patient's results through the use of Healthlinks (www.healthlink.ie).
3. External Referrals – Results from CPL and the NVRL are electronically transmitted directly into the ICE record. Electronic PDF copies of results from other external laboratories are uploaded to ICE using Folding Space provided the original request was placed on ICE. All samples prior to the introduction of Folding Space (22nd May 2023), or placed on paper will continue to have their reports saved to the F shared drive and are only accessible within TUH. The text in the ICE result indicates which method of report display is used.
4. Reports are sent electronically to TUH clinicians via ICE and to GP practices via healthlinks.

   Exceptions are listed below:

   Haematology:

   Hard copy reports are sent to External sources not on Healthlinks and occupational health. Referral reports are available on ICE and the original reports are scanned. Hard copy referral reports are sent to GPs.

   Blood Transfusion:

   Hard copy of crossmatch reports are sent to the clinical area with the blood/blood product.

   Microbiology:

   Hard copy of referral reports from referral laboratories (except NVRL) are sent to GPs

4.5 TUH MAJOR EMERGENCY PLAN

This plan is part of the major accident plan for the greater Dublin area. This is available on Q-pulse and on iPassport LM-MP-0301

5.0 LABORATORY MEDICINE EXTERNAL LABORATORY REFERRALS

Each discipline refers samples for testing in a number of external laboratories. Please refer to the specific departments for details. Laboratory Medicine Central Specimen Reception handles Immunology and Genetic referral samples.

Specimen Requirements

In general, for immunology requesting serum samples (red cap) must be provided. EDTA samples are required for most Genetics requests.
All immunology and genetic tests are available on ICE and should be requested using ICE. Sample requirements and any specific collection procedures are described when ICE ordering. Samples will be accepted on white immunology forms if ICE is unavailable but recording of these requests will not be visible on ICE until the report has been returned which may cause confusion.
All Genetics requests must be accompanied by the specific genetic laboratory request forms.
Ensure that sample date and time are recorded on tube. Please send to the Laboratory Medicine Central Specimen Reception Department, TUH.
Requests are processed each weekday morning and dispatched to the CPL daily and to other labs Monday to Thursday.
Patient acceptance details on sample must be as described in section 4.1.

5.1 IMMUNOLOGY REFERRALS

5.1.1 Introduction

Requests for immunology (other than immunochemistry) are referred primarily to the Immunology Department in the Central Pathology Laboratory (CPL), St. James's Hospital. The department offers both a comprehensive testing service and clinical advice. . If users require Clinical Immunology advice, the Immunology clinical team can be contacted via St. James's Hospital switchboard on 01-4103000. Tests not analysed in CPL are sent to the appropriate UK laboratory, see table below.
If you have technical questions related to the immunology testing service please contact Mr Ciaran Love in Laboratory Medicine at 3905 or Senior Medical Scientist at 3988.

5.1.2 Standard Immunology Tests

For specimen requirements and turnaround times visit the St James's Immunology User Manual:
SJH Immunology Test directory

5.1.3 Common Non-CPL immunology tests

Turnaround times (TAT), sample details and/or special requirements can be found directly on the referring laboratory's webpage -~~*click on the clinks below to access*~~: Please allow 7-10 days additional TAT to allow for sample processing, transit and returned report processing.

GABA & AMPA ½ Receptor Abs	**Oxford Immunology Laboratory**
Acetylcholine Receptor Antibodies	
Voltage Gated CA+ Channel (Calcium)	
Voltage Gated K+ Channel (Potassium)	
Glanglioside Antibodies GM1 CSF / Serum	
Glanglioside Antibodies GQ1b CSF / Serum	
Glutamic Acid Decarboxylase (Anti GAD)	
Glycine Receptor Abs CSF / Serum	

Myelin Associated Glycoprotein Antibodies	**Oxford Immunology Laboratory cont.**
Myelin Oligodendrocyte Glycoprotein Antibodies	
HMG Co-Reductase	
Aquaporin 4	
NMDA Receptor CSF / Serum	
Adalimumab drug and antibody level	
Infliximab drug and antibody Levels	
Ganglionic Acetlycholine Receptor Antibodies	
Neuronal Antibodies **(Anti-HU / Anti-Ri / Anti-YO)** CSF / Serum	
Neuronal Immunoblot	
Orexin / Hypocretin	
Anti-CASPR2 CSF / Serum	
Anti-LGI1 CSF / Serum	
DPPX Abs CSF / Serum	
Paranodal / Nodal ABS	
IgLON5	
Adrenal Ab	
Islet Cell Ab	
Ovarian Ab	
MuSK Antibodies	
Myositis Screen	
Vascular Endothelial Growth Factor	**Queens Square Neuroimmunology**
BP180/230 ELISA	**St Thomas' Immunodermatology**
Zinc Transporter 8 Autoantibodies (Anti Zinc Antibodies)***	**Exeter Clinical Laboratory**
A-2 Antibody***	
Covid Antibodies	**Beaumont Immunology**
Scleroderma Panel	
Histone Antibodies	**Sheffield PRU Immunology**
Complement CH50	
IgD	
RNA Polymerase III	

5.1.4 Allergen Testing

Specific allergens are measured at Immunology SJH. In the case of rarer allergens, these are sent to Protein Reference Unit Sheffield for analysis. All available allergens are coded on ICE for requesting.

The criteria suggested by Immunology SJH with regard to allergen testing is as follows –

For the diagnosis of specific allergy in children and adults a good clinical history is recommended with testing for a limited number of suspected allergens. Requests for allergy testing should reflect these recommendations

The **Irish Food Allergy Network** website provides comprehensive guidelines on allergy testing.

Available resources
St. James's Hospital, Department of Immunology Allergy Advice Service is intended to support medical staff in the diagnosis of allergy. For allergy advice, please email AllergyAdvice@stjames.ie.

5.1.5 Protocol for Requesting Urgent ANCA and Anti-GBM Requests, and Monitoring Patient Post Plasmapheresis.

The Immunology Department, St James's Hospital provides a diagnostic laboratory service for the investigation of patients with disorders affecting their immune system, details of which can be found at:

Critical Results Policy (CPL)

Urgent ANCA and GBM Request Policy (PDF 112Kb)

5.1.6 Procedure for transport of precious samples to CPL Immunology.

Urinary CASTS and Urinary CD163
Samples should arrive in specimen reception before 12.30pm in order to send to CPL while still viable.

5.2 GENETIC TESTING

5.2.1 Introduction

The laboratory offers a comprehensive programme of referral genetic testing to clinical departments. This is provided as a number of distinct process 'streams'.

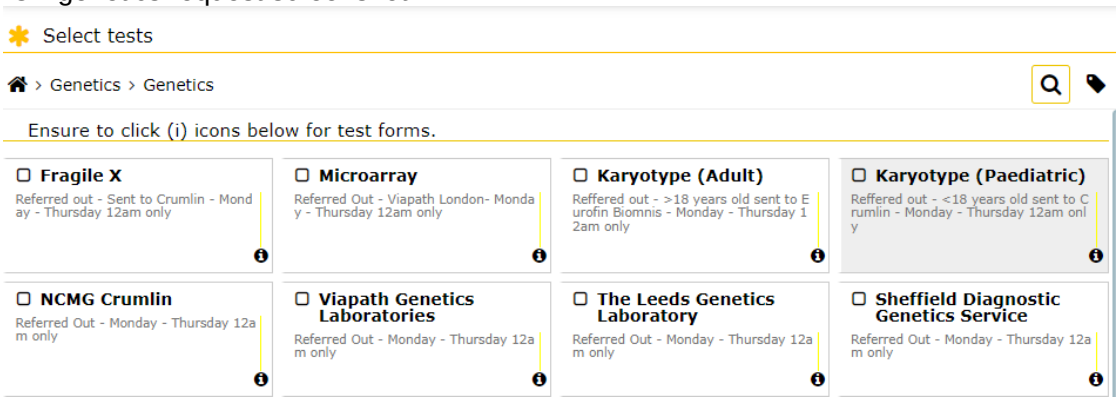
- Each Department in the Laboratory provides specific genetic testing pertinent to their scope and profiles. Users should refer to the appropriate User Manual sections for relevant instructions. Consent forms may be required.
- Test for **Hereditary Haemochromatosis** should be directed to the Haematology laboratory where they are referred to Eurofins Biomnis for testing. *Note that this service is expensive*. Requests must be accompanied by a signed patient consent form; **any requests received without a signed consent form will be rejected**. Consent forms can be downloaded from www.eurofins.ie/biomnis/ . (https://cdnmedia.eurofins.com/european-west/media/1930291/generic-genetic-consent-form-002.pdf)
- For *other, non-haematology related,* constitutional cytogenetic testing and molecular genetic testing, the Laboratory refers these to external laboratories – all requests should be placed on ICE and accompanied with the appropriate Genetic Lab request forms – instructions below:

Genetics requesting on ICE:

ICE genetics test request options are based on External lab name. (ie – for any & all genetics tests going to CeGaT select "CeGaT" from the test menu.) (Fragile X, Microarray CGH, and Karyotyping are the exceptions to this.) Requesting on ICE will ensure a record of the sample being sent is visible, prior to a report being returned, which can be a number of months.

The Laboratory Specific request form will still have to be completed fully and sent with the samples to the lab in order for the sample to be processed.

The (I) icon in the bottom-right corner of the test button will bring you to the correct online site for printing off the required form.
ICE genetics request screenshot:



In all cases, correct request forms for the designated referral laboratory together with a signed consent form are required. Cut-off time for receipt of requests is 12.00 noon on Wednesday of each week.

Direct referral to international centres of excellence may be required by our clinical teams when a patient presents with a known or suspected rare molecular defect. The Laboratory facilitates this service following discussion and the arrangement is for samples to be sent directly to these centres using their designated request forms (see individual laboratory websites), with reports returned to the clinical teams.

5.2.2 Turn-Around Times

It may take > 12 months for results of genetic testing to be returned.
In general however, routine cytogenetic tests are reported within 8-10 weeks and most molecular genetic testing is available within 4 months.

If you have technical questions relating to the constitutional genetic service please contact Mr Ciaran Love at 3905 or a senior member of the Laboratory team.

5.3 IMMUNOLOGY AND GENETICS RESULT REPORTING

Immunology reports are available on ICE, reporting in 1 of 2 ways. (CPL laboratory reports and Non-CPL)

- CPL immunology –
  Reports are reported by electronic means from the Laboratory at CPL via MediBridge software. Following review & authorisation, they transfer directly to ICE and are available to view as part of the electronic patient record for laboratory results.
- Non-CPL laboratories–
  Samples prior to the 22nd May 2023 will have the scanned PDF copies of reports from all referral laboratories on the F drive;
  F:\Shared\UserGroups\Laboratory_Medicine_Referral_Reports_Repository.
  Requests placed on ICE since 22nd May 2023 will have PDF copies of the reports uploaded & viewable in the ICE record. Requests placed on paper will be resulted using the F drive folder above. The text in the ICE record indicates which method is used.

If you have any queries regarding the Immunology service, please contact Mr Ciaran Love at 3905 in Laboratory Medicine or another senior member of the Laboratory Staff at 3988.

Important General Notice Regarding Referral Testing

We regard referral testing as vital to our clinical colleagues and supportive of their clinical need to deliver the best possible care to their patients. In particular, we regard it as essential that access is provided to unusual and rare analytes & molecular genetic analyses that will never be directly provided within the state. We must however balance this against escalating costs which in 2015 reached over €700,000 with substantial additional transport costs.

It is policy that rare and uncommon tests and analyses which are referred to laboratories overseas must be approved at Consultant level by the requesting team. Senior Laboratory Management may seek to discuss individual requests as part of any cost-curtailment exercise.

6.0 NEAR PATIENT TESTING (NPT)

NPT testing is testing performed by non-laboratory staff near to the patient rather that in the clinical laboratory. The rapidity of obtaining a result can contribute to improved outcomes for patients. It is essential that all NPT is conducted within a framework of quality standards in compliance with national guidelines. The Policy for the Management of Near Patient Testing and other related documents such as blood gas operating procedures (PC-LP-015) and NPT user quick reference guides are located on the hospital intranet located here http://intranet.amnch.ie/departments/labmed/pct/Pages/home.aspx

Near Patient Testing Manager: poct@tuh.ie

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Access to Service (TRAINING)

Training and competency assessment is required for access to all NPT equipment under the governance of the NPT manager. Training for some NPT analysers is undertaken at staff induction. This includes blood gas and glucometer analysis training. Some ward staff are trained by the Near Patient Testing team as cascade ABG trainers. These trainers can train staff in their own working area.
To schedule training please contact: Near Patient Testing Manager**:** poct@tuh.ie or Tele: 3609

6.1 BLOOD GAS ANALYSIS

Locations of the analysers are listed in the table below. The Clinical Chemistry Laboratory can also analyse ABG samples for users. See table below for a list of analysers and the corresponding back up analyser in the event of analyser unavailability

- Blood gas analyser locations and back up :

Location	Back-up
AAE (Resus)	AAE (RATU) or AMU
AAE (RATU)	AAE (Resus) or AMU
AMU	AAE (Resus or RATU)
ITU X 4	Theatre
Theatre	ITU X 4
CCU	Ruttle or ITU
PHDU	CCU, Ruttle or ITU
Clinical Chemistry Lab	Any analyser on wards (ITU closest)
Crampton	Ruttle
Ruttle	CCU
RDSC	Clinical Chemistry Laboratory
Paediatric Emergency Care Unit (PECU)	Clinical Chemistry Laboratory

Please use assigned back up analyser if your analyser is unavailable. Alternatively, a labelled sample can be hand delivered to the clinical chemistry lab for processing (bleep 7283 outside routine working hours). The laboratory blood gas service provides as a back-up for all analysers.

- See Clinical Chemistry section 5.8 Specimen Guide on PROTOCOL FOR BLOOD GAS SPECIMENS) for details.

6.2 GLUCOMETRY

There are 142 glucose meters located throughout the hospital for use in patient monitoring. Training and retraining is provided monthly. Please contact POCT@tuh.ie for list of dates available.

6.3 BLOOD HCG ANALYSIS

NPT blood HCG analysis is available in Theatre (DOSA) and Reeves Day Surgery Centre for pre –theatre. Locations of the meters and back up meters in the event of analyser unavailability are listed in the table below.

Location	Backup Analyser
Theatre (DOSA)	**Clinical Chemistry Laboratory** Roche Cobas 801 Line1 1 S/N 801 AS1739-09 Roche Cobas 801 Line 2 S/N AS1737-04
RDSC	

In the event of analyser unavailability a labelled Lithium Heparin sample can be delivered to the Clinical Chemistry laboratory for processing See Clinical Chemistry section 8.8 Specimen Guide for details..
Relevant safety data sheets (SDS's) and chemical agent risk assessments. (CARA's) are maintained on the ChemWatch website accessed through TUH intranet available to all users (https://beehive-eu.chemwatch.net/login). All users should be aware of the risk associated with the device before use.
.

6.4 INR ANALYSIS

NPT INR analysis is available in the anti-coagulation Clinic/ Warfarin Clinic and Reeves Day Surgery Centre (RDSC). Locations of the meters and back up meters in the event of analyser unavailability are listed in the table below.

Location	Backup Analyser
Anti Coag Clinic	NPT Shared Lab
Anti Coag Clinic	NPT Shared Lab
RDSC	NPT Shared Lab

Please use assigned back up analyser if your analyser is unavailable. Alternatively, a labelled sample can be delivered to the Haematology lab for processing. The laboratory service provides as a back-up for all analysers.

If a patients INR is >4.5 the test is repeated and if there is >0.5 difference in the results Nurse (User) is required to take a venous sample and send to the laboratory for testing.

If a patients INR is >8 on the NPT device they must have a venous sample sent to the haematology laboratory.

See Haematology section 9.6.2 Specimen Guide for ROUTINE COAGULATION LABORATORY for details.
Relevant safety data sheets (SDS's) and chemical agent risk assessments. (CARA's) are maintained on the ChemWatch website accessed through TUH intranet available to all users (https://beehive-eu.chemwatch.net/login). All users should be aware of the risk associated with the meter before use.

6.5 HBA1C ANALYSIS

NPT HbA1C analysis is available in the Paediatric Outpatients Department and Diabetic Day Centre (Simms). Locations of the meters and back up meters in the event of analyser unavailability are listed in the table below. Please use assigned back up analyser if your analyser is unavailable. In the event of failure of the analyser in the NPT Laboratory EDTA samples may be sent to Clinical Chemistry for analysis See Clinical Chemistry section 8.8 Specimen Guide for details. The laboratory service provides as a back-up for all analysers.

Asset No	Device Type	Serial Number	Location	Backup Analyser
PC0012	HbA1c analyser	CB101 Q65031198	DDC Simms	Clinical Chemistry Lab *Menarini Arkray Adamns HA-8180V CC1095*
PC0013	HbA1c analyser	CB101 Q65031381	POPD Rm 5	
PC0014	HbA1c analyser	CB101 Q65031380	POPD Rm 5	
PC0015	HbA1c analyser	CB101 Q65031382	DDC Simms	

The cobas b 101 instrument shows the result in the display in less than 6 minutes. The result of the measurement will be displayed in % haemoglobin A1C (DCCT/NGSP) and mmol/mol haemoglobin A1c (IFCC). The analyser will also display estimated average glucose (eAG) in mmol/L. For more information please refer to PC-ED-021A Roche Cobas b101 HbA1C Test Kit Insert for more details.

The Measuring range of the instrument is 20-130 mmol/mol (IFCC) or 4-14 % (DCCT/NGSP). Results >130mmol/mol should have a venous sample sent to the Clinical Chemistry Laboratory.

Relevant safety data sheets (SDS's) and chemical agent risk assessments. (CARA's) are maintained on the ChemWatch website accessed through TUH intranet available to all users (https://beehive-eu.chemwatch.net/login). All users should be aware of the risk associated with the meter before use.

Please refer to PC-LP-021 Procedure for measurement of HbA1C on the Roche Cobas b101 analysers for further details.

6.6 NPT COVID TESTING

NPT Covid testing is available in Adult ED. Locations of the analysers and back up service in the event of analyser unavailability are listed in the table below. Please use assigned service if the analyser is unavailable. In the event of failure of the analyser in Adult ED samples may be sent to Microbiology for analysis See Microbiology section 12.7.3 Respiratory Tract Infection for details. The laboratory service provides as a back-up for all analysers.

Asset No	Device Type	Serial Number	Location	Backup Analyser
PC0035	Abbott ID NOW Covid Testing	5A3DE81C	Adult ED Triage	Microbiology Service
PC0038	Abbott ID NOW Covid Testing	72B1401D		

6.7 APPLICATION FOR NEW SERVICES

Any new NPT services must be approved by the NPT Steering committee. Application forms are available from the NPT Manager and are also available on the hospital intranet located here
http://intranet.amnch.ie/departments/labmed/pct/Pages/home.aspx

Clinical Advice/Result Interpretation
For clinical advice and result interpretation please revert to individual laboratory consultant as outlined above:
Blood gas analysis, blood hCG analysis, Glucometry, HbA1c analysis-Consultant Chemical Pathologist.
INR analysis-Consultant Haematologist
NPT Covid Testing-Consultant Microbiologist.

7.0 ADULT PHLEBOTOMY SERVICE

7.1 PROCEDURE FOR ORDERING FOR IN-PATIENTS

Monday to Friday Phlebotomy Ward Rounds are given in table 7.8 below.

Saturday, Sunday and Bank holiday service is for "urgent phlebotomy requests" only.

All requests for tests are raised on the ICE system and manual ordering using request forms is only used where there is no ICE provision, this should be the exception.

Cut-off time for ordering of blood tests is 5.00 a.m. Staff placing orders after this time must be aware they will not be collected until the following day.

In special circumstances, **after consultation with and the agreement of** the attending phlebotomist additional requests may be placed.

- Completed and **dated** request forms must contain the following information:

  Patient Surname and First name
  D.O.B.
  Gender
  MRN
  Clinical details
  Location
  Tests required
  Requesting Clinician

If urgent, please state clearly on request form and it will be given priority. This status should be used for requests where an urgent result will add to immediate patient care as urgent requests are handled outside the normal test stream and require resources to achieve. Phlebotomist will add an urgent label to identify sample as urgent.

For routine tests turn-around times are given in each department section in this manual and are frequently reviewed to improve efficiency.

- Patient Identification is confirmed by checking wristband for the following:

  Full Patient name
  D.O.B
  MRN

This information is checked against the details on the OCS Honeywell mobile device and when verified the label will print to the mobile printer and is applied to the sample tube when samples have been taken.
For manual orders the details are either written on the sample tube or a generic label is printed from ICE.

All request forms must be left at the agreed location on each ward.

All samples obtained are sent to the Laboratory throughout the morning until rounds are completed.

If blood sample cannot be obtained due to (e.g.):

Patient unavailable**,**

Phlebotomist unable to obtain sample**,**

The phlebotomist will contact the relevant ward and inform them that the sample could not be obtained.

The relevant team will decide whether to re-order requests until the following day or to take them themselves.

If requests on forms are to be placed on the following day's phlebotomy work list, please change the date and leave at the agreed location. If it is decided not to proceed with the blood tests, the team must discard the request forms.

When ordering fasting or other tests that require patient preparation, please ensure that the patient and nursing staff are informed.

7.2 PROCEDURE FOR MANUAL ORDERING FOR OUT-PATIENTS

- Blood request is ordered on ICE by clinician, patient presents at OPD and checks in at the swift queue kiosk located in corridor at phlebotomy and phlebotomy OPD entrance.
- Completed and dated request forms must contain the following information:

  Patient Surname and First name
  D.O.B.
  Gender
  MRN
  Clinical details
  Location
  Tests required
  Requesting Clinician

If urgent please state clearly on request form and it will be given priority.

- Patient Identification is confirmed, allowing sampling to proceed, by asking the patient to state their full name and date of birth without prompting

  Full Patient name
  D.O.B

A label generated in phlebotomy containing patient details is applied to the tube, or alternatively this information is written on the sample tube.

- If ordering fasting blood glucose levels please clearly state **fasting on request form, and inform the patient**, taking cognisance of the insulin dependent diabetic.

Refer to 7.8 below for adult phlebotomy hours of service

The Phlebotomy Manager may be contacted at 3040/Bleep 6249.

7.3 REQUEST FOR GROUP & CROSSMATCH/SAVE SAMPLE

- **(See Blood Transfusion Section 10.0)**
- It is mandatory that patient is wearing a TUH2D ID wristband which can be checked for his/her:

  Surname
  First Name
  D.O.B
  MRN

7.4 PROCEDURE FOR TEST ORDERING in the Department of Psychiatry TUH

There is an interim policy for Phlebotomy pending introduction of positive patient identification mechanism in Psychiatric Unit.

The Nurse-in-Charge shall allocate staff member to identify each patient requiring blood tests.
The allocated staff member shall positively identify each patient requiring blood tests, sign the OCS request sheets or requisition forms, remain with the Phlebotomist and assist with venepuncture procedure if required.

7.5 REQUEST FOR PATIENT ON CLOZARIL MEDICATION

The request is signed by the Nurse in charge and the Phlebotomist on the ICE request list. Clozaril packs are made up by Night Staff and left in the Nurses' Station for the Phlebotomist.

7.6 OUT-PATIENT CLINIC/GP PHLEBOTOMY SERVICE

The Adult Phlebotomy (Blood Tests) Department offers two types of services

- Out-Patient Clinic Referral Service
- GP Referral Service

Opening Hours - (Adults)

Out-Patient Clinic Referral Service 08.00hrs to 16.45hrs Monday to Friday.

OPD Patients can avail of this service by booking an appointment on www.tuh.ie and selecting the tab Book Out-patient Blood Tests. Then select the icon as appropriate for the service required.

GP Referral Service 08.00hrs to 16.45hrs Monday to Friday.

GP Patients can avail of this service by booking an appointment on www.tuh.ie and selecting the tab Book GP Blood Tests. Then select the icon as appropriate for the service required.

A GP request form signed by the GP is required for this service.
Note: GP patients that select a TUH outpatient appointment will be not be seen at the appointment time.

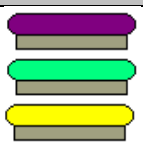
The following information is required:

- Confirm with your clinician if you are required to fast for your blood test.
- You may have sips of water during your fast.
- Check with your clinician if you should take your medication before your blood test.

Directions to Adult Patient Blood Tests Area: Enter via the main entrance and take the second left. The phlebotomy department is located in the Rynd unit at the end of the main corridor.
Patients are requested to check in at the swift queue self-service kiosk on their arrival. Registering at the kiosk will notify the phlebotomist of your arrival.

Note: Paediatric Phlebotomy service is managed by the Children's Hospital Ireland (CHI)
If the child is under 16 years use the link below to book blood test.
https://www.childrenshealthireland.ie/outpatients/blood-tests

7.7 BLOOD COLLECTION ORDER OF DRAW

CAT NO.	SPEC. VOL.	ORDER OF DRAW	COLOUR CLOSURE	TUBE CONTENT	EXAMPLE ASSAYS	MIXING INSTRUCTIONS	SPECIAL INSTRUCTIONS
Blood Culture	10ml (Adult) 4ml (Paed)	Draw MUST be first, preferably separate venesection			Whichever system is used to draw blood, please ensure Blood Cultures are taken first to avoid contamination. See Infection Control Blood Culture Policy	Rotate gently to mix	
		Order of draw minimizes carry over of anticoagulant					
454349	3ml	1		Tri-sodium Citrate Solution	FILL TO LINE ON BOTTLE. All coag tests - for increased accuracy 2 coag samples can be taken and first discarded (tissue factor contamination during venepuncture) Renal transplant workup 20ml (take a clotted sample as well)	After blood collection invert tube 4 times	Fill to arrow line, under or over filled tubes CANNOT be used
454071	4ml	3		Clotting Accelerator	Serology, Immunology & Virology Tests, Cold Agglutinins, Viral Antibody & Antigen Testing, Antibiotic Assays, Anti Cardiolipin AB, B12Folate, Ferritin, RA, Intrinsic Factor AB SPEP, FLC, LDH, Li, Vitamin D	After blood collection invert tube 5 – 10 times	Allow 30 mins before centrifuging
456092	4ml	4		Non-Gel Clotting Accelerator	Cryoglobulins,	After blood collection invert tube 5 – 10 times	All blood letting equipment warmed prior to sample taking. Sample to be transported and kept at 40°C
454083	4ml	5		Heparin	General Biochemistry, Lipid Profile, TDM, Hormone Studies, Endocrinology Tests	After blood collection invert tube 5 – 10 times	
454041	3ml	6		EDTA	FBC, ESR, HBA1C, Haemoglobinopathy investigation Malaria Parasites, Sickle Cell, Reticulocyte Count, Coombs Test, Ciclosporins, Tacrolimus, Immunophenotyping, Silrolimus, PTH, Ammonia, HCY, Renin, ACTH, DNA Analysis, Molecular testing for Blood borne viruses	After blood collection invert tube 8 – 10 times	
456093	6ml	7		EDTA	Group & Screen, Group & Crossmatch, Direct Coombs Test	After blood collection invert tube 8 – 10 times	Use EBTS PDA to print Collect label or Handwritten details - must be signed NO addressograph NO exceptions
454091	4ml	8		Sodium Fluoride Potassium Oxalate	Blood Glucose Levels Lactate	After blood collection invert tube 5 – 10 times	State time on sample and state whether sample is FASTING or RANDOM
	SOME PROFILES REQUIRE A COMBINATION OF SAMPLES. CONTACT THE RELEVANT LABORATORY FOR INFORMATION						

FURTHER INFORMATION CONTACT:
Blood Transfusion: 3965/ Haematology: 3961/ Biochemistry:3994/3995/ Histology: 3971/ Microbiology 3940

SAMPLE VOLUMES

- It is preferable that blood tubes, especially those containing preservatives, are filled to their stated capacity. This avoids any risk of insufficiency or interferences from excess concentrations of preservative.
- This is mandatory for some tests, e.g. PTH, where the increased EDTA concentration that results from under filling would invalidate the test.
- EDTA tubes for PTH must be filled to the mark.
- Coagulation tubes must be filled to the mark.
- It is usually possible to process smaller samples where the tube is at least half filled i.e. 2mls or, in the case of paediatric tubes, 0.7ml. A limited chemistry profile can usually be obtained on such samples.
- In the case of very short samples please indicate those tests that are of highest priority.

Additional information

- Please ensure samples reach the laboratory in as short a time as possible post phlebotomy as delays may impact on the ability to perform certain analyses, and/or the quality of results; please refer to the individual department sections for information specific to tests you may wish to request.
- If you have an urgent request, please contact the laboratory section in advance and tick the urgent box on the request form.

7.8 ADULT PHLEBOTOMY DEPARTMENT STARTING TIMES / HOURS OF SERVICE

WARD	A&E	CCU	ICU	ALL MALE SURG.	ALL FEMALE SURG.	ALL MALE MED.	ALL FEMALE MED.	CLINICAL DECISION UNIT	AGE RELATED HEALTH	PSYCH.	ALL O.P.D. REFER.	ALL G.P. REFER.	SACU
Mon-Fri	7.30am-11.30am	7.30am-9.30am	7.30am-8.30am	7.30 am-12.00pm	7.30 am-12.00pm	7.30am-12.00pm	7.30 am-12.00pm	7.30 am-8.30am	7.30 am-8.30am	7.30am-8.30am	8.00am-4.45pm	10.00am-1.30pm	7.30am-12.00am
Sat	N/A	6.50am-8.00am	6.50am-7.30am	6.50am - 12.00pm	6.50am - 12.00pm	6.50am - 12.00pm	6.50am - 12.00pm	6.50am - 8.30am	6.50am – 8.30am	N/A	N/A	N/A	7.00am-10.00am
Sun & Bank Hols.		7.00am-10.00am	N/A	7.00am-11.00am Gogarty Webb Maguire Osborne AMAU Ruttle	N/A	N/A	N/A	N/A	N/A				

8.0 CLINICAL CHEMISTRY

8.1 INTRODUCTION

Advice concerning interpretation of the investigations available and comments or suggestions relating to the service or this manual should be addressed to the Consultant Chemical Pathologists, Dr Gerard Boran or Dr Ana Rakovac or other senior staff.

8.2 REQUESTING INVESTIGATIONS

Order Communications System (OCS) ICE must be used for requesting where available. The use of forms increases the risk of patient/sample identification errors and missed tests. Turnaround time for request forms will be significantly greater than for requests made through ICE.
(Turnaround time in the lab is measured from the time the sample is registered in the Laboratory Information System (LIS) to the time a result is authorised.)

Verbal requests for tests are NOT accepted under any circumstances.

There is a requirement for a minimum of two acceptable identifiers.

See Section 4.1 for labelling requirements.
If necessary, Starstedt 1.3ml tubes can be used for paediatric samples. If an OCS label is attached to an outer tube, the inner tube must be labelled with one or more of, name, MRN or OCS number.

Staff members' routine requests will be treated as GP/OPD and must fulfil sample labelling requirements, as outlined in Section 4.1. Results will be returned, to the stated requesting Clinician/GP, who must be willing and available to accept results.

SAMPLE REJECTION CRITERIA

Samples may be rejected if the following situations apply:

- Significant difference between patient identifiers on sample and corresponding request form.
- MRN provided does not match the other details on the request form.
- Samples that do not have at least two primary identifiers.
- Sample types not compatible with tests requested.
- Samples which are past the recommended time from phlebotomy to analysis
- Samples that have been left un-separated overnight will not be analysed
- Expired sample collection tubes
- Where sample quality would affect analysis e.g. haemolysis
- Sample volume insufficient

PATTERNS OF REQUESTING

Tests may be requested specifically by name or by group. Specific requesting is preferred when possible. Renal, liver and bone 'profiles' will be available (for constituents see table "ASSAY FREQUENCY / TURNAROUND TIMES/SAMPLE TYPE" in section 8.7).

SPECIMEN COLLECTION AND PACKAGING

Specimen collection should comply with requirements stated in the Specimen Guide. Specimens, together with the Request Form where appropriate, should be placed inside a plastic biohazard bag and dispatched to the laboratory.

DISPATCH TO THE LABORATORY

Specimens should be delivered to the laboratory as soon as possible after collection. All specimens should be delivered on the day of collection.

Arterial blood gas samples should be received in the laboratory within 30mins of sample collection. Samples for ionised calcium should be analysed within 15mins of sample collection.
Blood samples taken for measurement of Potassium should ideally be received in the laboratory within 4 hrs. Delays in sample transport can result in falsely elevated values.

Blood samples for potassium measurement should NOT be refrigerated.

Use of the phlebotomy service in Tallaght Hospital will ensure prompt delivery to the laboratory.

Specimens should normally be dispatched to the laboratory using the Pneumatic Tube System (PTS). See separate instructions.

HEALTH AND SAFETY
Standard precautions should be observed when handling all pathological material. Specific instructions for sending radioactive samples are available in the local rules for ionizing radiation.

8.3 SPECIAL PROCEDURES

Appointments/Results/Enquiries	
Sweat Tests*	3952 or 3954 Appointments & Results enquiries *** Requests for urgent appointments must be discussed with the Clinical Chemistry Registrar. The process for obtaining informed consent for the sweat test procedure lies solely with the requesting clinician.**
Diagnostic Endocrinology Clinic	For endocrinology dynamic function tests. Requests for appointments must be discussed with Clinical Chemistry Registrar at Ext. 3930 or Bleep 7285
Water Deprivation Test	Must be notified in advance to avoid possible delays in processing. All samples must be delivered by hand to the Clinical Chemistry Laboratory with contact details of Clinician/team performing test provided on form & samples and form clearly labelled with collection time.

8.4 RESULTS - ENQUIRIES – ADD-ON REQUESTS

Results will normally be reported through ICE and will be available for viewing on wards shortly after being authorised for release by the laboratory staff. GP results will be reported via Healthlinks. Email gplabqueries@tuh.ie with enquiries.

Results for specialised analysis referred to external laboratories will be filed by MRN and can be viewed in
\\Client\F$\Shared\UserGroups\Laboratory_Medicine_Referral_Reports_Repository\Clinical Chemistry Referral Reports
Hardcopies are sent to the requesting clinician.
Samples sent to referral sites after September 2023 will have reports directly viewable through ICE.

Clinical Chemistry General Enquiries Helpline: 3952 or 3954

- All results enquiries should be made to 3952 or 3954;
- Advice on selection of tests, interpretation of results and sampling procedures will be directed to the appropriate person.

RETROSPECTIVE REQUESTING (ADD-ON REQUESTS)

Clinical Chemistry specimens are retained for a period post-analysis.
If you need further tests on a specimen that is already in the laboratory, send a **Request form for Additional Tests** (CC-LF-001A) to the laboratory. Verbal requests for additional testing are not accepted The add-on request form is now available on the intranet under the documents section at http://intranet.amnch.ie/departments/clinchem/Pages/home.aspx.

All sections must be completed, including “Reason for the addition of these tests”. Use this form only for Clinical Chemistry tests.
Analyses for additional tests are subject to stability of analyte. In general tests can be added up to 24 hours post collection, after 24 hours it is preferable to collect another sample.

Some tests are not suitable for add-on requesting, these are:

Alcohol (ETOH) (May be possible up to 6hrs Subject to sample suitability)
Ammonia
Bicarbonate (May be possible up to 6hrs Subject to sample suitability)
C Peptide
Electrophoresis
Glucose
HCG
AFP
Insulin
IL-6
Ionised Calcium
Lactate
UIBC

TELEPHONING OF RESULTS

All reasonable efforts will be made to communicate critical results. These will be telephoned to the requesting source or the requesting team.
Special arrangements will be agreed with certain users to reduce unnecessary phoning of results.

TABLE 1: Critical Values for Specific Analytes for phoning.

Analyte	Units	Action limits Low threshold	Action limits High threshold	Urgency	Comment
Sodium	mmol/L	<120	>155	A	
Potassium	mmol/L	<2.5	>6.00	A	Suggest repeat for Haemolysed samples
eGFR	mls/min	≤15		A	New presentation
Urea	mmol/L		≥30	A	New/significant increase in non - dialysis patient
Creatinine	mmol/L		>354	A	New/significant increase in non-dialysis patient
ABG’s				A	Phone all /report to Doctor
Ammonia			>60 umol/L	A	
Amylase	IU/L		IU/L Normal x 5	A	

AST/ALT	IU/L		IU/L Normal x15	B	
Bilirubin -total	umol/L		> 250	B	
Bilirubin-conjugated		>25 neonates (<1 month) only		B	
Calcium (adjusted)	mmol/L	<1.8	>3.50	A	
CK	IU/L		≥5000 IU/L	A	
CRP	mg/L		≥300 mg/L	A	
CSF Glucose /Protein		All , except neurology OPD	N/A	B	
Digoxin	ug/L		≥ 2.5	B	
Glucose	mmol/L	≤ 2.5	≥25.0	A	
Iron	umol/L		>60 umol/L	B	
Lactate	mmol/L	>5.0		B	
Magnesium	mmol/L	≤ 0.4 mmol/L		A	
Osmolality (Serum)	mOsm/Kg	<240	> 310	B	
Phosphate	mmol/L	≤0.3 ≤ 0.45		A B	
Pregnancy serum HCG	IU/L	>2 IU/L (in-patients & AOPD only)		B	
Toxicology screen Ethanol	mg/dL		≥250 mg/dl	B	
Toxicology screen-Paracetamol	mg/L		All detectable levels mg/L	B	

Toxicology screen-Salicylate	mg/L		All detectable levels mg/L	B	
Triglycerides	mmol/L		≥20	B	
Troponin	ng/L		>18	A	Suggest repeat for Haemolysed samples
Non ICU Total Protein	g/L	<50	<50 and > 100g/L	B	GP only first occurrence
Non ICU Albumin	g/L	<25	<25	B	GP only first occurrence
Immunochemistry					
Paraprotein	g/L	Any IgE/IgD	IgG >15 IgA >10 IgM >10	C	First time detection
Hypogamma-globulinemia	g/L	IgG <3		C	With low IgA and IgM

TABLE 2 Analytes to be phoned for patients with established CRF.

Analyte	Units	Lower threshold	Higher threshold	Urgency
Sodium	mmol/L	<120	>160	A
Potassium	mmol/L	<2.50	>7.0	A
Calcium (Corrected)	mmol/L	<1.80	>3.20	A
Phosphate	mmol/L		>5.00	A
Magnesium	mmol/L	<0.50	>2.00	A
Urea	mmol/L	>50.0		A

TABLE 3 Table of Therapeutic drug critical levels for phoning

Drug		Low threshold	High threshold	Urgency
Carbamazepine	mg/L		≥25.0	B
Digoxin	ug/L		≥2.5	B
Lithium	mmol/L	<0.3	>1.0	B
Phenobarbitone	mg/L		> 45.0	B
Phenytoin	mg/L		>25	B

Theophylline	mg/L		>25	B
Valproate			No need to phone unless stated overdose	B
Cyclosporin (Renal)	ng/mL		> 300	B

TABLE 4 Table of Endocrinology Critical Levels for Phoning

Hormone	Units	Low threshold	High threshold	Urgency
Cortisol	nmol/L	<50 unless Dexamethazone suppression test has been performed		A
Short synacthen test-cortisol	nmol/L	30 minute sample <250		B
TSH	IU/L		≥75	B
FT4	pmol/L	≤5.0	≥50	B

8.5 STAT LAB EMERGENCY SERVICES

The emergency service is available on a 24-hour, 365 day basis. The range of tests outside routine hours is restricted – see below. In certain circumstances, other tests may be requested but these would require discussion with the person on-call or with the laboratory medical staff on-duty.

NOTIFICATION OF EMERGENCY WORK

Within routine hours please telephone the Stat Lab. This is essential to ensure that the specimen is expected and is handled as an emergency test. Please note that marking a sample "Urgent", or requesting an urgent test on ICE will not cause it to be handled urgently unless the Stat Lab has been informed. Critical results will be telephoned to the location on the original request.

All requests from the Adult and Paediatric ED, ICU, Theatre and Children's HDU, Oncology and Haematology day ward will be automatically treated as emergency tests without the requirement of phoning the Stat Lab. Outside routine working hours (8pm to 8am) the On Call scientist must be paged to let them know samples are being sent to the laboratory.

ALL URGENT WORK MUST BE NOTIFIED BY PHONE	
Within Normal Working Hours	**Outside Normal Working Hours**
Phone: 3951	In the first instance: **Phone the Stat Lab: 3951** Otherwise: **Contact the Scientist on-call on HOSPITAL BLEEP 7283 and leave a message.** **Contact Switch if there is no reply**
Urgent samples from inpatients (including Peamount Hospital) must be delivered directly to the Clinical Chemistry laboratory	

COMMON INVESTIGATIONS (UNRESTRICTED)

- Acid-Base, Blood Gases, Carboxyhaemoglobin, Meth Hb
- Renal, Liver, Bone profiles.
- LDH
- CRP
- Glucose
- Lactate
- Amylase
- Pregnancy tests
- Conjugated bilirubin, where appropriate
- Calcium, ionised calcium, albumin, phosphate, magnesium, urate.
- Ammonia
- Iron-(suspected overdose)-in children
- Cardiac Markers (Troponin T)
- Salicylate, paracetamol, ethanol
- CSF Glucose and Protein
- Spot Urine Na/K
- Serum or urine osmolality
- Urine Toxicology Screening

ON-CALL INVESTIGATIONS REQUIRING CONSULTATION

- The Emergency Service cannot accommodate routine investigations. These will be analysed on the next working day.
- Therapeutic Drugs (digoxin, theophylline, lithium, anticonvulsants, methotrexate, cyclosporin etc.)
- Urine Chemistries not mentioned above
- Other Chemistries not mentioned above
  Planned investigations occurring out of hours or over weekends should be discussed in advance with the Clinical Chemistry medical team.

    - Restricted investigations must be discussed in the first instance with the on-call Medical, Surgical, or Paediatric Registrar who should then contact the Chemical Pathology Registrar or the Consultant Chemical Pathologist. Further details can be obtained from the on-call scientist

EMERGENCY TOXICOLOGY

Most requirements for emergency toxicology can now be met locally, e.g. salicylate, paracetamol, ethanol and urine toxicology screen. Certain other poisons (e.g. iron overdose in children) are available as emergency tests on-site. Please note that toxicology testing for medico-legal purposes is not currently available, including ethanol for “drink-driving” cases.

Additional Toxicology investigations can be included in the local emergency repertoire as the need arises. Any such requirements should be discussed with the Consultant Chemical Pathologist.

8.6 SERVICE AGREEMENTS FOR VARIOUS INVESTIGATIONS

We will endeavor to meet the following standards, subject to availability of sufficient staff and other resources including the Order Communications System (OCS).

ALL USERS	STANDARD SET
Routine Clinical Chemistry (OCS requests)	90% released to OCS within 4 hours of receipt, subject to cut-off
Routine Endocrinology (OCS requests)	90% released to OCS on the next working day.
Blood Gases	Release to OCS within 15 minutes of receipt

SPECIAL ARRANGEMENTS	STANDARD SET
ICU	Agreed daily "ICU Profile" received before 07:45 will be released to ICE by 09:00

8.7 ASSAY FREQUENCY / TURNAROUND TIMES/SAMPLE TYPE

Analyte	Available Urgently without consultation (Normal Hours 8am-8pm)	Sample Type	Assay Frequency	Turnaround Time	Comment
Turnaround times (TAT) of Clinical Chemistry tests are regularly monitored **Urgently processed requests**:- >85% within one hour of receipt **Routine** general chemistry:->90% within 4 hours of receipt (subject to cut-off) **Routine** endocrinology:->90% within 24 hours of receipt (subject to cut-off) It may not be possible to meet turnaround time targets during unscheduled instrument down time or during scheduled maintenance **Daily cut-off time for same day reporting** of in-house general chemistry OCS samples is: 16:00hrs **Samples from Primary Care and OPD received after 15:00hrs may be held until next working day**					
AFP		LH	#Daily on arrival	72 hrs	Requests subject to screening
Albumin	√	LH	*Daily on arrival	4hrs	
ALP	√	LH	*Daily on arrival	4hrs	
Alpha 1 anti-Trypsin		LH	*Daily on arrival	24hrs	
ALT	√	LH	*Daily on arrival	4hrs	
Aluminium		White	Monthly	8 weeks	Approved no-additive tube only
Ammonia (NH3)	√	EDTA	*Daily on arrival	4hrs	**Send immediately on ice**
Amylase	√	LH	*Daily on arrival	4hrs	
Apolipoprotein A1		LH	Weekly	7 days	One run per week
Apolipoprotein B		LH	Weekly	7 days	One run per week
Arterial Blood Gas	√	Syringe	Daily on arrival	30 mins.	**Send to laboratory within 30mins(max)**
AST	√	LH	*Daily on arrival	4hrs	
Bicarbonate	√	LH	*Daily on arrival	4hrs	

Analyte	Available Urgently without consultation (Normal Hours 8am-8pm)	Sample Type	Assay Frequency	Turnaround Time	Comment
Bilirubin –Direct	√	LH	*Daily on arrival	4hrs	
Bilirubin –Total	√	LH	*Daily on arrival	4hrs	
BNP		LH	*Daily on arrival	72hrs	Requests subject to screening
Bone Profile **(Ca,Phos, Alk.Phos)**	√	LH	*Daily on arrival	4hrs	
C Peptide		LH	Weekly	7 days	One run per week
C3		LH	Daily	24hrs	
C4		LH	Daily	24hrs	
CA 153		LH	#Daily on arrival	72 hrs	Requests subject to screening
CA 199		LH	#Daily on arrival	72 hrs	Requests subject to screening
CA125		LH	#Daily on arrival	72 hrs	Requests subject to screening
Caeruloplasmin		LH	*Daily on arrival	24hrs	
Calcium	√	LH	*Daily on arrival	4hrs	Fasting sample preferred
Calcium - Ionised	√	Syringe	Daily on arrival	15 mins.	**Send to laboratory within 15 mins(max)**
Calprotectin faecal		Stool	Weekly	7 days	One run per week
Carbamazepine	√	LH	*Daily on arrival	8hrs	
Carboxyhaemoglobin	√	LH	Daily on arrival	15 mins.	
CEA		LH	#Daily on arrival	72 hrs	Requests subject to screening
Chloride	√	LH	*Daily on arrival	4hrs	
Cholesterol	√	LH	*Daily on arrival	4hrs	
CK	√	LH	*Daily on arrival	4hrs	
Copper		TE	Monthly	4 weeks	
Cortisol		LH	#Daily on arrival	24hrs	
Creatinine	√	LH	*Daily on arrival	4hrs	
CRP	√	LH	*Daily on arrival	4hrs	
CRP-S	√	LH	*Daily on arrival	4hrs	
CSF Biomarker profile (ß-Amyloid, tTau, pTau)		Starstedt CSF collection device	Fortnightly	2 weeks	Any request for information should in the first instance be directed to eoin.begley@tuh.ie
Cryoglobulin		2 X SE NON – GEL	Daily on arrival	10 days	Contact Ext. 4856 - heating block required.
Cyclosporine		EDTA	Weekly	7 days	One run per week (Usually Wed.)
Digoxin	√	LH	*Daily on arrival	8hrs	
Electrophoresis		SE	2 Batches per week	7 days	Dependent on additional processing
Ethanol	√	LH	Daily on arrival	4hrs	.
FK 506 (Tacrolimus)		EDTA	2 Batches per week	1-6 days	Two runs per week (Usually Tues/Wed)
Free Light Chains (kappa, lambda)		SE	1Batche per week	7 days	One run per week
FSH		LH	#Daily on arrival	24hrs	
GGT	√	LH	*Daily on arrival	4hrs	
Glucose	√	FlOx	*Daily on arrival	4hrs	
Glucose - CSF	√	sterile universal container	*Daily on arrival	4hrs	Sample should arrive in Clinical Chemistry within 2 hours of collection
Growth Hormone		LH	1 Batch per week	7 days	One run per week
Haemoglobin A1c		EDTA	*Daily on arrival	2 days	SEPARATE EDTA REQUIRED
HCG (pregnancy)	√	LH	Daily on arrival	4hrs	

Analyte	Available Urgently without consultation (Normal Hours 8am-8pm)	Sample Type	Assay Frequency	Turnaround Time	Comment
HCG (tumour marker)		LH		72 hrs	Requests subject to screening
HDL-C	√	LH	*Daily on arrival	4hrs	
Homocysteine		EDTA	*Daily on arrival	7 days	**Send immediately on ice.**
Interleukin-6		LH	*Daily	24hrs	
IgA		SE	*Daily on arrival	8hrs	Immunoglobulin only requests
IgE		SE	*Daily on arrival	24 hrs	
IgG		SE	*Daily on arrival	8hrs	Immunoglobulin only requests
IGF1		LH	One batch per week	7 days	One run per week
IGF BP3		LH	One batch per week	7 days	One run per week
IgM		SE	*Daily on arrival	8hrs	Immunoglobulin only requests
Insulin		LH	Weekly	7 days	One run per week
Iron	√	LH	*Daily on arrival	4hrs	
Lactate	√	FlOx	*Daily on arrival	4hrs	
Lactate - CSF		Sterile universal container	Daily on arrival	1 hour	Sample should arrive in Clinical Chemistry within 2 hours of collection
LDH	√	SE	*Daily on arrival	4hrs	
LH		LH	#Daily on arrival	24hrs	
Lipid Profile (Chol, Trig, HDL, LDL)	√	LH	*Daily on arrival	4hrs	
Lipoprotein a	√	LH	Daily	3 Days	
Lithium		SE	#Daily on arrival	8hrs	Sample should be delivered within 4 hrs
Liver Profile (TP, Alb, T.Bil, ALT, Alk Phos. GGT)	√	LH	*Daily on arrival	4hrs	
Bioactive prolactin		LH		4 days	2 runs per week
Magnesium	√	LH	*Daily on arrival	4hrs	
Methotrexate		LH	#Daily on arrival	8hrs	Advance notice required
Microalbumin		Urine	Daily	24hrs	
Oestradiol		LH	#Daily on arrival	24hrs	
Osmolality	√	LH	*Daily on arrival	4hrs	
Osmolality	√	Urine	*Daily on arrival	4hrs	
Paracetamol	√	LH	*Daily on arrival	4hrs	.
Parathyroid Hormone		EDTA	#Daily on arrival	24hrs	Separate sample required
pH (Pleural Fluid)		Syringe	*Daily on arrival	4hrs	Separate sample required
Phenobarbitone	√	LH	#Daily on arrival	8hrs	
Phenytoin	√	LH	#Daily on arrival	8hrs	
Phosphate	√	LH	*Daily on arrival	4hrs	
Potassium	√	LH	*Daily on arrival	4hrs	Sample should be delivered within 4 hrs
Procalcitonin		LH	*Daily	24hrs	
Progesterone		LH	#Daily on arrival	24hrs	
Prolactin		LH	#Daily on arrival	24hrs	
Protein - Total	√	LH	*Daily on arrival	4hrs	
Protein - Urine		Urine		4hrs	

Analyte	Available Urgently without consultation (Normal Hours 8am-8pm)	Sample Type	Assay Frequency	Turnaround Time	Comment
Protein - CSF	√	sterile universal container	*Daily on arrival	4hrs	
Prot/Creat Ratio		Urine	*Daily on arrival	4hrs	
PSA		LH	#Daily on arrival	24hrs	
Renal Profile (Na, K, Urea, Creat)	√	LH	*Daily on arrival	4hrs	
Salicylate	√	LH	Daily on arrival	4hrs	
Sodium	√	LH	*Daily on arrival	4hrs	
Sweat Test		Sweat	Two clinics per week	Day of test	
T3 (Free)		LH	#Daily on arrival	72 hrs	Requests subject to screening
T4 (Free)		LH	#Daily on arrival	24hrs	
Testosterone		LH	#Daily on arrival	24hrs	
Theophylline	√	LH	#Daily on arrival	8hrs	
Thyroid Function Test (TSH, FT4)		LH	#Daily on arrival	24hrs	Discordant results requiring further investigations may take up to 14 days
TPO		LH	#Daily on arrival	24hrs	
Triglyceride	√	LH	*Daily on arrival	4hrs	
Troponin T	√	LH	*Daily on arrival	4hrs	
TSH		LH	#Daily on arrival	24hrs	
UIBC		LH	#Daily on arrival	4hrs	
Urate	√	LH	*Daily on arrival	4hrs	
Urea	√	LH	*Daily on arrival	4hrs	
Valproate		LH	#Daily on arrival	8 hrs	
Vitamin D		SE	#Daily on arrival	8 hrs	
Zinc		TE	Monthly	4 weeks	
LH=Lithium Heparin, SE = Serum (Clotted), FlOx = Fluoride Oxalate, TE = Trace Element					
Urines -general chemistry					
Urgently processed requests:- 90% within one hour of receipt Non Urgent requests -within 2 working days of receipt Urinary electrophoresis requests – within 14 days of receipt					

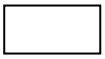
For tests not listed above please contact a senior member of laboratory staff before sending the specimen –see 5.8 below

Specimens for some specialised analysis are referred to external laboratories. A complete list of details of all referral laboratories is contained in the form CC-LF-701G, this is available on request. Referral laboratories are evaluated and selected in terms of competence to perform the requested examinations and accreditation status.

8.8 CLINICAL CHEMISTRY SPECIMEN GUIDE

BLOOD SPECIMENS

The common specimen requirements are heparinised plasma, serum (from whole blood which has clotted), fluoride-oxalate plasma, and EDTA whole blood or plasma. For most biochemical and endocrine tests the preferred specimen tube is a 3.5mL heparinised tube. Requests raised using OCS will generate a label with the appropriate sample type indicated.

Specimen Guide – Blood Tubes		
Lithium Heparin Tube	Green Orange (Paed.) 	Most Clinical Chemistry analyses, except those stated below Glucose (assuming analysis within 1 hour)
EDTA Tube	Purple 	HbA1c, Renin, Aldosterone, ACTH, , PTH, Lead, Homocysteine, Cyclosporin, FK506
Fluoride Oxalate Tube	Grey Yellow (Paed.) 	Glucose (where a delay before analysis of >1 hour is likely), Lactate
Serum (Clotted) Tube	Red 	Electrophoresis, FLC, Lithium, LDH, Cryoglobulins, Vitamin D
Trace element Tube (Copper, Zinc)	Navy 	Copper, Zinc
Aluminium	White 	Aluminium
Balanced Heparin (ABG) Syringe		ABG, Ionised Calcium Fluids for pH

SAMPLE VOLUMES

- It is preferable that blood tubes, especially those containing preservatives, are filled to their stated capacity. This avoids any risk of insufficiency or interferences from excess concentrations of preservative.
  - This is mandatory for some tests, e.g. PTH, where the increased EDTA concentration that results from under filling would invalidate the test. EDTA tubes for PTH must be filled to the mark.
- It is usually possible to process smaller samples where the tube is at least half filled i.e. 2mls or, in the case of paediatric tubes, 0.7ml. A limited chemistry profile can usually be obtained on such samples.
- We will always try to maximise the use of any sample. In the case of very short samples please indicate those tests that are of highest priority.

PROTOCOL FOR BLOOD GAS SPECIMENS

Please Note:
The POCT ABG standard operating procedures, PC-LP-015, is available to all users on the hospital intranet located here: http://intranet.amnch.ie/departments/labmed/pct/Pages/home.aspx

The Blood Gas Analysers in ICU, Theatre, AAE, AMU, CCU, and PHDH (Crampton and Ruttle from July2020) are for use by trained staff in those areas only. Samples for Blood Gas analysis from any other location should go directly to the laboratory. The protocol outlined below must be followed for samples going to the laboratory.
In order for the laboratory to process Blood Gas samples as quickly and safely as possible the following simple rules must be followed.

- The heparinised syringe must be labelled with an IPMS addressograph label or a hand written label. The patient's name, DOB, MRN and location must be clearly identified.

- The specimen must be accompanied by a Clinical Chemistry Request form completed with the patient's name etc. as per section 5.3 REQUESTING INVESTIGATIONS - REQUEST FORMS AND SAMPLE LABELLING. Please include a bleep number if available.

  - **Any air** in the syringe **must** be expelled prior to mixing the sample.

  - **The needle must be removed from the syringe and destroyed as soon as the sample has been taken. The cap provided must be fitted to the syringe.**

- It is recommended to transport labelled blood gas samples in an appropriate biohazard bag by hand immediately to the laboratory. For out of hours, advanced notice is required by bleeping Clinical Chemistry on-call on 7283. It is not recommended to use the pneumatic chute to deliver ABG samples to the laboratory.

- If you have any questions about the taking or analysing of Blood Gas samples, contact the laboratory at ext. 3951.

CSF Xanthochromia - Information for Clinicians:

1. This instruction refers to the procedure in place for spectrophotometric CSF Xanthochromia requests for referral to biochemistry, Beaumont Hospital.

2. For Xanthochromia testing, at least 1 mL CSF is preferred[1, 2]; the analysis should not be done on the sample taken into the first tube, because of possible red cell contamination from a traumatic tap. A 4th vial should be taken where possible [1, 3].
3. The date and time of sample collection should be stated on the request form. It is recommended that CSF for analysis for Xanthochromia is not collected until at least 12 hours after the clinical event [1, 3].
4. Samples for Xanthochromia should be kept in the dark (tinfoil) and delivered promptly to the Clinical Chemistry laboratory, to arrive within 30-60 minutes of collection. It is recommended that samples are not transported by pneumatic tube (as this may cause lysis of red blood cells) and that prior notice is given to the laboratory so that staff are available to centrifuge the sample on receipt [1, 2,3]. Outside of routine hours 8am-8pm, the Scientist on-call should be alerted by bleeping 7283. Referral of the sample to Beaumont will only be carried out during next routine working day.
5. A simultaneous blood specimen should be taken for serum bilirubin and total protein measurement [3]

References:

1. All Wales Clinical Biochemistry Audit Group
Standards for Analysis of Cerebrospinal Fluid (CSF) for Xanthochromia VERSION: 1, dated 20th May 2005.
2. Beaumont Laboratory sample requirements via email 04/12/2018 (G:\Clinical Chemistry\Quality and Accreditation\Pre Analytical References).

3. National guidelines for analysis of cerebrospinal fluid for bilirubin in suspected subarachnoid haemorrhage UK National External Quality Assessment Scheme for Immunochemistry Working Group *Ann Clin Biochem* 2003; **40**: 481–488

CSF Alzheimer's Disease Markers

The Clinical Chemistry laboratory now offers analysis of the markers of Alzheimer's disease.
CSF should be collected into a blue top Sarstedt CSF collection device: Product 63.614.625
The assay frequency is every two weeks.
The test is orderable on ICE and is reported back to ICE electronically.

- Testing profile includes ß-Amyloid, tTau, pTau

Any request for information should in the first instance be directed to eoin.begley@tuh.ie

SENT AWAY / REFERRED SPECIMENS/UNUSUAL REQUESTS

Please contact a senior member of laboratory staff to discuss any unusual requests before sending the specimen. Specimens for some specialised analysis are referred to external laboratories. Samples for certain analysis will be sent away when the capacity of the local system is exceeded.

A complete list of details of all referral laboratories is contained in the form CC-LF-701G, this is available on the Clinical Chemistry homepage on the Intranet. Referral laboratories are evaluated and selected in terms of competence to perform the requested examinations and accreditation status.

All urgent referrals must be discussed directly with senior staff in Clinical Chemistry in order to ensure prompt referral.

Samples for referral outside Ireland should be, if possible, collected Mon-Wed.

Biochemistry Referral reports are available on ICE, reporting in 1 of 2 ways. (CPL laboratory reports and Non-CPL)

- CPL immunology –

Reports are transferred twice weekly by electronic means from the Laboratory at CPL via MediBridge. Following review & authorisation, they transfer directly to ICE and are available to view as part of the electronic patient record for laboratory results.

- Non-CPL laboratories–

Samples prior to the 22nd May 2023 will have the scanned PDF copies of reports from all referral laboratories on the F drive; F:\Shared\UserGroups\Laboratory_Medicine_Referral_Reports_Repository. Requests placed on ICE since 22nd May 2023 will have PDF copies of the reports uploaded & viewable in the ICE record. Requests placed on paper will be resulted using the F drive folder above. The text in the ICE record indicates which method is used

Urine Specimen Requirements

Analytes in urine are usually determined in one of the following: (1) a timed (e.g. 24 hour) collection, (2) a random/spot urine, (3) a random urine with results expressed as a ratio with creatinine.

URINE SPECIMEN GUIDE	ACID 24 hr container (24 hr urine with HCl added)	ACID WASHED (24 hr urine container pre-washed in nitric acid and rinsed with water)	Plain 24 hr container	Spot Urine	Comment
Albumin (Albumin/Creatinine Ratio - ACR)				✓	Early morning urine preferred
Amino acids (freeze)				✓	Deliver immediately to Lab.
5-amino laevulinate (ALA)			✓		Protect from light
Amylase				✓	
Arsenic				✓	
Cadmium		✓			
Calcium (refrigerate)	✓				
Calcium/Creatinine Ratio				✓	Deliver immediately to Lab.
Catecholamines [Paediatric patients <14 years old only] (adrenaline, nor-adrenaline, dopamine)				✓	Deliver immediately to Lab
Citrate	✓				
Copper		✓			
Cortisol			✓		
Creatinine (refrigerate)	✓		✓		Plain preferred
Cystine			✓	✓	24hr preferred
5-HIAA	✓				
Homovanillic acid	✓				
Phosphate (inorganic)	✓				
Iron		✓			
Lead		✓			
Magnesium	✓				
Mercury		✓			
Metanephrines	✓				
Organic acids (freeze)				✓	Deliver immediately to Lab
Osmolality				✓	
Oxalate (refrigerate)	✓			✓	24hr preferred
Porphobilinogen (PBG)				✓	Protect from light
Porphyrins				✓	Protect from light
Potassium (refrigerate)			✓	✓	
Protein/Creatinine Ratio				✓	
Protein (refrigerate)			✓		Protein/creatinine ratio (see above) is the recommended test
Sodium (refrigerate)			✓	✓	
Steroid Profile/Metabolites			✓		
Stone (Kidney/Renal) screen *Sodium, Citrate, Urate (Plain Urine)* ***Calcium, Phosphate, Oxalate (Acid Urine)***	✓		✓		Two 24 hr collections are required for a full Stone Screen (Plain + Acid**)**
Urate (Do not refrigerate)			✓	✓	
Urea (refrigerate)			✓	✓	
Zinc		✓			

8.9 ESTIMATED GLOMERULAR FILTRATION RATE (EGFR)

INTRODUCTION OF eGFR:

The Irish and the UK guidelines on classification and monitoring of chronic kidney disease (CKD) recommend assessing renal function based on an estimated glomerular filtration rate, the eGFR. CKD has been classified into 5 stages based on the patient's eGFR and other evidence of renal impairment such as proteinuria. This eGFR is based on the formula derived in the "Modification of Diet in Renal Disease" (MDRD) Study. The MDRD formula is based on 4 variables: serum creatinine; age; gender and ethnicity. Serial measurement of eGFR is essential in assessing the severity of any renal condition. The eGFR will replace the 24 hour creatinine clearance for many patients (see below). eGFR underestimates normal or near normal glomerular function so results above 90 will be reported as >90 ml/min per 1.73m^2.

THE CHRONIC KIDNEY DISEASE CLASSIFICATION IS AS FOLLOWS:

Stage	Description	
1	"Normal" GFR	**e**GFR >90 ml/min/1.73 m^2 with other evidence of chronic kidney damage*
2	Mild impairment	**e**GFR 60-89 ml/min/1.73 m^2 with other evidence of chronic kidney damage*
3	Moderate impairment	**e**GFR 30-59 ml/min/1.73 m^2
4	Severe impairment	**e**GFR 15-29 ml/min/1.73 m^2
5	Established renal failure	**e**GFR <15 ml/min/1.73 m^2 or on dialysis

***The "other evidence of chronic kidney damage" may be one of the following:**
• Persistent microalbuminuria
• Persistent proteinuria
• Persistent haematuria (after exclusion of other causes, e.g. Urological disease)
• Structural abnormalities of the kidneys demonstrated on ultrasound scanning or other radiological tests e.g. polycystic kidney disease, reflux nephropathy and/or Biopsy proven chronic glomerular nephritis
NB: Without this other evidence, a GFR >60/ml/min **does not indicate CKD**.

FACTS ABOUT THE MDRD eGFR:

- eGFR will be reported in mL/min/1.73m^2. Since the MDRD formula underestimates GFR in patients with normal or near normal kidney function eGFRs of ≥90 mL/min/1.73m^2 will be reported as >90 mL/min/1.73m^2.
- eGFR is not valid in patients with rapidly changing renal function e.g. acute renal failure. Plasma creatinine should be monitored in these patients.
- The MDRD eGFR calculation was validated in Caucasian and Afro-Caribbean patients with renal disease in the USA. Patients of Afro-Caribbean origin have a higher muscle mass so the eGFR should be multiplied by 1.21 for black patients. Although it has not been validated for all ethnic or population groups, the eGFR has been accepted for use in white and South Asian populations.
- MDRD eGFR has NOT been validated for calculating drug doses.
- Creatinine clearance with timed urine collections is still required for measuring GFR in certain circumstances:
    - Extremes of body size and age e.g. severe malnutrition or obesity, elderly, children < 18 years
    - Pregnancy, Vegan diet, Creatine supplements
    - Skeletal muscle disease e.g. muscular dystrophy, paraplegia, quadriplegia, amputee
    - Prior to dosing with nephrotoxic / chemotherapy drugs
- Microalbuminuria is still the gold standard for detecting early renal disease in patients with diabetes mellitus.
- ***eGFR formula varies slightly depending on the method used to analyse creatinine.***

If you have any queries please contact the Chemical Pathology team in the Clinical Chemistry Laboratory.

PROTEIN CREATININE RATIO

Protein Creatinine Ratio (PCR) is available for screening and monitoring of proteinuria. A random urine sample is the specimen required for this investigation. PCR is not affected by hydration status. This will be reported as mg Protein/mmol of Creatinine (mg/mmol). A 24 hr urine collection will no longer be required for assessing renal protein excretion. Interpretation of results should be based on the table below.

Table: Based on the UK CKD Guidelines

PCR mg/mmol	UK CKD	Approx dipstick Equivalent	Comment
<15	Normal	Negative	Normal
15-44	"Trace" protein	Trace	Trace proteinuria
45-100	Clinical proteinuria (Macroproteinuria)	1+	Two or more PCR results > 45, in the absence of UTI, indicates proteinuria
> 100	Clinical proteinuria (Macroproteinuria)	2+	Marked proteinuria. Suggest referral to Nephrologist
≥ 450	Nephrotic range proteinuria	3+	Nephrotic Syndrome Range Suggest urgent referral to Nephrologist

NB: Urinary Albumin/Creatinine Ratio measurement is still the gold standard for detecting early renal impairment in diabetic patients

CHRONIC KIDNEY DISEASE

Stage	eGFR mL/min/ 1.73m^2	Associated Metabolic Disturbance	Interpretation	Minimum Frequency of Monitoring Renal Function
1	>90	• Hypertension – more frequent than in patients without kidney disease	Normal GFR. Not CKD unless there is other evidence of chronic kidney damage e.g. • persistent microalbuminuria, proteinuria and/or haematuria (not urological); • radiological diagnosis • biopsy proven chronic glomerulanephritis	Yearly if patient has evidence of CKD
2	60 – 89	In CKD patients: • Hypertension • PTH starts to increase	Mild impairment if there is other evidence of CKD (see above) Mild decrease in GFR is common in 30% of healthy adults	Yearly if patient has evidence of CKD
3	30 – 59	• Hypertension is frequent • Calcium absorption and phosphate excretion decrease • PTH increases is more marked • Onset of Malnutrition • Onset of Anaemia (erythropoietin deficiency) • Onset of LVH	Moderate impairment Treat complications Monitor progression Referral to a Nephrologist if: • condition progressive (more than 20% deterioration in eGFR or plasma creatinine) • Microscopic haematuria present • Urinary microalbumin:creatinine ratio > 3.5 or protein:creatinine ratio ≥45 • Unexplained anaemia • Abnormal K^+, Ca^{2+}, or Phos • Uncontrolled BP (>150/90)	Yearly if stable 6 monthly if just diagnosed or progressive
4	15 – 29	• As for stage 3 but more pronounced • Triglyceride levels rise • Risk of Hyperkalaemia • Hyperphosphataemia • Metabolic acidosis • Decreased libido	Severe impairment Suggest referral to a Nephrologist	6 monthly if stable 3 monthly if just diagnosed or progressive
5	<15	• As for stage 4 but more pronounced • Salt retention causing heart failure • Anorexia • Vomiting • Pruritis – without skin disease	Established renal failure (ERF) Suggest urgent referral to a Nephrologist	3 monthly

*Classification of CKD proposed by the US Kidney Diseases Outcome Quality Initiative (K/DOQI) Group[8]

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8.10 TUMOUR MARKER SERVICE

Measurement of tumour markers can be useful for monitoring in-patients with an established diagnosis of certain tumours. Hence, a Tumour Marker Assay Service has been provided at TUH for use primarily by oncology teams who are managing patients with a cancer diagnosis or with pre-malignant conditions.

With the possible exception of PSA, it is not appropriate to screen patients either in primary or secondary care using tumour markers. This is due to the low sensitivity of the markers for the detection of malignancy and the unacceptably high false positive rates in the general population which may lead to unnecessary further investigation and concerns, and possibly false reassurance. In particular, the practice of "screening" patients admitted to hospital with a panel of markers is not appropriate.

REQUESTS SUITABLE FOR ANALYSIS

Adequate clinical details must be included with each request.
The following indications are generally recognized in the international literature:

Medical Oncology, Gastroenterology and Related Teams

- For the monitoring of established malignancy
- AFP for surveillance for hepatocellular carcinoma in high risk patients (i.e. cirrhosis, or other chronic liver diseases such as chronic active hepatitis). "Abnormal LFT's" is NOT sufficient evidence.
- For the investigation of Cancers of Unknown Primary
  (ESMO/NCCN suggested panel: HCG, AFP, PSA, CA 125, CA 15-3)
- CEA is offered for colorectal cancer (CRC) monitoring.

Gynaecology

- Ca-125 Rapid Access Service for ovarian tumours as agreed with the Gynaecologists.
- Ca-125 from GP's carried out in accordance with the National Cancer Control Program guidance for ovarian cancer GP Referral Pathway

Surgical Oncology

- Ca19.9 for the investigation of pancreatic tumours and chronic pancreatitis.

Breast Markers

- Ca15.3 is only accepted from an Oncology Team (including breast surgeons) accompanied by appropriate clinical details.

PSA

- PSA is useful to monitor prostate cancer. PSA is also accepted when tested in accordance with the National Prostate Cancer GP Referral Guideline.
- Rarely, PSA in females (e.g. carcinoma of periurethral (Skene's) glands).
- Free PSA only by Urologist referrals as per national guideline

Other Categories

- Certain other conditions which are known to be pre-malignant (e.g. various paraneoplastic syndromes).
- Friedrich's Ataxia request for AFP
- All requests for a specific marker where cancer pathology is either established or highly likely as indicated by clinical details (e.g. HCG and AFP with clinical details "Testicular mass detected" or other "mass lesions "is allowable).
- GP requests on patients with known malignancy.

Any other requests not fitting these criteria need to be discussed on a case by case basis and will not be analysed where a clear indication is lacking. Samples are stored for a minimum of three months to allow for processing following discussions.

8.11 THERAPEUTIC DRUG MONITORING (TDM) *

A guide to the therapeutic drug monitoring service is given below.

- All **urgent requests**(for analysis outside the scheduled days) **must be discussed** with the laboratory on a case by case basis
- Scheduled analysis will continue on Tuesday and Wednesday for Tacrolimus and Wednesdays for Ciclosporin
- Patients on **Itraconazole** treatment must be discussed with the laboratory to arrange measurement of Ciclosporin or Tacrolimus at another centre (Analytical interference with Tallaght method)

Drug [Therapeutic Range]	**Sampling Time**	**Minimum time for sampling after dose change**	**Analysis Days**
DIGOXIN **Therapeutic Range:** 0.5-1 microgram/L **>2 microgram/L: Toxic**	Pre-dose or 6 – 8 hours after last dose	7 days	Daily (Routine Hours)
CICLOSPORIN Therapeutic ranges vary depending on transplant type and timing of sample post-transplant. Target levels and dose adjustments should be discussed with the transplant team. Early post-transplant range 100-150ng/mL Maintenance therapy range 50-100ng/mL	**Pre Dose** (trough) Not suitable for patients on Itraconazole – please contact laboratory.	Suggested 3-5 days after a dose change, initiation of therapy or initiation of an interacting medication.	Wednesday (PM))
LITHIUM Maintenance: 0.2-1.0 mmol/L; Manic phase: 0.6-1.0 mmol/L	At least 12 hours after last dose or before next dose if BD dosing	7 days	Daily (Routine Hours)
THEOPHYLLINE [10-20 mg/L]	Trough: pre dose	SR preparations:3-6 days IV infusion: 15 hours	Daily (Routine Hours)
PHENOBARB [10-40 mg/L]	Not critical	3-4 weeks	Daily (Routine Hours)
PHENYTOIN [10-20 mg/L]	Not critical (but pre-dose recommended)	Make take up to three weeks to reach new steady state after dose change. Re-measure 7-14 days after dose change.	Daily (Routine Hours)
Carbamazepine [4-12 mg/L] Adjust dose according to response rather than to plasma level	Pre Dose (morning)	3-4 days after dose change or 2 weeks after initiation	Daily (Routine Hours)
Tacrolimus (FK506) Therapeutic ranges vary depending on transplant type and timing of sample post-transplant. Target levels and dose adjustments should be discussed with the transplant team. Early post-transplant range 8-12µg/L Maintenance therapy range 5-8µg/L	**Pre dose(**trough) Not suitable for patients on Itraconazole – please contact laboratory.	Levels should be monitored regularly when interacting medications are added.	Tuesday (PM) Wednesday (PM)
VALPROATE 40-100 mg/L	Blood levels are not particularly useful in adjusting the dose, but they may be useful for checking compliance.		Daily (Routine Hours)

*** Refer to TUH Adult Medicines Guide for further information**

8.12 CLINICAL CHEMISTRY SERVICE IN SIMMS BUILDING

The Clinical Chemistry service has expanded to provide Chemistry, Immunoassay and HbA1c service to the Endocrinology outpatient service in the SIMMS building located adjacent to the main hospital campus.
The service will link in with both the outpatient clinics and phlebotomy to provide a one stop service for patients. This will ensure same day phlebotomy and rapid turnaround of results to provide real time decision making while also removing the need for prior visits for phlebotomy.

8.13 REFERENCE VALUES

Adult reference values for common investigations are tabulated below. Many reference intervals depend on age, sex, diet, posture etc. and the values given are for guidance only. Please contact the relevant laboratory section if you have any problems in interpretation. Please note that reference intervals for urine vary markedly with body size (hence with age and sex), and often with dietary composition as well as renal function.

Reference ranges are method dependent and can change if there has been a change in assay methodology. Changes in reference ranges will be highlighted on report forms.

REFERENCE VALUES IN CHILDREN

Please contact the laboratory for interpretation of results in children.

ADULT REFERENCE VALUES

Please note; Reference Values are subject to regular review and may be updated. The appropriate values are always shown on the report/

GENERAL CLINICAL CHEMISTRY – COMMON PROFILES	
RENAL PROFILE	
Electrolytes, plasma Sodium Potassium	 135-145 mmol/L 3.5-5.0 mmol/L
Urea, plasma	2.0-7.0 mmol/L
Creatinine, plasma	45-84 μmol/L (F) –59-104 μmol/L (M)
LIVER PROFILE	
Bilirubin, plasma	< 17 μmol/L
ALT, plasma	M ≤ 45 IU/L F ≤ 35 IU/L
Alkaline Phosphatase, plasma	M 40 -130 F 35 – 105 (Age related variations)
Gamma GT, plasma	M <60 IU/L F <40 IU/L
Total Protein, plasma	65-85 g/L
Albumin, plasma	35-50 g/L
BONE PROFILE	
Calcium, Total and adjusted, plasma	2.15 – 2.55 mmol/L
Phosphate, plasma	0.8-1.4 mmol/L
Alkaline phosphatase, plasma	M 40 -130 F 35 – 105 (Age related variations)
Albumin, plasma	35-50 g/L

ADDITIONAL BLOOD AND URINE CHEMISTRIES	
Urate, plasma	M 200-420 μmol/L F 140-340 μmol/L
Ammonia, Plasma	F 11 - 51 μmol/L M 16 -60 μmol/L
Magnesium, Plasma	0.7-1.0 mmol/L
Bilirubin, Conjugated, Plasma	0-5 μmol/L
Lactate, Plasma	0.5-2.2 mmol/L
Lipoprotein (a)	<72 nmol/L
Osmolality, plasma	285-295 mOsm/kg
24 hour Urine: Sodium Potassium Calcium Phosphate Urate Creatinine Urea Protein Chloride Bicarbonate	 80-250 mmol/day 30-100 mmol/day 2.5-7.5 mmol/day 15-50 mmol/day 2.1-3.6 mmol/day 9-19 mmol/day 250-580 mmol/day <0.15 g/day 95-105 mmol/L 22-28 mmol/L

ADDITIONAL ENZYMES	
LDH, serum	135-220 U/L
AST, plasma	M ≤ 35 IU/L F ≤ 30 IU/L
Amylase, plasma	≤ 100 IU/L
IONISED CALCIUM	
Calcium, Ionised (Balanced Heparinised Syringe)	1.15 – 1.30 mmol/L

CARDIAC MARKERS	
CK, plasma	M < 190 IU/L F < 170 IU/L
Troponin T	<14 ng/L
BNP	<300 pg/ml (Ruleout)

BLOOD GASES, ELECTROLYTES AND METABOLITES	
pH	7.35-7.45
Hydronium ion concentration	35-45
PCO_2	4.5- 6.0 kPa
PO_2	11-15 kPa
Actual Bicarbonate	22-28 mmol/L
Standard Bicarbonate	22-27 mmol/L
Base excess	-2 to +2 mmol/L
Oxygen saturation	94-100%
Carboxyhaemoglobin (as % Hb)	<1.5% in non-smokers Up to 9% in smokers > 20%: Toxic. (Source; Tietz)
Oxyhaemoglobin	Not reported
Methaemoglobin	0.4-1.5%
Potassium	3.5-5.0 mmol/L
Sodium	135-145 mmol/L
Chloride	95-105 mmol/L
Ionised Calcium	1.15-1.30 mmol/L
Glucose	Not reported
Lactate	0.5-1.6 mmol/L
tHb	Not reported

TUMOUR MARKERS	
PSA	<table><tr><td>Age</td><td></td></tr><tr><td>Under 50 years</td><td><2µg/L</td></tr><tr><td>50-59</td><td><3µg/L</td></tr><tr><td>60-69</td><td><4µg/L</td></tr><tr><td>70+</td><td><5µg/L</td></tr></table>
CEA	0-5 ng/ml
CA 125	< 35 U/ml
CA 15-3	< 28 U/ml
CA 19-9	< 39 U/mL
AFP	0-5 IU/L

TOXICOLOGY (Adult Decision levels)	
Paracetamol, plasma	Refer to IMB Guidelines
Salicylate, plasma	Therapeutic levels usually 150-300 mg/L Minor Toxicity 301-450 mg/L Moderate Toxicity 451-700 mg/L Major Toxicity > 700 mg/L
Ethanol, plasma	Up to 100 mg/dL: euphoric changes, some impairment expected. 100-300 mg/dL: drowsiness, confusion >300 mg/dL: impaired consciousness, coma

ENDOCRINOLOGY	
TSH, plasma	0.3-4.2 mU/L
Free T4, plasma	12-22 pmol/L
Free T3, plasma	3.1-6.8 pmol/L
Thyroperoxidase Antibody [TPO-Ab]	Negative <35 U/L
Cortisol, plasma, am	Reference Range [6-10 AM 166-507]
Growth hormone	<5 mU/L
IGF1, IGFBP3	See reports for appropriate age related reference ranges
FSH and LH, plasma (IU/L) Follicular Mid-cycle Luteal Postmenopausal Males	 FSH <13 LH<13 FSH <20 LH <95 FSH <8 LH<11 FSH >25 LH >55 FSH <12 LH <8
Progesterone, plasma (must be luteal phase DAY 21 sample)	>30 nmol/L indicates ovulation 5-30 nmol/L inadequate luteal phase, etc < 5 nmol/L indicates anovulation
Oestradiol, plasma (pmol/L) Follicular Midcycle Luteal Postmenopausal Males	 45-600 300-1800 160-780 <200 <223
PTH (whole molecule), plasma	15-65 pg/mL
Prolactin (Total), plasma Prolactin (Bioactive), plasma	F 100-500 mU/L M 90-320 mU/L F 75-381 mU/L M 63-245 mU/L

Testosterone, plasma Adult males Adult females	 9-29 nmol/L 0.1-1.8 nmol/L

IRON STUDIES	
Iron, plasma	M 14-31 μmol/L F 10-30 μmol/L
TIBC, plasma	50-80 μmol/L
Transferrin Saturation, plasma	M 20-50% F 15-50%
PROTEINS	
Albumin/creatinine ratio	*ACR <3 Normal* *3 - <30 Increased ("Microalbuminuria")* *30-300 Moderately increased* *>300 Severely increased*
CRP, Plasma	<5 mg/L
Immunoglobulins	See reports for appropriate age and sex related reference ranges.

NEUROCHEMISTRY	
CSF Glucose	2.2-3.9 mmol/L for adults 3.3-4.5 mmol/L for children (<16years) CSF glucose values should be approximately 60% of the plasma glucose values and must always be compared with concurrently measured plasma values for adequate clinical interpretation
CSF Protein	15-45 mg/dL

ADDITIONAL INFLAMMATORY MARKERS	
Interleukin- 6	< 7 pg/ml
Procalcitonin	< 0.1 ng/ml

LIPIDS - Management of Dyslipidaemia

Adapted from:
2016 ESC/EAS Guidelines for the Management of Dyslipidaemias
(European Heart Journal (2016) 37, 2999–3058)

Total risk as estimated from systems such as "SCORE"*	LDL-C ^ Treatment goal	Non-HDL-C #Non-HDL-Cholesterol is a strong independent risk factor and should be considered as a risk marker, especially in subjects with high Triglyceride.
Very High	**LDL-C <1.8 mmol/L** or a reduction of at least 50% if the baseline is between 1.8 and 3.5 mmol/L	**Non-HDL-C <2.6 mmol/L**
High	**LDL-C <2.6 mmol/L** or a reduction of at least 50% if the baseline is between 2.6 and 5.2 mmol/L	**Non-HDL-C <3.4 mmol/L**
Moderate to low	**LDL-C<3.0 mmol/L**	**Non-HDL-C <3.8 mmol/L**
Total Cholesterol is to be used for the estimation of total CV risk by means of the SCORE system. ^LDL-Cholesterol is recommended to be used as the primary lipid analysis for screening, risk estimation, diagnosis and management #Non-HDL-C should be considered as a secondary treatment target.		

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Use of HbA1c as a diagnostic test for diabetes in adults

The WHO (2011) Diabetes Guidelines for the first time permits the use of HbA1c as a diagnostic test for diabetes in certain circumstances (www.who.int/diabetes/publications/diagnosis_diabetes2011/en/index.html). This should simplify the diagnosis particularly of the very common Type 2 Diabetes in adults and hence we are implementing this strategy at Tallaght Hospital.

In combination with judicious use of plasma glucose measurements, this should also obviate the need to perform Glucose Tolerance tests in these patients except in rare circumstances.

Initial Testing Recommendation

Initial testing in **non-pregnant adult patients suspected of having type 2 diabetes** should now include **a Fasting Venous Plasma Glucose and concurrent HbA1c measurement** Patient selection may be further refined by using a type 2 diabetes risk-assessment questionnaire such as FINDRISC (see: www.diabetes.fi/en/finnish_diabetes_association/dehko/publications)

Diagnosis

A:- Symptoms

When classic symptoms of hyperglycaemia are present, any **ONE** of the Laboratory measurements **(B)** is sufficient to establish the diagnosis (and usually the quoted thresholds are significantly exceeded).

In the absence of classic symptoms, **ANY TWO** of the Laboratory measurements **(B)** may be used to establish the diagnosis of diabetes.

B:- Laboratory Data Diagnostic Cut-points for diabetes (WHO-2011):

IFCC HbA1c ≥ 48 mmol/mol (6.5%)

Fasting Venous Plasma Glucose ≥ 7.0 mmol/L

Random Venous Plasma Glucose ≥ 11.1 mmol/L

HbA1c

For HbA1c, a value of **≥** 48 mmol/mol (6.5% in the old units) using an IFCC-standardised method (as pertains in any accredited laboratory in Ireland) is recommended as the cut-point for diagnosing diabetes.

A number of exclusions apply where HbA1c measurement is not suitable (see list) however in the vast majority of cases the diagnosis of diabetes can be established on the basis of plasma glucose measurements without recourse to Glucose Tolerance testing.

List of exclusions (do not rely on HbA1c testing for diagnosis)

- All children and young people
- Patients of any age suspected of having Type 1 diabetes
- Patients with symptoms of diabetes for less than 2 months
- Patients at high diabetes risk who are acutely ill (e.g. those requiring hospital admission)
- Patients taking medication that may cause rapid glucose rise e.g. steroids, antipsychotics
- Patients with acute pancreatic damage, including pancreatic surgery
- In pregnancy
- Presence of genetic, haematological and illness-related factors that influence HbA1c and its measurement (e.g. known haemoglobinopathy, altered red cell survival)

See Guideline for comprehensive information.

Glucose Tolerance Testing

As a result of these changes, we do not provide an open access service for GTTs. All requests for GTT will need to be discussed in advance of ordering with the Chemical Pathology team.
The Phlebotomy Dept. does not perform Glucose Tolerance Tests.

Intermediate Findings and Areas of Uncertainty

As with plasma glucose measurements at present, intermediate findings also occur commonly with use of HbA1c for diagnosis. Most patients with abnormal glucose or HbA1c values which fall short of diabetes are likely to benefit from lifestyle and other interventions as for existing pre-diabetes management. Further information and suggested approaches can be found in the Guideline. We are also happy to answer any queries you have on these patients by contacting us or the diabetes team.

8.14 INTERFERENCE IN TEST RESULTS

Many tests are subject to interference. This may be biological, where the offending substance alters the true concentration within the body, or analytical, where the method is not specific. Samples are checked for haemolysis, lipaemia and icterus. Interference due to these is included in the final report.
Lists of substances that interfere with each method are available in the Clinical Chemistry Laboratory. Cases of suspected interference should be discussed with the laboratory.

Some important Drug Interferences are listed in the Table below:
THIS IS NOT A COMPLETE LIST. CONTACT CLINICAL CHEMISTRY FOR FURTHER INFORMATION

Test	Interfering Substance(s)	Details	Source
Ammonia	**Sulfasalazine/Sulfapyridine**	No result produced	CCFSN_04-15 10/06/2015
AST	**Sulfasalazine/Sulfapyridine**	Interference ↓ Results	CCFSN_04-15 10/06/2015
ALT	**Sulfasalazine/Sulfapyridine**	Interference ↓ Results	CCFSN_04-15 10/06/2015
Cyclosporin	**Itraconazole**	This method is not suitable for patients on **Itraconazole** treatment, please discuss with the laboratory.	Method information sheet
Creatinine (Enzymatic)	**N-Acetyl Cysteine (>333mg/L)** **Methyldopa** **Rifampicin** **Levodopa** **Dexium**	Interference ↓ Results Interference ↓ Results Interference ↓ Results	Roche Safety Notice CCFSN-03-15 May 2015 HPRA **SN2015(09)** **Issue Date: 21 05.15**
Digoxin	Certain drugs including **hydrocortisone** therapy, **uzara** and **triamterin** may cause falsely elevated digoxin levels. Also **spironolactone** and similar drugs at high doses.	Interference # Results	Method information sheet
Estradiol	**Fulvestrant**	Due to risk of cross reactivity, this assay should not be used when monitoring estradiol levels in patients being treated with fulvestrant.	Method information sheet
Iron/TIBC/% Saturation	**Oxytetracycline,** **Iron-Supplements,** **Desferoxamine** **Ferritin (>1200ug/L)**	Oxytetracycline causes artificially low TIBC. Iron Supplements may result in falsely high TIBC. Deferoxamine binds iron and interferes. If Ferritin (>1200ug/L) – do not use TIBC or %sat results.	Method information sheet

Lactate	**N-Acetyl Cysteine (>1497mg/L)**	Interference ↓ Results	Roche Safety Notice CCFSN-03-15 May 2015 HPRA **SN2015(09) Issue Date: 21 May 2015**
Lipids (Chol, Trig, HDL, LDL)	**N-Acetyl Cysteine**	Interference ↓ Results	Roche Safety Notice CCFSN-03-15 May 2015 HPRA **SN2015(09) Issue Date: 21 May 2015**
Tacrolimus	**Itraconazole**	This method is not suitable for patients on **Itraconazole** treatment, please discuss with the laboratory.	Method information sheet
Testosterone	**Nandrolone**	Strong interaction with Nandrolone. Do not use samples from patients on Nandrolone treatment.	Method information sheet
Uric Acid	**N-Acetyl Cysteine**	Interference ↓ Results	Roche Safety Notice CCFSN-03-15 May 2015 HPRA **SN2015(09) Issue Date: 21 May 2015**
Urine Toxicology Screen	**Various**	This is an immunological based screening test and is subject to interferences. A full list of interfering substances is available on request.	Method information sheet
Immunoassays - Cobas 8000	**Biotin > 5mg/day** **See information below**	Samples should not be taken until at least 8 hours following biotin administration.	Method information sheet
THIS IS NOT A COMPLETE LIST. CONTACT CLINICAL CHEMISTRY FOR FURTHER INFORMATION			

Potential for Biotin interference in Immunoassays

If patients are taking large doses of this Biotin / Vitamin B7, there is known potential for significant interference in immunoassays for a number of commonly requested tests in Clinical Chemistry. This arises because biotin is involved the assay design for many biomarker immunoassays.

Although normal diets, and low dose multivitamin preparations are thought not to interfere, in recent times, health food enthusiasts have been recommending people take large doses of Biotin for healthy hair, skin and nails, and supplements up to 10mg per tablet are available over the counter in many health food stores and online. There are also a couple of ongoing clinical trials of mega doses (up to 300mg/d) of Biotin in Multiple Sclerosis.

If you have a test result that does not fit the clinical picture, you may wish to exclude possible biotin interference as a cause, by asking the patient / parent / carer about any over the counter supplements or checking for a biotin prescription.

1. **<5 mg supplements** are not thought to interfere

2. **5-10 mg supplements** are typical concentrations sold over the counter. Pharmacokinetic data extrapolation shows that these concentrations correspond to plasma concentrations of between 15.6-31.3 ng/ml.
   While ALL immunoassay tests may be affected some of the most significant effects are summarised below.
   The extent of the interference is dose and time related.

Test	Effect of 5-10 mg supplement
Testosterone	Inappropriately HIGH result
Free T3	Inappropriately HIGH result
Anti-TPO	Inappropriately HIGH result

3. **High-dose biotin (100 mg)** is sometimes used to treat metabolic diseases (isolated carboxylase defects and defects of biotin metabolism). A 100 mg biotin dose equates to 500 ng/mL plasma concentration. **This concentration leads to gross analyte disturbance across ALL Roche assays**

Please contact the laboratory if you need further information on this.

9.0 HAEMATOLOGY

9.1 HAEMATOLOGY KEY CONTACTS

Prof. Helen Enright	Consultant Haematologist	Haematology	3912
DR. Ronan Desmond	Consultant Haematologist	Haematology	4132
Dr Johnny McHugh	Consultant Haematologist	Haematology	3913
Rotation	Registrar	Haematology	3937 bleep 6258 or bleep 7025
Lorraine McMahon	Chief Medical Scientist	Haematology	3909
Heather Baker	Quality Co-ordinator	Haematology	3962
Niamh Mullen/Vikki Murphy	Senior Medical Scientist	Routine Haematology	3961
Lisa Potts	Senior Medical Scientist	Coagulation	3963
Brona Maguire	Senior Medical Scientist	Special Haematology	3960
Tracey Shannon	Senior Medical Scientist	Haematinics	4088
Anne Doyle	Administrative Assistant Grade V		3932
		Result Enquiries	3932/3959

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If calling from outside the hospital, insert (01) 414 before extension number for direct access or (01) 4142000 (for hospital switchboard) and ask for extension or bleep number.

9.2 TEST REQUESTS

9.2.1 SAMPLE & FORM LABELLING REQUIREMENTS

Failure to provide required information (see Section 4.1 for details) or a discrepancy between the request form and container will result in a delay in processing of the specimen until the discrepancy has been rectified, or rejection of the request.
Please use **separate** Request Forms for each section within the Haematology Department when ICE is not available.

9.2.3 SAMPLE REJECTION CRITERIA

Test requests may be rejected if the following situations apply:

- Sample types are not compatible with tests requested.
- Significant difference between patient identifiers on sample and corresponding request form.
- MRN provided does not match the other details on the request form.
- Samples that do not have at least two acceptable identifiers.
- Sample volume inappropriate (under filled/overfilled) where applicable
- Samples which are past the recommended time from phlebotomy to analysis (See 9.2.6 below)
- Expired sample collection tubes
- Samples stored or handled at the incorrect temperature
- Samples received after cut-off time
- Where sample quality would affect analysis e.g. haemolysis for coagulation investigations
- Test requests which are not considered relevant based on clinical information provided.

9.2.4 SPECIMEN COLLECTION AND PACKAGING

Specimen collection should comply with requirements stated in section 7.6. Specimens, together with the Request Form, if applicable, should be placed inside a plastic biohazard bag and dispatched to the Laboratory as per section 4.2.

9.2.5 HEALTH AND SAFETY

Standard precautions should be observed when handling all pathological material. Specific instructions for sending radioactive samples are available in Section 4.2.2 above.

9.2.6 RETROSPECTIVE REQUESTING (ADD-ON REQUESTS)

In some cases, further tests on a specimen that is already in the laboratory may be added to the request. Only the requesting doctor or person nominated by them may request additional testing. Please contact the relevant laboratory section to add on test requests. Analyses for additional tests are subject to stability of analyte as follows:

Test	Maximum time from phlebotomy to testing:
FBC samples	24 hours
Infectious mononucleosis screens	3 days

Sickle cell screening	3 days
Coagulation tests	4 hours
D dimer	4 hours
Fibrinogen	24 hours
Haematinics	Samples must be sent to the lab for centrifugation as soon as possible post phlebotomy, then tests may be added on for up to 3 days.
Reticulocytes	24 hours
Blood film	24 hours (morphology may not be reportable)
Malaria screening	Send to the lab immediately, can be added on up to 4 hours post phlebotomy.
Immunophenotyping (PB)	48 hours

9.2.7 RESULTS, ENQUIRIES, TECHNICAL AND CLINICAL ADVICE

Haematology General Enquiries/Result Enquiries: 3932/3959

- Advice on interpretation of results, sampling & storage procedures and frequency of requesting will be directed to the appropriate person.
- Advice on choice and use of examinations, including required type of sample, limitations of examination methods and the frequency of requesting the examination will be directed to the appropriate person.
- Clinical advice & information for users of laboratory services on medical indications and appropriate selection of available procedures, effective utilization of laboratory examinations, and professional judgments on the interpretation of the results of examinations should be sought directly from the Clinical Haematology Team.
- Critical results will be telephoned to the location on the original request.
- For sample requests originating outside of the hospital, out of hours contact details for the requesting clinician should be supplied.

9.3 EMERGENCY ON-CALL SERVICES FOR HAEMATOLOGY

The on-call service is provided to process non-deferrable/urgent test requests, the results of which will impact on immediate patient management.
Do not forward routine requests to the laboratory during on-call hours:

Monday to Friday: 8 pm – 8 am

Saturday 12.30 pm – Sunday 9 am

Sunday + Bank Holiday: 9 am – 8 am

Delivery of Samples out of hours:
The Scientist On-Call MUST be bleeped when Urgent Samples are being sent during On-Call periods.

Emergency On – Call Bleep 7282

Samples may be delivered to the laboratory via the Pneumatic Transport System or by hand. Samples delivered by hand should be left in the box labelled “urgent samples” outside Haematology Lab door. Samples left at other locations may not be noticed by Scientist On-Call resulting in a delay in processing of samples and provision of results.

URGENT TESTS AVAILABLE ON CALL

- Full Blood Count
- White cell differential
- PT / INR
- APTT /APTT Ratio
- Fibrinogen
- D-Dimers
- Hb S (Sickle cell) Screen (when indicated), Lab must be informed
- Malaria Screen (only rapid diagnostic test performed out of hours. Examination of thick and thin films including speciation will not be carried out until the next routine working day, unless RDT is positive for P. falciparum.) Lab must be informed when a Malaria screen is being sent.

Other requests may be facilitated, after approval by the Haematology Consultant on-call (approval to be sought by the requestor and evidence of this provided), and appropriate arrangements made with the laboratory.

9.4 SAMPLE REQUIREMENTS /CONSIDERATIONS FOR REFERRED TESTS

- Genetic requests for Haematological malignancy must arrive in the lab by 2pm Thursday at the latest. Requests received after this time may not be processed.
- T & B lymphocyte subset investigations must arrive in the lab
  Monday to Thursday: 15.00 hrs
  Friday: 11.00 hrs
  For further information on this tests see the link to SJH immunology in section 5.1.2 above.
- Plasma viscosity: phone ahead before taking the sample to make arrangements with referral lab.
- Samples for specialised coagulation testing must be received before 3.30pm Mon-Fri.
- Oxidative burst tests must be pre-arranged with St. James' Immunology Dept. and must be received in Lab before 9am.
- Hereditary Haemochromatosis Screening and MTHFR – request MUST BE accompanied by a Patient consent form. Requests received without the signed consent form will be rejected. Copies of this form are only available from the Referral Lab Website: https://cdnmedia.eurofins.com/european-west/media/1924974/generic-genetic-consent-form-002.pdf

For more details on availability, sample requirements and special considerations for referral tests, including turn-around times, please contact the haematology lab.

9.5 TURNAROUND TIMES

We will endeavor to meet the following standards, subject to availability of sufficient staff and other resources including various IT systems.
Reporting of results may take longer pending further investigation of initial results. The quoted turnaround times are dependent on samples that are from patients that do not need any analytical intervention (e.g. reflex/further testing).
Reporting of results may also take longer during on-call periods, depending on the work load.
Please note that marking a sample "Urgent", or requesting an urgent test on ICE may not cause it to be handled urgently unless the Lab has been informed.

URGENT REQUESTS (ROUTINE INVESTIGATIONS)	**TURN AROUND TIMES**
Haematology (Full blood count)	1 hour of receipt
Coagulation	1 hour (Excluding D dimer) of receipt
INR (Warfarin Clinic)	90 minutes

NON URGENT REQUESTS	**TURN AROUND TIMES**

Routine Haematology	within 3 hours of receipt, subject to cut-off
Routine Coagulation	within 2 hours of receipt, subject to cut-off (excluding D dimer)
Haematinics	3 working days

Above tables refer to In Patient investigations only. Requests from GPs and Out Patients may take longer. For specialised assays/requests see specific details in following tables. Turn-around times for examinations referred to external laboratories will be provided by the external laboratory directly or from their website. Contact ext. 3961/3962 for details.

9.6 SAMPLE REQUIREMENTS /CONSIDERATIONS

SAMPLE VOLUMES

- It is preferable that blood tubes, especially those containing preservatives, are filled to their stated capacity. This avoids samples being rejected due to insufficiency or interferences from excess concentrations of preservative. This is mandatory for some tests, e.g. Coagulation based tests, where the increased / decreased anticoagulant concentration that results from under / over filling would invalidate the test.
- Special paediatric coagulation tubes are suitable for routine coagulation investigations only.
- See following tables for special conditions/handling requirements/notes for individual tests
- For more details on availability and special considerations for referral tests, including turn-around times, please contact the haematology lab (4143961)

9.6.1 ROUTINE HAEMATOLOGY

Assay	Sample Type	Special Conditions/sample handling requirements	TAT
Full Blood Count #	EDTA Purple	FBC only: Minimum sample volume is 1ml. FBC plus ESR: Minimum sample volume is 3ml.	Urgent 1 hour Routine 3 hours
Differential White Cell Count #	EDTA Purple		Urgent 1 hour Routine 3 hours
Peripheral Blood Film #	EDTA Purple		2 routine working days
Reticulocyte Count #	EDTA Purple		Urgent 1 hour Routine 3 hours
E.S.R.	EDTA Purple	ESR only: Minimum sample volume is 1.5ml ESR plus FBC: Minimum sample volume is 3ml.	24 hours
Infectious Mononucleosis Screen #	EDTA Purple		24 hours

Malaria Screen: 1.Rapid diagnostic test (RDT) 2.Thick & thin film for microscopy #		EDTA Purple	Must contact lab before sending sample. Fresh sample to be sent without delay to the laboratory. Will only be carried out if relevant clinical details and travel history are supplied.	3 hours for RDT Microscopy: 24 hours (if received during routine hours)
Sickle Cell Screen #		EDTA Purple		8 hours (if received during routine hours)
Haemolytic anaemia screen	FBC/Film/ Retic/DCT	2 x EDTA Purple DCT performed in blood transfusion		Urgent 1 hour Routine 3 hours
	Haptoglobin	1 x Serum Red		3 weeks
	Urine haemosiderin	Urine		2 days

#: 1 EDTA specimen is sufficient to perform FBC/Diff/Blood Film, Infectious Mononucleosis Screen, Sickle Cell Screen and Retic Count, provided the sample is of adequate volume. All of the above samples may be sent in the Pneumatic Tube System (PTS).

9.6.2 ROUTINE COAGULATION LABORATORY

COAGULATION SAMPLES MUST BE RECEIVED WITHIN 6 HOURS OF PHLEBOTOMY
***** For Exception See D-Dimers**

Assay	Sample Type	Special Conditions	TAT
Coagulation Screen	Sodium Citrate Blue	State if patient is on Warfarin +/- Heparin +/- DOAC	Urgent 1 hour Routine 2 hours
PT / INR	Sodium Citrate Blue	State if patient is on Warfarin.	Urgent 1 hour Warfarin Clinic 90mins Routine 2 hours
APTT / ratio	Sodium Citrate Blue	State if patient is on Heparin.	Urgent 1 hour Routine 2 hours
Thrombin Time	Sodium Citrate Blue	Only when specifically requested by the Haematology team	3 hours
D-Dimers	Sodium Citrate Blue	Should only be requested once daily in cases of suspected DVT & DIC. Not appropriate for GP patients. *** Must be processed within 4 hours of phlebotomy.	3 hours
Fibrinogen	Sodium Citrate Blue		Urgent 1 hour Routine 2 hours

All of the above samples may be sent in the Pneumatic Tube System (PTS).

9.6.3 SPECIAL COAGULATION LABORATORY

SPECIAL CONDITIONS

****NB**** The following tests **MUST NOT** be sent in the Pneumatic Tube System (PTS). Samples must be sent to the laboratory as soon as possible after phlebotomy.

ALL COAGULATION SAMPLES MUST BE RECEIVED WITHIN 6 HOURS OF PHLEBOTOMY

The following tests should only be requested following consultation with the Haematology team or Laboratory. Please state family/clinical history and anticoagulant status.

Samples for special coagulation requests must be received **by 3.30pm Mon-Fri.**

For more details on availability and special considerations for referral tests, including turn-around times, please contact the coagulation lab (4143963).

Assay	Sample Type	Special Conditions	Turn-around Time
Hyper-Coagulation Screen (Thrombophilia screen, includes Factor V Leiden and Prothrombin Variant)	6 x Sodium Citrate Blue 1 x Serum Red 2x EDTA Purple	6 weeks post-acute event	12 weeks
Hypo-Coagulation Screen (Intrinsic & Extrinsic screens)	6 x Sodium Citrate Blue		12 weeks
Coagulation Factor Assays	2 x Sodium Citrate Blue		Dependent on specific Factor
Coagulation Factor Inhibitor Assays	2 x Sodium Citrate Blue		12 weeks
Lupus Anticoagulant Antiphospholipid Antibodies	3 x Sodium Citrate Blue 1 x Serum Red		12 weeks
Platelet Function Investigations	6 x Sodium Citrate Blue	Must be pre-booked with St. James's Hospital Haematology Laboratory	http://search.stjames.ie/Labmed/
Heparin Induced Thrombocytopenia Screen (H.I.T.S)	2 x Serum Red	4T score form MUST be filled out, please download a copy of this form from SJH website or phone 01 416 2049 for a copy	http://search.stjames.ie/Labmed/
Anti Factor Xa	2 x Sodium Citrate Blue	Contact Consultant Haematologist before requesting this test	Case dependent
Protein C levels in Meningococcaemia	1 x Sodium Citrate Blue		4 hours
Antithrombin levels in L Asparaginase therapy	1 x Sodium Citrate Blue		4 hours

9.6.4 SPECIAL HAEMATOLOGY LABORATORY

Assay	Sample Type	Special Conditions	PTS	Turn-around time
Genetic testing for haematological malignancy (2)	9mls PB (EDTA) or 9mls BMA (lithium heparin, no gel (3) and/or EDTA)	Refer to special instructions on ICE for specific test requirements	Y (PB)	variable
Immuno- phenotyping for Lymphoma / Leukaemia diagnosis / monitoring.	3-5mls BM in RPMI +Heparin. (3) or 6mls PB EDTA	In consultation with Haematology team or laboratory	BMA-No. PB-Yes	48 hours
CSF cell counts and cytospin for lymphoma/leukaemia monitoring	CSF in sterile container (no additive)	In consultation with Haematology team or laboratory. Sample should arrive in lab before 4.45pm	No	48 hours
CSF for immunophenotyping	CSF in RPMI+ heparin (2, 3)	Only by prior arrangement with special haematology		24 hours
Fluid for immunophenotyping	Fluid in RPMI+ heparin (2,3). Fluid in sterile container (no additive) also required	Only by prior arrangement with special haematology		24 hours
PNH	6ml PB EDTA Purple	In consultation with Haematology team or laboratory	Yes	48 hours
Urine Haemosiderin	Urine	Early morning specimen required.	Yes	2 weeks

(1) Slides should be made using a **minimum** volume of the bone marrow aspirate (1 small drop). To avoid dilution of the sample, the total volume drawn should fill the nozzle of the syringe only.
(2) Please contact the Haematology team (bleep 7025/6258) for instructions and advice on taking CSF & BMA samples.
(3) Bottles for BMA samples available in special haematology.

For more details on availability, sample requirements and special considerations for referral tests, including turn-around times, please contact the special haematology lab (3960).

9.6.5 HAEMATINICS LABORATORY

Assay	Sample Type	Special Conditions	PTS	Turn-around time
Vitamin B12	Serum Red		Yes	3 working days
Serum Folate	Serum Red		Yes	3 working days
Ferritin	Serum Red		Yes	3 working days

9.7 REFERENCE INTERVALS

REFERENCE VALUES IN CHILDREN

Please contact the laboratory for interpretation of results in children

REFERENCE VALUES IN ADULTS:

Adult reference intervals for common investigations are tabulated below. Many reference intervals depend on age, sex, and other variables and the values given are for guidance only. Please contact the relevant laboratory section if you have any problems in interpretation.
Reference intervals are method dependent and can change if there has been a change in assay methodology. Changes in reference ranges will be highlighted on report forms.

Note: Please contact Haematology Lab 3961 for pregnancy specific reference ranges.

CLINICAL DECISION/CRITICAL ALERT VALUES

Please contact the Haematology Lab for a list of critical alert values if required.
Staff will attempt to communicate critical results by phone where applicable, however, it is the duty of all clinicians to follow up, in a timely fashion, on the results of haematology investigations requested on patients under their care.

ROUTINE HAEMATOLOGY		
PARAMETER	**UNITS**	**ADULT REFERENCE RANGE**
RED CELL COUNT	$X10^{12}/L$	M 4.5 - 6.5 F 3.8 - 5.8
HAEMOGLOBIN	g/dL	M 13.0- 18.5 F 11.5- 16.5
HCT	L/L	M 0.380 - 0.510 F 0.360 - 0.460
MCV	fL	80 - 96
MCH	pg	27.0 - 34.0
MCHC	g/dL	31.0 - 36.5

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ESR	mm/hr	
Age	*Gender*	*Reference range*
0-14	*M and F*	*34 (26-41)*
15-50	*F*	*37 (36-39)*
15-50	*M*	*28 (20-30)*
51-70	*F*	*39 (38-45)*
51-70	*M*	*37 (31-44)*
>70	*M and F*	*46 (45-55)*

RETICULOCYTE	$X10^9/L$	35.2 -122.8
PLATELET COUNT	$X10^9/L$	150 – 450
WHITE CELL COUNT	$X10^9/L$	4.0 - 11.0
NEUTROPHILS	$X10^9/L$	2.0 - 7.5
LYMPHOCYTES	$X10^9/L$	1.5 - 4.0
MONOCYTES	$X10^9/L$	0.2 - 0.8
EOSINOPHILS	$X10^9/L$	0.04 - 0.4
BASOPHILS	$X10^9/L$	0.00 - 0.1

COAGULATION		
PARAMETER	**UNITS**	**ADULT REFERENCE RANGE**
PT	Seconds	9.6 – 11.8
APTT	Seconds	20.8 – 30.8
FIBRINOGEN	g/L	1.5– 4.0
D DIMER	ug/mL	<0.44 normal reference range <0.40 cut off for exclusion of DVT in conjunction with Wells Score
FACTOR II:C	IU/mL	0.91 – 1.37
FACTOR V:C	IU/mL	0.84 – 1.57
FACTOR VII:C	IU/mL	0.72 – 1.61
FACTOR VIII:C	IU/mL	0.55 – 1.40
FACTOR IX:C	IU/mL	0.62 – 1.26

FACTOR X:C	IU/mL	0.81 – 1.44
FACTOR XI:C	IU/mL	0.69 – 1.37
FACTOR XII:C	IU/mL	0.61 – 1.72
ANTI THROMBIN	IU/mL	0.87 – 1.19
PROTEIN C	IU/mL	0.70 – 1.50
PROTEIN S (Free Antigen)	IU/mL	M 0.76 – 1.42 F 0.64 – 1.20

NOTE: For all other special coagulation assay reference intervals please contact Coagulation laboratory at ext 3963

HAEMATINICS		
PARAMETER	**UNITS**	**ADULT REFERENCE RANGE**
SERUM FOLATE	ng/mL	3.3 – 17.2
FERRITIN	ug/L	14-200
VITAMIN B12	pg/mL	200 – 660

10.0 BLOOD TRANSFUSION

10.1 Introduction

The Blood Transfusion Laboratory is located in room 3.5/05 in Laboratory Medicine. This laboratory provides compatibility testing and blood products for hospital patients. The services provided are listed below in Section 10.3.

The Blood Transfusion Department complies with the International Standard ISO 15189 and AML-BB (Registration Number 330 MT), and the regulations, policies, and terms and conditions of the Irish National Accreditation Board (INAB) and requirements of Health Products Regulatory Authority (HPRA) which is the competent authority for Blood Transfusion.

The Blood Transfusion Department TUH provides full laboratory testing and blood product services to CHI@Tallaght. The Paediatric Consultant Haematologist provides clinical governance and advisory services for CHI@Tallaght. Haemovigilance service is provided by CHI Haemovigilance officer(s), available at haemovigilance@childrenshealthireland.ie. Haemovigilance officer(s) at CHI@Tallaght are responsible for reporting all serious adverse reactions/events to the Paediatric Consultant Haematologist and TUH. The Blood Transfusion Department in TUH is responsible for reporting to the National Haemovigilance office and the maintenance of traceability records under article 14 and 15 of EU directive 2022/98/EC and AML-BB requirements.

10.2 Contact Information

POSITION:	NAME:	CONTACT NUMBER:
Consultant Haematologist (Head of Department)	Dr. Ronan Desmond	Ext 4132
Consultant Haematologist (BT lab services and Haemovigilance)	Prof. Helen Enright	Ext 3912
Consultant Haematologist	Dr. Johnny Mc Hugh	Ext 3913/3966
Registrars		Bleep 6258 or 7025
Routine Laboratory	Routine Laboratory	Ext 3964 / 3965 (08:00-17:00)
On Call	On Call	Bleep 7281
Chief Medical Scientist	Ms. Alison Harper	Ext 3910
Senior Medical Scientist		Ext 3999
Quality Officer	Ms. Meghan O'Brien	Ext 3964/3965
Haemovigilance Officer	Helen Byrne Glenda Taylor	Ext 2372 / Bleep 2111 Ext 2437 / Bleep 2110
Blood Delivery Porter		Bleep 7266

Clinical Advice is available from the Haematology Team 24 hours a day.

10.3 Patient Consent

Sampling:

Consent can be inferred when the patient willingly submits to the sample collecting procedure.

If obtaining consent is not possible in emergency situations, the laboratory may carry out necessary procedures, provided they are in the patient's best interest.

Users of the Laboratory Medicine Service are advised to familiarise themselves with the publication – HSE National consent policy NOHREP-CONS-001 available on Q-pulse.

Transfusion:

For consent to be valid the patient must: have received sufficient information in a comprehensible manner about the nature, purpose, benefits and risks of an intervention/service. Not be acting under duress and have the capacity to make the particular decision.

Information leaflets are available on clinical areas to assist Healthcare Professional in the provision of patient information. There is tick box on the front of the Blood Prescription Document (purple document) to indicate if an information leaflet has been given.

The Healthcare Professional must document clearly the intention to transfuse. Verbal consent must be documented in the patient's Health Care Record (chart) following the patient's or the Childs guardian agreement to be transfused.

If a patient wishes to refuse blood products please refer to Management of Adult Patients Who Refuse Blood and Blood Products for Religious Reasons and Other Patients who Refuse Blood/Blood Products/Components and consent from appendix 2 onwards (PPC-POL-51). The patient's refusal of blood should be documented in the patient's Health Care Record (chart).

Patient Consent	
Residual Risk	Patient not consented/informed consent not provided. Blood product transfused without patient consent. Resulting in potential legal implications. Low risk provided hospital policies and procedures are adhered to. Full risk assessments (BT-RA-0600E) available upon request.

10.4 Blood Transfusion Services

Blood Transfusion Emergency On-Call hours:

- Monday to Friday: 8pm – 8am
- Saturday 12:30pm – Sunday 9am
- Sunday & Bank Holidays: 9am – 8am

The Scientist On-Call **MUST** be bleeped (bleep 7281) when Urgent Samples are being sent during On-Call periods.

Routine hours:

- Mon-Fri 09:00 – 17:00 - Samples must be received in Blood Transfusion Laboratory no later than ***15:45*** in order for testing to be complete the same day
- Sat 09:00 – 12.30 - Samples must be received in Blood Transfusion Laboratory no later than ***11:00*** in order for testing to be completed the same day.
- All samples received after stated cut off times will be processed by 12pm on the next routine working day.

Blood Transfusion Services:

Routine Testing
Patient samples are treated as routine unless the laboratory is contacted. For patients scheduled for elective surgery, a current in-patient sample must be received prior to procedure, during routine hours. Samples from pre-assessment clinics are processed during routine hours only. When treatment is ongoing and a valid sample is available request blood products in advance to cover weekends.
Urgent Testing
Urgent requests are for unavoidable medical/surgical emergency e.g. patient bleeding If results/blood are required urgently the requesting Medical Doctor must contact the Blood Transfusion Laboratory Note: Unavoidable delays in the provision of compatible blood can occur when a patient has a positive antibody screen.
Emergency Requests
The Blood Transfusion Laboratory and Blood Porter must be contacted for Emergency Requests of Blood Products. • Blood Transfusion Lab EXT 3964/3965 Bleep 7281 • Blood Porter Bleep 7266, porter pool Bleep 7264 Refer to section 10.6 Emergency & Massive Transfusion Protocol

10.4.1 Group & Save

Group & Save: ABO and RhD Group and Antibody screen for clinically significant red cell antibodies.

The sample is held in the laboratory and is valid for 72hrs from time taken. Add-on requests for products can be made during this time.

A new sample is required for each inpatient episode and if 72hrs has elapsed since last sample was taken.

Any patient requiring blood, platelets or plasma must have 2 blood groups on file in the blood transfusion laboratory. Group O blood will be issued until 2nd sample is processed.

Group & Save	
Sample Type	6ml EDTA (pink top)
Processing TAT	Routine – Same day if received before cut off time see section 10.3 Urgent – 4 hours
Information	• Samples are kept and are valid for 72hrs from the time the sample was taken. • Unavoidable delays in the provision of results can occur when a patient has a positive antibody screen.
Residual Risk	Delay in test result/product availability for clinician/patient. Incorrect result released. Repeat sampling of patient. Low risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600F) available upon request. Note: Blood Transfusion sampling is high risk, see section 10.6 below.

10.4.2 Crossmatch/Red Cells

Red blood cell transfusions are primarily given to patients with anaemia (low red blood cell count) or those who have experienced significant blood loss. This is done to increase the oxygen-carrying capacity of the blood.

Crossmatch - determines compatibility between donor red cells and the patient. This may be determined electronically or serologically.

Serological crossmatch – compatibility testing each donor unit against the plasma of the intended recipient.

Electronic Issue (EI) - compatibility of the donor red cells with the patient determined by the Laboratory Information System.

Patients that are eligible for electronic issue of red cells may have units available in a shorter timeframe, contact Blood Transfusion Lab to check patients' eligibility. Patients who are suitable for EI:

- Must have a valid fully processed inpatient group & save sample and a historical blood group on record in TUH.
- Must have no previously known antibody of clinical significance
- Must not be excluded on clinical grounds e.g. transplant, AIHA, Sickle Cell Disease.

Crossmatch/Red Cells	
Sample Type	6ml EDTA (pink top)
Processing TAT	Routine & Urgent – 2 hours Emergency – 4 hours
Information	• Patient must be a current in-patient with a TUH ID wristband • A valid Group & Save sample is required. The sample is held in the laboratory and is valid for 72hrs from time taken. Add-on requests for products can be made during this time. • A new sample is required for each inpatient episode and if 72hrs has elapsed since last sample was taken. • Patients who do not have a historical blood group on file in TUH must have a 2nd group check sample taken to confirm their blood group before blood can be issued. **This sample must be taken independently from the first.** • Consult Transfusion Guidelines for details on special requirements e.g. CMV-, irradiated, paediatrics, sickle cell patients • Patients that are eligible for electronic issue of red cells may have units available in a shorter timeframe, contact Blood Transfusion Lab to check patients' eligibility. • **Unavoidable delays in the provision of compatible blood can occur when a patient has a positive antibody screen/availability of suitable blood** • A crossmatch can be added to a valid sample by sending a completed add-on request form.
Residual Risk	Serious adverse reaction (SAR) associated with ABO incompatible transfusion. Delay in blood product availability, incorrect/inappropriate blood product issued/transfused resulting in SAR or Serious Adverse Event (SAE). Low-medium risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600H, BT-RA-0600I and BT-RA-0600L) available upon request.

10.4.3 Direct Coombes Test (DCT)

The Direct Coombes Test (DCT)/ Direct Antiglobulin Test (DAT) is used to investigate potential causes of red blood cell destruction by demonstrating in-vivo coating of red cells with antibodies and/or complement proteins.

DCT	
Sample Type	EDTA sample (3ml purple top or 6ml pink top)
Processing TAT	Routine – Same day if received before cut off time see section 10.3 Urgent – 4 hours
Information	DCT may be requested up to 48 hours after sample taken, contact BT lab to check sample suitability. A DCT can be added to a valid sample by sending a completed add-on request form. **Note**: Testing for IgA, IgM, C3c and C3d are not within the scope of INAB accreditation.
Residual Risk	Delay in test result availability for clinician/patient. Incorrect result released impacting patient care/treatment. Repeat sampling of patient. Low risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600G) available upon request.

10.4.4 Transfusion Reaction Investigation

Investigation of suspected transfusion reactions due to blood products is carried out by serological laboratory investigations using patient pre and post transfusion samples.

Haemovigilance review of the patient's clinical record is performed where necessary. Haematology Team advice is available 24/7.

All investigations carried out are reviewed with the Consultant Haematologist at Blood Transfusion/Haemovigilance Team Meetings.

Suspected transfusion reactions must be reported to the Haemovigilance Officer (HVO), out of hours report to the Blood Transfusion Laboratory.

Information is available in the purple document and on Qpulse PCC-POL-010 and PCC-POL-011.

Transfusion Reaction Investigation	
Sample Type	6 ml EDTA (pink top)
Processing TAT	Routine – Blood Transfusion serological investigation completed the same day if received before cut off time see section 10.3 Urgent – 4 hours for Blood Transfusion serological investigation
Information	**Stop Transfusion**. Contact medical/surgical team for patient review. Contact Blood Transfusion Lab and Haemovigilance Officers PPPGs available on Qpulse: Adult: Management of transfusion Reaction Algorithm PPC-RSC-51 on Qpulse and within the Blood and Blood Product Transfusion and Prescription Record. Qpulse policy PPC-HAE-POL-010 Management of Adverse Transfusion Reactions in Adult Patients. Child: Management of an Acute Transfusion Reaction in the Child Algorithm PPC-RSC-52 on Qpulse. Policy on the management of adverse transfusion reactions and events in paediatric patients PPC-HAE-POL-011.
Residual Risk	Failure to identify or recognise symptoms of a transfusion reaction resulting in fatal or life-threatening, disabling, incapacitating conditions in the patient. Delay in investigation result/blood product availability for clinician/patient. Potential impact on patient care - repeat sampling, delay of investigation results, availability of blood products. Low risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600J, BT-RA-0600N and BT-RA-0600O) available upon request.

10.4.5 Platelets

Used to provide platelet replacement where deficiency or functional abnormality is causing significant haemostatic problems. Platelets are ordered from the Irish Blood Transfusion Service (IBTS) on a named patient basis.

Platelets	
Sample Type	6ml EDTA (pink top)
Processing TAT	Delivery is arranged on a case by case basis based on urgency and availability from the IBTS i.e. required for immediate use or can wait for next scheduled delivery. Within 3 hours for emergency/urgent requests or on next scheduled delivery.
Information	Platelets are ordered on a named patient basis from the IBTS. Orders for more than 1 platelet will be referred to the Haematology Team. Contact Blood Transfusion lab in advance if HLA matched platelets are required. All platelets are irradiated. Additional requests can be made by sending a completed request form once a valid sample in lab. Contact Blood Transfusion lab in advance if HLA matched platelets are required (see section 10.4.6 below).
Residual Risk	Serious adverse reaction (SAR). Delay in blood product availability, incorrect/inappropriate blood product issued/transfused resulting in SAR or Serious Adverse Event (SAE). Low-medium risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600I and BT-RA-0600L) available upon request.

10.4.6 HLA Matched Platelets

HLA matched platelets are used for patients who have developed antibodies against platelets due to prior transfusions or pregnancies, making them refractory to regular platelet transfusions.

HLA Matched Platelets	
Sample Type	6ml EDTA (pink top)
Processing TAT	Delivery is arranged on a case by case basis based on urgency and availability from the IBTS i.e. required for immediate use or can wait for next scheduled delivery. TAT dependant on availability of matched donor.
Information	Order in consultation with the Haematology Team. Contact Blood Transfusion lab in advance to order HLA matched platelets. In emergency situations HLA matched platelets may not be immediately available, consult with haematology team for suitable alternatives. Suitable HLA matched platelet is dependent on donor availability.
Residual Risk	Serious adverse reaction (SAR). Delay in blood product availability, incorrect/inappropriate blood product issued/transfused resulting in SAR or Serious Adverse Event (SAE). Low-medium risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600I and BT-RA-0600L) available upon request.

10.4.7 Frozen Plasma

LG-octaplas is human plasma pooled and treated for virus inactivation. It contains human plasma proteins which are important to maintain normal clotting characteristics and is used the same way as normal fresh-frozen plasma (FFP). Used in cases of complex deficiencies of coagulation factors which can be caused by severe failure of the liver or massive transfusion. LG-octaplas may also be given in emergency situations when a coagulation factor concentrate (such as Factor V or Factor XI) is not available or a necessary laboratory diagnosis is not possible. It may also be given to rapidly reverse the effects of oral anticoagulants (coumarin or indanedione type), when vitamin K is insufficient due to impaired liver function or in emergency situations. LG-octaplas can be given to patients who undergo plasma exchange in order to restore the balance of the coagulation factors.

Frozen Plasma (LG Octaplas)	
Sample Type	6ml EDTA (pink top)
Processing TAT	Routine – up to 2 hours if Blood Group unknown Urgent – up to 40 minutes if Blood Group unknown
Information	For immediate use within 8 hours of thawing. Check coagulation screen results prior to ordering. Additional requests can be made by sending a signed request form once a valid sample in lab.
Residual Risk	Delay in blood product availability, incorrect/ inappropriate blood product transfused resulting in Serious Adverse Reaction (SAR) or Serious Adverse Event (SAE). Low-medium risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600I and BT-RA-0600L) available upon request.

10.4.8 Fibrinogen Concentrate

Fibrinogen concentrate (FIBRYGA) contains human fibrinogen and is used for the treatment of bleeding episodes and prophylaxis for surgery in patients with congenital lack of fibrinogen (hypo- or afibrinogenaemia) with a bleeding tendency and for fibrinogen supplementation in patients with uncontrolled severe bleeding accompanied by acquired lack of fibrinogen during surgery.

Fibrinogen Concentrate (Fibryga)	
Sample Type	None
Processing TAT	Routine & Urgent – up to 40 minutes
Information	Check patient Fibrinogen levels prior to ordering. Requires completed request form signed by requesting Doctor
Residual Risk	Delay in blood product availability, incorrect/ inappropriate blood product issued/transfused resulting in adverse reaction or event. Low-medium risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600I and BT-RA-0600M) available upon request.

10.4.9 Albumin

Human Albumin (Baxalta) used for restoration and maintenance of circulating blood volume in cases of hypovolaemia and hypalbuminaemia. Available in 20% and 5% concentrations.

Albumin	
Sample Type	None
Processing TAT	Routine – up to 2 hours Urgent – up to 40 minutes
Information	Two concentrations available: • 5% 500ml • 20% 100ml Requires completed request form signed by requesting Doctor
Residual Risk	Delay in blood product availability, incorrect/ inappropriate blood product issued/transfused resulting in adverse reaction or event. Low-medium risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600I and BT-RA-0600M) available upon request.

10.4.10 Prothrombin Complex Concentrate (PCC)

PCC (Octaplex) contains the human vitamin K dependent blood coagulation factors II, VII, IX and X. Used for the treatment of bleeding and perioperative prophylaxis of bleeding in acquired deficiency of the prothrombin complex coagulation factors when rapid correction of the deficiency is required and in congenital deficiency of the vitamin K dependent coagulation factors II and X when purified specific coagulation factor product is not available.

PCC	
Sample Type	None
Processing TAT	Routine & Urgent – up to 40 minutes
Information	Order in consultation with the Haematology Team. Refer to Prothrombin Complex Concentrate (PCC) / Octaplex Blood Product/Component Guideline PPC-GUI-212 on QPulse. Requires request form signed by requesting Doctor
Residual Risk	Delay in blood product availability, incorrect/ inappropriate blood product issued/transfused resulting in adverse reaction or event. Low-medium risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600I and BT-RA-0600M) available upon request.

10.4.11 Anti-D Prophylaxis

Conatins human anti-D immunoglobulin. Used to prevent RhD isoimmunisation in RhD-negative mothers carrying an RhD-positive baby.

Anti-D (Rhophylac)	
Sample Type	6 ml EDTA (pink top)
Processing TAT	Routine & Urgent – up to 40 minutes if Blood Group unknown
Information	Check Rh D group and antibody screen result. Should only be issued to Rh D negative patients. Most effective when given within 72hours of sensitising event. Qpulse guideline PPC-GUI-218 Additional requests can be made by sending a completed request form once a valid sample in lab.
Residual Risk	Delay in blood product availability, incorrect/ inappropriate blood product issued/transfused resulting in adverse reaction or event. Low-medium risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600I and BT-RA-0600M) available upon request.

10.4.12 Granulocytes

Pooled leucocytes. May be used in severely neutropenic patients with proven sepsis while receiving adequate antibiotic therapy.

Granulocytes	
Sample Type	6 ml EDTA (pink top)
Processing TAT	Delivery is arranged on a case by case basis based on urgency and availability from the IBTS. TAT dependant on availability of Product. Issued within 2 hours of receipt of product.
Information	Patient must be a current in-patient with a TUH ID wristband Patients who do not have a historical blood group on file in TUH must have a 2nd sample taken to confirm their blood group before blood can be issued. **This sample must be taken independently from the first.** Consult Transfusion Guidelines for details on special requirements e.g. CMV-, irradiated, paediatrics, sickle cell patients Patients that are eligible for electronic issue of red cells may have units available in a shorter timeframe, contact Blood Transfusion Lab to check patients' eligibility. **Unavoidable delays in the provision of compatible units can occur when a patient has a positive antibody screen/availability of suitable blood** Can be added to a valid sample by sending a completed add-on request form.
Residual Risk	Delay in blood product availability, incorrect/ inappropriate blood product transfused resulting in Serious Adverse Reaction (SAR) or Serious Adverse Event (SAE). Low-medium risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600H and BT-RA-0600L) available upon request.

10.4.13 Coagulation Factor Concentrates

Coagulation factor concentrates are used to treat bleeding disorders by replacing missing or deficient clotting factors in the blood. They are typically derived from human plasma or produced through recombinant DNA technology.

Coagulation Factor Concentrates	
Sample Type	None
Processing TAT	Routine & Urgent – 40 minutes if in stock.
Information	Order in consultation with the Haematology Team Contact Blood Transfusion Lab to check availability Requires request form signed by requesting Doctor
Residual Risk	Delay in blood product availability, incorrect/ inappropriate blood product issued/transfused resulting in adverse reaction or event. Low-medium risk provided hospital policies and procedures are adhered to. . Full risk assessment (BT-RA-0600I and BT-RA-0600M) available upon request.

10.4.13 Veraseal

VeraSeal is a sealant used to stop bleeding during surgery or to support stitches during surgery on blood vessels. It contains the active substances human fibrinogen and human thrombin.

Veraseal	
Sample Type	None
Processing TAT	Urgent – up to 40 minutes
Information	Contact Blood Transfusion Lab in advance. See product insert for expiry once thawed. Requires request form signed by requesting Doctor
Residual Risk	Delay in blood product availability, incorrect/ inappropriate blood product issued/transfused resulting in adverse reaction or event. Low-medium risk provided hospital policies and procedures are adhered to. Full risk assessment ((BT-RA-0600I and BT-RA-0600M) available upon request.

10.4.13 Tisseel

Tisseel is a fibrin sealant indicated for use as an adjunct to haemostasis and sealing techniques.

Tisseel	
Sample Type	None
Processing TAT	Urgent – 40 minutes
Information	Contact Blood Transfusion Lab in advance. See product insert for expiry once thawed. 3 volume options available; 2ml, 4ml, 10ml Product issued frozen, thaw in clinical area. Theatre procedure PPC-PRO-137 Requires request form signed by requesting Doctor
Residual Risk	Delay in blood product availability, incorrect/ inappropriate blood product issued/transfused resulting in adverse reaction or event. Low-medium risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600I and BT-RA-0600M) available upon request.

10.4.14 Cold Agglutinin Screen

Determines the presence of cold antibodies, usually IgM-type antibodies, which react optimally at room temperature or at 4oC.

Cold Agglutinin Screen	
Sample Type	6ml Clotted (red top) **without gel**
Processing TAT	Routine – 2 days from sample receipt
Information	Samples must be transported in heat block to Blood Transfusion lab. Heat block is stored in the Immunology Lab, Clinical Chemistry department. **Note**: this is not an INAB accredited test.
Residual Risk	Delay in test result/product availability for clinician/patient. Incorrect result released. Repeat sampling of patient. Low risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0113A) available upon request.

10.4.15 HLA Typing for potential Bone Marrow Transplant Patients

Testing performed in the National Histocompatibility and Immunogenetics Reference Laboratory (NHIRL).
Contactable hours 09:00-17:00 Monday to Friday
Telephone No. 01 432 2975/ 01 432 2971
For more information see https://healthprofessionals.giveblood.ie/clinical-services/transfusion-transplantation/national-histocompatibility-and-immunogenetics-reference-laboratory/

HLA Typing for potential Bone Marrow Transplant Patients	
Sample Type	10mls Citrate + EDTA
Processing TAT	Routine – up to 4 weeks
Information	Contact Transplant Co-ordinator/Haematology/Oncology External Laboratory Tests. Complete appropriate **request forms**. Request forms available from Blood Transfusion laboratory. Referral tests cannot be sent without a completed request form.
Residual Risk	Delay in test result availability for clinician/patient. Incorrect result released impacting patient care/treatment. Repeat sampling of patient. Low risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600K) available upon request.

10.4.16 Disease Association Tissue Typing

Testing performed in the National Histocompatibility and Immunogenetics Reference Laboratory (NHIRL).
Contactable hours 09:00-17:00 Monday to Friday
Telephone No. 01 432 2975/ 01 432 2971
For more information see https://healthprofessionals.giveblood.ie/clinical-services/transfusion-transplantation/national-histocompatibility-and-immunogenetics-reference-laboratory/

Disease Association Tissue Typing	
Sample Type	10mls Citrate + EDTA
Processing TAT	Routine – up to 4 weeks
Information	External Laboratory Tests. Complete appropriate **request forms**. Request forms available from Blood Transfusion laboratory. Referral tests cannot be sent without a completed request form.
Residual Risk	Delay in test result availability for clinician/patient. Incorrect result released impacting patient care/treatment. Repeat sampling of patient. Low risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600K) available upon request.

10.4.17 Leucocyte Antibodies

Testing performed in the National Histocompatibility and Immunogenetics Reference Laboratory (NHIRL).
Contactable hours 09:00-17:00 Monday to Friday
Telephone No. 01 432 2975/ 01 432 2971
For more information see https://healthprofessionals.giveblood.ie/clinical-services/transfusion-transplantation/national-histocompatibility-and-immunogenetics-reference-laboratory/

Leucocyte Antibodies	
Sample Type	10mls Clotted
Processing TAT	Routine – up to 4 weeks
Information	External Laboratory Tests. Complete appropriate **request forms**. Request forms available from Blood Transfusion laboratory. Referral tests cannot be sent without a completed request form.
Residual Risk	Delay in test result availability for clinician/patient. Incorrect result released impacting patient care/treatment. Repeat sampling of patient. Low risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600K) available upon request.

10.4.18 Platelet Antibodies

Testing performed in the National Histocompatibility and Immunogenetics Reference Laboratory (NHIRL).
Contactable hours 09:00-17:00 Monday to Friday
Telephone No. 01 432 2975/ 01 432 2971
For more information see https://healthprofessionals.giveblood.ie/clinical-services/transfusion-transplantation/national-histocompatibility-and-immunogenetics-reference-laboratory/

Platelet Antibodies	
Sample Type	10mls Clotted
Processing TAT	Routine – up to 4 weeks
Information	External Laboratory Test. Complete appropriate **request forms**. Request forms available from Blood Transfusion laboratory. Referral tests cannot be sent without a completed request form.
Residual Risk	Delay in test result availability for clinician/patient. Incorrect result released impacting patient care/treatment. Repeat sampling of patient. Low risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600K) available upon request.

10.4.19 National Blood Centre Serological Investigation/Crossmatch

Testing performed in the Red Cell Immunohaematology (RCI) Immunogenetics Reference Laboratory (NHIRL).
Routine hours 08:00-19:00 Monday to Friday
Telephone No. 01 432 2972/ 01 432 2973
Emergency hours 19:00-08:30 Monday to Friday, and 24 hours Sat-Sun (including bank holidays)
Telephone No (Switch) 01 432 2800
For more information see https://healthprofessionals.giveblood.ie/clinical-services/transfusion-transplantation/red-cell-immunohaematology-diagnostics/

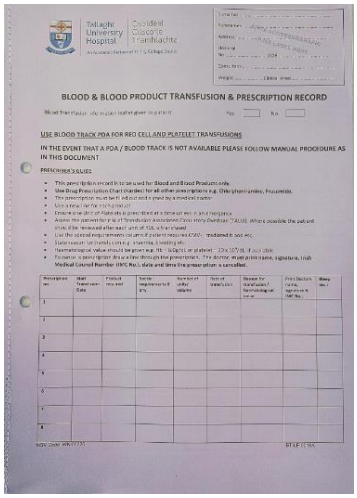
National Blood Centre Serological Investigation/Crossmatch	
Sample Type	2X 6ml EDTA (pink top)
Processing TAT	Routine & Urgent – 1-2 days depending on complexity of the investigation
Information	Samples with complex serological patterns are referred to IBTS. Please send samples to Blood Transfusion as early as possible. Blood Tested and issued by IBTS will be selected and crossmatched as per specific patient requirements. See report issued by IBTS for details.
Residual Risk	Delay in blood product availability, incorrect/inappropriate blood product issued/transfused resulting in Serious Adverse Reaction (SAR) or Serious Adverse Event (SAE). Low-medium risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600K and BT-RA-0600L) available upon request.

10.4.20 Histocompatibility & Immunogenetics Beaumont Hospital

Testing performed in Histocompatibility & Immunogenetics laboratory in Beaumont hospital. Transplant immunology service for solid organ transplantation, including HLA typing and crossmatching donors and recipients for solid organ transplants, HLA antibody screening for post-transplant monitoring and HLA typing for disease association.
Routine hours 08:00-18:00 Monday to Friday
Telephone No. 01 809 3000/ 01 089 3377
Emergency hours: Out of hours emergency on-call service available
Telephone No. (Switch) 01 809 3000
For more information see https://www.beaumont.ie/pages/health-A-Z/histocompatibility-immunogenetics-department-nhissot

Histocompatibility & Immunogenetics Beaumont Hospital	
Sample Type	As per Beaumont Request From
Processing TAT	Routine - Contact HLA laboratory Beaumont Hospital
Information	Blood Transfusion laboratory label and transport samples to Beaumont Hospital. Results returned directly to the requesting Doctor. External Laboratory Tests performed in Beaumont Hospital.
Residual Risk	Delay in test result availability for clinician/patient. Incorrect result released impacting patient care/treatment. Repeat sampling of patient. Low risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600K and 24-BT-RA-001) available upon request.

10.5 Prescription & Requesting a Test/Product

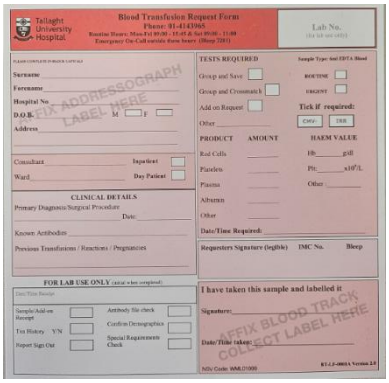

BLOOD & BLOOD PRODUCT TRANSFUSION & PRESCRIPTION RECORD

All Blood products must be prescribed using BT-LF-0016A Blood and Blood Product Transfusion Record & Prescription Record ('Purple Document').

Refer to Administration of Blood and Blood Products Procedure PPC-PRO-212 Section on Prescribing Blood & Blood Products/Components

BT-LF-0016A Blood and Blood Product Transfusion Record & Prescription Record ('Purple Document') are available to collect from the laboratory medicine store room beside specimen reception during routine hours.

Image 1. 'Purple Document'


Blood Transfusion Request Form

Blood Transfusion request form (BT-LF-0001A) must be completed before taking a blood transfusion sample.

A medical doctor must sign the 'Requester's signature' box in order to proceed.

Addressograph labels are acceptable on the request form in the patient demographic section.
Positive Patient Identification (PPI) begins with the completed request form, (as this identifies the intended patient).

Image 2: BT Request Card

Please note: where request forms are incomplete, it is at the discretion of the laboratory to allow correction/completion of existing form e.g. missing signatures. If the request form was not completed prior to phlebotomy and/or positive patient identification not performed (patient identifiers not on request form), a new request form and sample will be required.

Add-on Requests:
Additional tests including blood products can be ordered if a valid Group & Save sample is available in the lab. Suitable samples from current in-patients are valid for 72 hours from time taken.
In order to issue group specific blood products i.e. blood, platelets or plasma, the patient must have 2 blood groups on file in the blood transfusion laboratory. Group O blood will be issued until 2nd group check sample is processed.

Please note: In the event of a massive transfusion a single add-on request form which states 'Add On- Massive Transfusion' and includes the requesting doctors signature, IMC and bleep number is sufficient to cover all orders for that patient made by telephone to the lab.

Prescribing & Requesting	
Residual Risk	Prescription of blood products for the incorrect patient, inappropriate/unnecessary transfusion of blood products resulting in Serious Adverse Reaction/Event (SAR/SAE). This can result in fatal or life-threatening, disabling, incapacitating conditions. Medium risk, ensure hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600D) available upon request.

10.6 Sampling

Adhere to standard infection prevention and control precautions as per Management of Infection Prevention and Control available on Qpulse. Wear personal protective clothing as required.

Refer to section 7.7 BLOOD COLLECTION ORDER OF DRAW. Blood Transfusion samples for Group and Save/ Group and Crossmatch are collected in a 6ml EDTA pink top sample tube.

Blood Track collect labels are the ONLY labels which can be used to label BT samples.

Dual-labelling of samples is not accepted: either label with a BloodTrack Collect label or handwrite label; do not use both on same sample. Information on the patient's sample must be identical to information on the patient's TUH wristband.

Note: Samples which do not meet the minimum requirements will not be accepted.
Corrections cannot be made to the labelled sample.

Sampling	
Residual Risk	Non-adherence to correct blood transfusion sampling procedure, patient misidentification, resulting in a Wrong Blood In Tube (WBIT) and Serious adverse reaction (SAR) associated with ABO incompatible transfusion. High risk, ensure hospital policies and procedures are adhered to. Full risk assessments (BT-RA-0600A, BT-RA-0600B and BT-RA-0600C) available upon request.

10.6.1 Positive Patient Identification (PPI)

Positive Patient Identification (PPI) must be done before sampling using the completed BT request form.

The person taking the sample is responsible for identifying the patient. All patients having Blood Transfusion samples taken must be wearing a TUH ID Wristband. (If patient has been transferred from another hospital to TUH, ensure you remove all other wristbands on admission).

The sample should be taken and labelled at the patient's bedside in one continuous uninterrupted process, involving one patient and one trained staff member only.

Incorrect or inadequate patient identification can lead to a sample for blood transfusion being taken from, or labelled for the wrong patient, an error known as 'Wrong Blood in Tube', which ***can result in fatal ABO-incompatible transfusion***.

There are 3 Key patient identifiers:

- Full name
- Date of Birth
- Medical Record Number (MRN)

These key identifiers must be crosschecked against the patient, the TUH ID wristband(s), relevant patient documentation and verbal confirmation. When using Electronic Blood Tracking System (EBTS) each identifier must be checked as it appears on the PDA screen. Any discrepancies must be checked, verified and amended before a sample is taken or a blood product is administered.

Please refer to **Patient Identification Policy** available on Tallaght University Hospital intranet through Q Pulse (PPC-DG-POL-022) and **Identification of Patients in the Adult Services Procedure** (PPC-PRO-151).

10.6.2 Taking the Sample

You must have a completed Blood Transfusion Request form prior to taking blood transfusion samples.

'Right Blood, Right Patient, Right Time, Right Place':

A single transfusion sample should be taken on admission, labelled and sent immediately to the laboratory.

If the patient is for transfusion or theatre, you may contact the laboratory to see if a group check (second) sample is required.

Patient safety can only be assured by checking the blood group on **two separate independent sampling events.**

When a patient with no TUH blood group on file needs a transfusion, is likely to need a transfusion or requires blood products reserved for theatre a group check sample should be taken.

A group check sample requirement will never impede the delivery of blood components from the laboratory. Group O red cells can be issued on a single sample or until a group check sample is received.

Phlebotomy, patient identification and sample labelling must be performed as one continuous, uninterrupted event at the patient's bedside.

10.6.2.1 BloodTrack PDA labelling

Only trained and authorised personnel can use BloodTrack PDA and printer. Contact Haemovigilance Officers to arrange training if required ext. 2435.

Never use another staff member's swipe card to use Blood Track/print labels. Your swipe card is your electronic signature. Use of another person's swipe card may result in a disciplinary process.

Take all equipment and completed Blood Transfusion Request Card to the patient's bedside, including the BloodTrack PDA and printer.

Once printed, ensure all details are visible on Collect labels.

Attach one of the Collect labels to the sample and the other to the bottom right hand-side of the Blood Transfusion request form.

Clean the PDA and printer after each patient use

Ensure the PDA is placed back into its cradle, indicated by an orange light on the PDA and a blue light on the cradle.

Never label a sample you have not taken. Do not leave the patient's bedside at any time.

10.6.2.2 Hand Written Labelling

It is acceptable to hand label samples if Blood Track is unavailable.

Please use a ballpoint pen only as fine/felt tip pens tend to smudge.

The sample **MUST** be labelled with the following information taken from the TUH wristband.

- Patients Surname and First name (do not use abbreviations e.g. Mgt instead of Margaret)
- Medical Record Number (Hospital number)
- Date of birth
- Signature of person taking the sample
- Date and time of sample collection

Patient gender and location should also be included on sample.

10.6.3 Sample and Request Form Minimum Labelling Requirements

Test Request	Sample Labelling Minimum Requirements	Request Form Minimum Requirements
Group & Save **Group & Crossmatch**	Handwritten or BloodTrack Collect Label First name and surname (spelt correctly, no abbreviations) Date of Birth Hospital number Signature of sample taker (handwritten or electronic on BloodTrack Collect label)	First name and surname (spelt correctly, no abbreviations) Date of Birth Hospital number Gender Signature of the requesting doctor (p.p. is not acceptable). Signature of sample taker (handwritten or electronic on BloodTrack Collect label) Location Date/time of sampling
Unidentified Emergency Patients	Handwritten or BloodTrack Collect Label First name and surname e.g. Jane Doe/ John Doe Hospital number Gender Date of Birth/ Estimated DOB, no DOB is acceptable Signature of sample taker	First name and surname e.g. Jane Doe/ John Doe Hospital number Gender Date of Birth/Estimated DOB (if available) Signature of the requesting doctor (p.p. is not acceptable). Signature of sample taker Location Date and time of sampling
DCT	Either Handwritten, BloodTrack Collect Label, ICE label or Addressograph label First name and surname (spelt correctly, no abbreviations) Date of Birth Hospital number	ICE label on sample – no request card required Request card: First name and surname (spelt correctly, no abbreviations) Date of Birth Hospital number Signature of the requesting doctor/Nurse authorised to request tests (p.p. is not acceptable). Date/time of sampling
Cold Agglutinin Screen	Handwritten, BloodTrack Collect Label, ICE label or Addressograph label First name and surname (spelt correctly, no abbreviations) Date of Birth Hospital number Date/time of sampling.	ICE label on sample – no request card required Request Card: First name and surname (spelt correctly, no abbreviations) Date of Birth Hospital number Name/Signature of the requesting doctor (p.p. is not acceptable). Date/time of sampling

10.6.4 Sending samples to the laboratory

Samples must be sent immediately to the laboratory. Out of hours please bleep Medical Scientist on-call bleep 7281.

- Use Blood Transfusion PTS 005 or use hospital porter phone ext. 3503.
- Samples can be transported at room temperature (exception samples for cold agglutinin testing see section 10.4.14).
- Samples received 24hrs after sample collection cannot be processed.
- Referral samples are sent intact to the referral laboratory.
- Refer to section 4.2

10.7 Emergency & Massive Transfusion Protocol (MTP)

The Blood Transfusion Laboratory and Blood Porter must be contacted for Emergency Requests of Blood Products.

Blood Transfusion Lab EXT 3964/3965 Bleep 7281
Blood Porter Bleep 7266, porter pool Bleep 7264

Refer to PPC-GUI-97 Adult Emergency Transfusion Guideline and PPC-RSC-61 Adult Emergency Department Transfusion Checklist.

The clinical situation and the urgency for blood and blood products will dictate the type of blood issued to each patient i.e.:

- Flying squad products if no blood group available or due to Massive Transfusion Protocol Activation.
- Uncrossmatched when a blood group is available but urgency does not allow for Antibody screen or serological crossmatch to be performed.
- Crossmatched blood, where a sample is available and time allows

10.7.1 Emergency Blood Products

Emergency Blood Product Requests	Processing TAT	Information
Emergency O Rh D negative Blood (Flying Squad O negative)	Within 15 minutes	4 Emergency O Negative stored in Blood Transfusion Laboratory. 2 Emergency O Negative stored in Theatre fridge. Emergency O Rh D positive blood available in consultation with Haematology Team. **Note: Only authorised trained staff can remove emergency blood products from storage.** **BloodTrack PDAs <u>MUST NOT</u> be used to administer Flying Squad Emergency Blood Products.**
Major Emergency Packs	Within 15 minutes	**Pack 1:** **4 Emergency O Rh D negative red cells + 2 Emergency plasma** Delivered to clinical area in Blood Cool Box. Blood warmer should be used in emergency situations. **Pack 2:** **4 RCC + 4 Plasma + 1 Platelet + 2g Fibrinogen concentrate.** *Will be delivered to clinical area as become available.*
Crossmatched ABO + Rh D Compatible Blood	Within 1 hour	Patients that are eligible for electronic issue of red cells may have units available in a shorter timeframe, contact Blood Transfusion Lab to check patients' eligibility.
Emergency Plasma (Flying squad AB Octaplas)	Within 15 minutes	Pre-thawed and stored in Blood Transfusion Laboratory. Delivered in Blood Cool Box **<u>Blood warmer must be used.</u>**
Group Specific Plasma (Patient's own Blood Group)	Within 40 minutes of suitable sample(s) receipt	For immediate use within 8 hours of thawing.
Emergency Platelets	Within 15 minutes if available on site. Within 2 hours if ordered from IBTS	Check availability of emergency stock platelet with Blood Transfusion Laboratory. **Note:** Blood Group of Emergency stock platelet may vary, issued as suitable in consultation with the Haematology Team.
Fibrinogen (1g Vial)	Within 15 minutes	Check patient Fibrinogen levels prior to ordering.
Prothrombin Complex Concentrate (PCC) (Octaplex)	Within 15 minutes	Order in consultation with the Haematology Team.

10.7.2 Emergency Product Transport

In emergency situations where blood products are required at the patient's bedside, blood will be packed and transported in a Blood Cool Box.

The Blood Cool box should always be accompanied by a Blood Cool box Record form (BT-LF-0124B).

Blood Cool Box Record Form BT-LF-0124B

Packing of Blood Cool Box for Delivery

Clinical Area

Porter Returning Blood Cool Box to Lab/Medical Scientist

Blood Cool Box Record Form BT-LF-0124B

Packing Instructions

Suitable for 1 -6 units of Blood / Plasma	Blood Cool Boxes are stored ready for use in Cold Room in main Transfusion Lab. Place units flat down, fit lid & close zip on outer bag. Store this form along with chart copy, if available, in attached plastic pouch.

See diagram below:

Section 1 of this form must be signed by the staff member receiving the Blood Cool box in the clinical area.

The box must not be opened unnecessarily. Blood products must be stored in the box at all times.

It is important to return the Blood Cool box and the cool box form within 4 hours of time packed. Please complete section 2 of the Blood Cool box Record form.

If blood has been stored incorrectly (i.e. not in the box at all times), this must be documented and laboratory staff informed.

When finished with a coolbox (products used or no longer required) please contact the blood porter for immediate return to the blood transfusion laboratory.

Blood must never be stored in any ward fridge

10.7 Theatre

10.7.1 Routine Elective Theatre

Majority of elective patients will have had a pre-assessment Group & Save sample taken prior to day of surgery. These samples are **NOT** suitable for issuing blood products. A current in-patient sample must be taken before surgery for blood products to be ordered.

The sample is held in the laboratory and is valid for 72hrs from time taken. Add-on requests for products can be made during this time.

Any patient requiring blood, platelets or plasma must have 2 blood groups on file in the blood transfusion laboratory. Group O blood will be issued until the group check sample is processed (processing time - within 15mins from sample receipt).

Patients with positive antibody screen may require significant time to obtain suitable blood. Commencement of surgery may have to be delayed to ensure suitable blood is available for the patient.

Patient Haemoglobin value and maximum surgical blood ordering schedule (MSBOS) should be checked before placing a request with the Blood Transfusion Laboratory.

It is the responsibility of the clinician to inform the Blood Transfusion Laboratory of any changes in circumstances e.g. cancellation of procedure, increased requirement for blood.

Maximum Surgical Blood Ordering Schedule (MSBOS) - Guideline recommendation for ordering of blood for elective surgical procedures. Available on Hospital Intranet Departments > Blood Transfusion > Documents.

MSBOS can be bypassed (if clinically indicated) by contacting the Blood Transfusion laboratory at 3965.

10.7.2 Urgent & Emergency Theatre

Emergency Pack and Blood products are available. See section 10.7 Emergency & Massive Transfusion Protocol (MTP) and PPC-GUI-97 Adult Emergency Transfusion Guideline

Refer to PPC-PRO-89 Removal of Emergency O Negative Blood/Flying Squad from the Theatre Blood Fridge

Note: A group check sample requirement will never impede the delivery of blood components from the laboratory. Group O red cells can be issued on a single sample or until a group check sample is received.

10.7.3 Theatre Fridges

Theatre Fridge

Theatre fridge is a monitored locked blood fridge located in theatre specifically for theatre use and only for storage of red cells. Swipe access to the theatre fridge is via the attached EBTS kiosk.

Access to theatre fridge is only available to trained authorised personnel. Training is arranged via Theatre clinical facilitators and Haemovigilance officers/blood transfusion laboratory staff.

Theatre fridge is linked to the Blood Transfusion Laboratory via interface with transmits patient and product information including alerts which may occur e.g. unit out of fridge >30mins. Please contact the Blood Transfusion Laboratory if an alert occurs.

Blood which is out of the fridge for greater than 30 minutes and which will not be used must be returned to the Blood Transfusion Laboratory to ensure traceability. Contact Blood Transfusion Lab with any queries and Porter to arrange transport back to laboratory.

Theatre Fridge

Emergency Blood:

There are 2 units of Flying Squad O Negative Blood suitable for emergency use stored in this fridge.

Refer to PPC-PRO-89 Removal of Emergency O Negative Blood/Flying Squad from the Theatre Blood Fridge

Reserved Blood:

Crossmatched blood is transferred from the blood transfusion laboratory fridge to this fridge when requested by the theatre staff.

Units in theatre fridge are accompanied by a “Crossmatch Report Chart Copy”, which is placed in the plastic pocket attached to blood fridge door, and a “Crossmatch Report Register Copy” which is placed in the Sign-out Register folder (small blue folder) located on a shelf in the fridge. This must be used to record date and time of removal from fridge and who took the blood out (in the event that the electronic blood tracking system is not working).

Blood is removed from Theatre Blood Fridge by blood porter and returned to Blood Transfusion Laboratory each evening.

RDSC Fridge

RDSC fridge is a monitored locked blood fridge located in RDSC specifically for emergency use and only for storage of 2 units of Flying Squad Emergency O Rh D Negative red cells. This fridge is not used for the storage of crossmatched blood.

Swipe access to the fridge is via the attached EBTS kiosk. Access to fridge is only available to trained authorised personnel. Training is arranged via RDSC clinical facilitators and Haemovigilance officers/blood transfusion laboratory staff.

Emergency Blood is transported to RDSC Fridge by porter/trained personnel each morning and returned to Blood Transfusion Laboratory each evening.

Refer to BT-LI-0201A RDSC Removal of Flying Squad Blood for Emergency Use (printed copy available above fridge kiosk in RDSC).

10.8 Transport of Blood Products

10.8.1 Transport of Blood Products within TUH

Requesting delivery to the Clinical Area
Check Blood Product availability using BloodTrack Enquiry. Contact Haemovigilance for training if required haemovigilance.dept@tuh.ie .

Ensure the patient is ready to receive the transfusion prior to requesting delivery of blood products.
To request delivery of red cells, platelets, plasma:

- Print a Pick-up slip using Blood Track Enquiry, available on ward computers.
- If BloodTrack enquiry is not available on ward computer please raise a ticket with ICT
- You must bleep 7266 to inform the porter that you require blood product delivery. State the clinical area, patients name and that you have printed a pick-up slip.
- This pick up slip will accompany the product and should be attached to the back of the corresponding chart copy report.

In the event of Blood Track Enquiry not being available or requiring products other than red cells, platelets or plasma you must bleep the porter on bleep 7266 or Porter supervisor on bleep 7264. The porter will contact you and ask for the following details:

- Patient Name
- MRN
- Clinical Ward area
- Product required
- Your name

Note: Blood and platelets will be delivered to the clinical area on a single unit basis as required. Requests for more than one unit must be made by contacting the Blood Transfusion Laboratory.
If you cannot contact Bleep 7266, phone 3964 / 3965 Mon-Fri 09:00 - 17:00 Sat 09:00 -12.30 Bleep 7264 out of these hours.

Blood products can only be transported to the clinical area by trained Blood porters/laboratory staff.
It is important that the person who orders the delivery of blood/blood product is available to receive it at the clinical ward area, or in cases where this is not possible, a nominated person should be present to receive the delivery.

Blood products will be transported in blood transport boxes/bags provided by the Laboratory. A Crossmatch Report Chart Copy will accompany the first unit of blood/blood products to the clinical area.
The person receiving blood products from the porter in the clinical area is responsible for checking the correct product and documentation has been delivered for the correct patient.

Return of Blood Products to the Laboratory
All unused blood products must be returned to the laboratory. Bleep Blood Porter (7266) or porter supervisor (7264) to arrange return.

Blood products not required for immediate transfusion must be returned promptly to the Blood Transfusion laboratory. Blood out of fridge >30 minutes cannot be re-refrigerated, but still must be returned to the Blood Transfusion laboratory.

10.8.2 Transport of Blood Products with Patients to/from Other Hospitals

Transfer of Blood Products with Patient to another Hospital
Notify the Blood Transfusion Laboratory of patient transfer and which blood products are required.

The Blood Products will be labelled for the patient and be accompanied by a **Chart Copy Report** form which will contain patient and product information. Appropriate transport carriers will be used.

All blood products transfused must be documented in the the Blood and Blood Product Transfusion and Prescription Record, all traceability labels must be removed completed and returned to the Blood Transfusion Laboratory in TUH.

It is the responsibility of nurse/doctor accompanying the patient that all Blood Products leaving the hospital must be:

- Correctly stored during transport.
- Correctly documented to ensure traceability.
- All products not for immediate use in the receiving hospital must be brought back to TUH

Receipt of Blood Products with Patient from another Hospital
Any blood products accompanying a patient on transfer to TUH which are not required immediately should be returned in original transport box, to the transferring hospital, with patient transport.

Where this is not possible, please inform the TUH Blood Transfusion Laboratory. Send all blood products to the laboratory without delay.

Any blood product from the transferring hospital transfused as an emergency must be prescribed and fully documented by the Medical/Surgical Team to ensure traceability. Please inform the blood transfusion laboratory and Haemovigilance officer of any such transfusions.

10.9 Administration of Blood & Blood Products

Refer to policies and procedures available on Qpulse:

PPC-PRO-212 Administration of Blood and Blood Products in Adult and Paediatric Patients in Tallaght University Hospital Procedure**.**

PPC-HAE-POL-010 Tallaght University Hospital Policy on Management of Adverse Transfusion Reactions in Adult Patients

PPC-GUI-213 Administration (Giving) Sets and Equipment Used for Blood and Blood Products / Components Guideline

CHI-GUI-132 Guidelines for the Clinical use of Red Cells and Paedipacks

CHI-GUI-133 Platelet Transfusion Guideline

Transfusion of Blood & Blood Products	
Residual Risk	Serious adverse reaction (SAR) associated with ABO incompatible transfusion. Delay in blood product availability, incorrect/ inappropriate blood product transfused resulting in SAR or Serious Adverse Event (SAE). This can result in fatal or life-threatening, disabling, incapacitating conditions. Production of an allo-antibody following transfusion may lead to delay in future blood product availability. Medium risk, ensure hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600L and BT-RA-0600M) available upon request.

10.10 Communication & Reporting of Results

Communication of Critical Results

Medical staff are responsible for requesting tests or blood products that their patient requires and clearly communicating this requirement, including date and time required, to Laboratory staff. Clinicians are responsible for providing accurate information to the Laboratory, including patient demographics, contact details and date/time of phlebotomy. Clinicians are responsible for developing a system whereby test results returned from the Laboratory are examined and appropriate action taken in a timely manner.

Critical results are classified according to the severity of potential underlying diagnoses, imminent risk to the patient and the urgency of intervention.

- Results that require immediate communication. This classification indicates potential immediate danger to the patient, or a potentially life threatening illness when urgent intervention is required.
- Results that require communication within 24 hours, and preferably on the same working day.
- Results that could have an immediate impact on a patient's management (either treatment or investigation), however action is likely to be taken on the next working day. Telephone communication of these results on the next working day is acceptable.

The Blood Transfusion Laboratory has a procedure (BT-LP-0200 Blood Transfusion Phoning Procedure) for communication of Critical results, including escalation procedures.

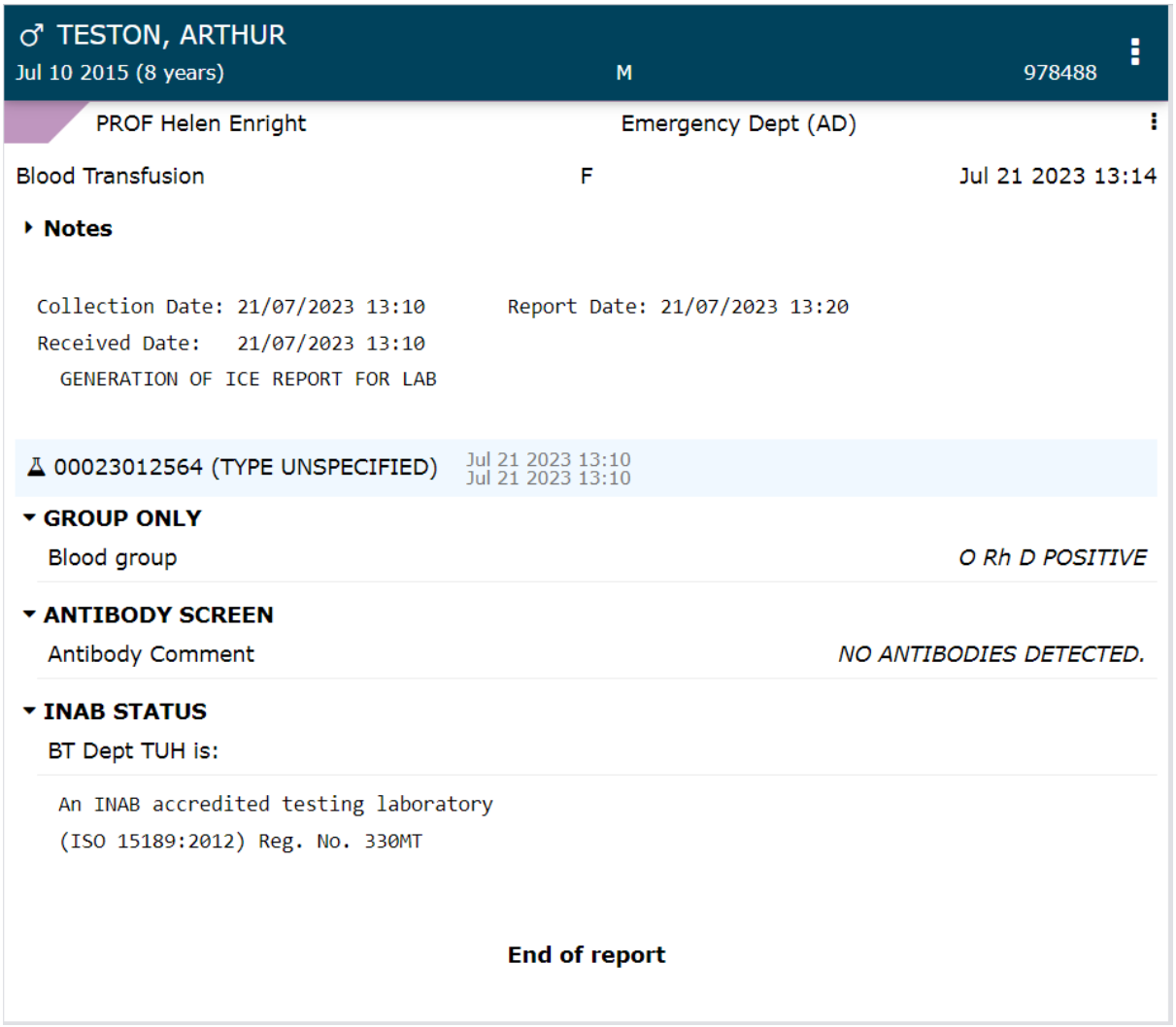
Reports

Order Communications Reporting is available for Blood Transfusion and can be viewed under results section of ICE. See table below for report format and location of reports.

Test	Report Format	Location
Group and Save	Electronic	ICE
Direct Coombs Test	Electronic	ICE
Cold Agglutinin Screen	Electronic	ICE
Transfusion Reaction Investigation	Electronic	ICE
Red cells, platelets and plasma	Electronic	BloodTrack Manager
Other Blood Products	Contact Lab to check product availability	Blood Transfusion Lab
HLA Typing / Leucocyte Antibodies / Platelet Antibodies (IBTS)	Hard Copy	Hard Copy Report sent to Clinician Copy scanned to F drive Copy stored in Blood Transfusion Laboratory
Disease Association Tissue Typing (IBTS)	Hard Copy	Hard Copy Report sent to Clinician Copy scanned to F drive Copy stored in Blood Transfusion Laboratory
Cytotoxic Antibody Screening / Renal Transplant Workup (Beaumont)	Hard Copy	Report sent to Requesting Clinician
GP test requests	Electronic	Report available on Healthlinks. Contact Blood Transfusion Laboratory if hard copy is required.

Example of a group and antibody screen report
This report contains the following information:

- Patient ABO and Rh D group
- Results of antibody screen
- Patient special requirements (if applicable)
- See ICE report below for the date and time the sample was taken. This can be used to check if a group and save sample is still valid (samples are valid for 72 hours from time taken):



♂ TESTON, ARTHUR
Jul 10 2015 (8 years) M 978488

PROF Helen Enright Emergency Dept (AD)

Blood Transfusion F Jul 21 2023 13:14

Notes

Collection Date: 21/07/2023 13:10 Report Date: 21/07/2023 13:20
Received Date: 21/07/2023 13:10
GENERATION OF ICE REPORT FOR LAB

00023012564 (TYPE UNSPECIFIED) Jul 21 2023 13:10
Jul 21 2023 13:10

GROUP ONLY

Blood group *O Rh D POSITIVE*

ANTIBODY SCREEN

Antibody Comment *NO ANTIBODIES DETECTED.*

INAB STATUS

BT Dept TUH is:

An INAB accredited testing laboratory
(ISO 15189:2012) Reg. No. 330MT

End of report

10.10 Blood Stock Management

The principle of Blood Stock Management is to optimise the use of blood products and minimise wastage, through stock rotation, establishing target stock values and participation in rerouting of blood products with other hospitals.

In the event/potential event of extreme shortage of blood the hospital Emergency Blood Management Group (EBMG) will meet. The aim of this group is to ensure the effective use of available blood when blood stocks have fallen to pre-specified critical levels nationally. The group can be chaired by the Consultant Haematologist and has members from interested parties e.g. Surgical, Medical directorate etc. Full risk assessment (BT-RA-0600P) available upon request.

Contingency measures as per BT-ED-0012A National Transfusion Advisory Group (NTAG) Plan for IBTS, HSE and Hospitals in the Republic of Ireland to address Red Cell Shortages and BT-ED-0012B NTAG Hospital Emergency Blood Management (EBM) Plan for Managing Shortages of Blood Components.

Blood Product Shortage	
Residual Risk	Inadequate National Blood Supply to support the Blood Transfusion Service in TUH. Low risk, full risk assessment (BT-RA-0600P) available upon request.

10.11 Haemovigilance

Haemovigilance is a set of organised surveillance procedures relating to traceability of blood and blood products, serious adverse or unexpected events or reactions in donors or recipients.

Haemovigilance service provision TUH

Routine hours Monday to Friday 8am – 4pm

EXT 2437/2372 Bleep 2110/2111

Out of hours – Blood transfusion laboratory Bleep 7281 or Haematology Team

Clinical advice on issues concerning Blood Transfusion is available from the Haematology team 24 hours a day.

Patient Information Leaflets are available on the clinical ward areas or from the store room in the laboratory.

CHI@Tallaght see MF-BTS-CHIaTHVO-01 Haemovigilance officer contact Information.

SAR/SAE Reporting

All suspected adverse transfusion reactions/events **MUST** be reported to the Blood Transfusion Laboratory as soon as possible.

Blood Track PDA can be used to record information/symptoms of suspected transfusion reaction.
Complete “Request for investigation of suspected adverse transfusion reaction form” – available in the Blood & Blood Product Transfusion and Prescription Record (Purple Document). Ensure form is signed by a medical Doctor and nurse involved in the patient’s care.

Return all blood products, administration sets and above form to the Blood Transfusion Lab
Refer to Policy/procedure on Qpulse:

- Management of adverse transfusion reactions in Adult Patients PPC-HAE-POL-010
- Management of an acute transfusion reaction in the adult patient Algorithm PPC-RSC-52
- Management of acute transfusion reactions ad events in Paediatric Patients PPC-HAE-POL-011
- Management of an acute transfusion reaction in the child algorithm PPC-RSC-52

Reporting Serious Adverse Reactions (SARs) and Serious Adverse Events (SAEs)	
Residual Risk	Failure to report Serious Adverse Reaction (SAR) or Serious Adverse Event (SAE) to the National Haemovigilance Office (NHO) Low risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600O) available upon request.

Traceability

It is a legal requirement to trace each individual unit of blood products, whether transfused or disposed of in accordance with the EU Directive 2002/98/EC.

Traceability labels are removed from the blood product compatibility label following positive patient identification and the commencement of transfusion.

Traceability labels should be signed and dated by the person administering/witnessing the transfusion, then placed in traceability boxes located in the clinical area.

If a traceability label is removed in error, contact the Blood Transfusion Laboratory.

Traceability of Blood and Blood Products	
Residual Risk	Failure to trace a unit of blood or blood product from donor to its final destination (transfused, disposed, returned to supplier). Low risk provided hospital policies and procedures are adhered to. Full risk assessment (BT-RA-0600Q) available upon request.

Policies, Procedures, Protocols, Guidelines (PPPGs)

Clinical PPPGs relating to Blood Transfusion and Haemovigilance are available on Qpulse. Use search term 'blood transfusion', all relevant PPPGs will appear using this search.

Additional information is also available on Blood Transfusion Intranet page.

Access via Hospital Intranet > Departments > Blood Transfusion

For further information on Blood Products and medical indications refer to Hospital Transfusion guidelines, on Blood Transfusion Intranet Webpage. Access via Hospital Intranet > Departments > Blood Transfusion Information on DOAC/warfarin reversal available in Adult Medicine Guide – found under clinical tools on TUH intranet.

CHI Clinical PPPGs relating to Blood Transfusion and Haemovigilance are available on Qpulse. Use search term 'CHI', all relevant PPPGs will appear using this search.

Education

Haemovigilance officers provide induction education to new staff in TUH. Haemovigilance education is supported by podcasts available on HSEland and online learning modules. On request, Haemovigilance officers will provide individual or departmental educational support. CHI @Tallaght Haemovigilance officers provided training to CHI@Tallaght.

11.0 CELLULAR PATHOLOGY

The Department of Cellular Pathology provides a comprehensive **Histopathology** and **Cytopathology** service. The cytopathology service also includes **Andrology (see section 11.5.3)**.

Clinical advice can be sought directly from a Consultant Histopathologist Monday to Friday 9am to 5pm or outside these hours from the Consultant Pathologist on call through the switch.

For Cellular Pathology general enquiries, please contact the admin office on ext. 3929/3928/3985 or email cellular.pathology@tuh.ie

11.1 SUPPLIES AVAILABLE FROM CELLULAR PATHOLOGY

The following are available from Cellular Pathology Specimen Reception (Ext 3925). A minimum of 24 hours' notice is required:

- Specimen containers – various sizes
- 10% neutral buffered formalin in pre-filled 40ml containers
- 3% Glutaraldehyde in pre-filled vials for Bronchial/Bilary Brushings
- Cytolyt preservative for FNAs
- Post vasectomy and semen analysis kits

11.2 SPECIMEN COLLECTION AND DELIVERY

The laboratory operates a collection service at designated times from the following areas

	Theatre	Minor operations	Endoscopy	Urology
Mon-Fri 10:30	**X**	**X**	**X**	**X**
Mon-Fri 14:00		**X**	**X**	**X**
Mon-Fri 15:30	**X**	**X**	**X**	**X**
Saturday 10:00	**X**			

The laboratory must be notified of urgent specimens requiring collection at other times (Ext 3925).

Specimens from other areas in the hospital may be hand delivered to Cellular Pathology specimen reception.

To avoid cellular deterioration, fresh samples must be delivered to the laboratory during routine hours (09:00-16:30).

Non-gynae cytology samples which cannot be transported to the lab during working hours must be placed in the specimen fridge in the cytology lab.

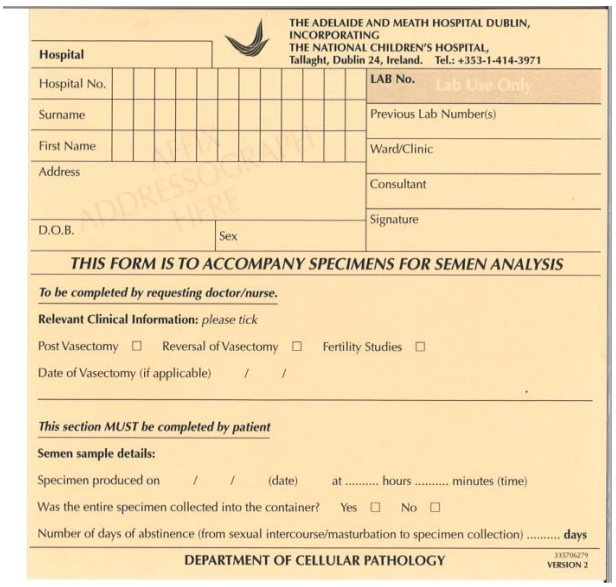
The PTS must never be used for cellular pathology specimens- they are only delivered to the laboratory by hand or scheduled collection as above.

11.3 SAMPLE LABELLING

11.3.1 Request form

Please raise requests for histology on ICE where possible using the tests HIST (histology) or CYT (cytology) samples.

Andrology (semen analysis samples) must be accompanied by a completed semen analysis form which is available in the kit provided to the patient.



THE ADELAIDE AND MEATH HOSPITAL DUBLIN,
INCORPORATING
THE NATIONAL CHILDREN'S HOSPITAL,
Tallaght, Dublin 24, Ireland. Tel.: +353-1-414-3971

Hospital

Hospital No.

Surname

First Name

Address

D.O.B.

Sex

LAB No. Lab Use Only

Previous Lab Number(s)

Ward/Clinic

Consultant

Signature

THIS FORM IS TO ACCOMPANY SPECIMENS FOR SEMEN ANALYSIS

To be completed by requesting doctor/nurse.

Relevant Clinical Information: *please tick*

Post Vasectomy ☐ Reversal of Vasectomy ☐ Fertility Studies ☐

Date of Vasectomy (if applicable) / /

This section MUST be completed by patient

Semen sample details:

Specimen produced on / / (date) at ..... hours ..... minutes (time)

Was the entire specimen collected into the container? Yes ☐ No ☐

Number of days of abstinence (from sexual intercourse/masturbation to specimen collection) ..... **days**

DEPARTMENT OF CELLULAR PATHOLOGY

335706279
VERSION 2

See Section 1.4 for sample labelling requirements.
For completeness of the final report, clinical information provided should include sufficient detail regarding the reason for the procedure.

Failure to follow labelling requirements or a labelling discrepancy between the request form and container will result in a delay in processing of the specimen until the discrepancy has been rectified.
Note: 3 attempts will be made to contact the team using details on the request form. If the team have not replied in 3 working days, a report will be issued stating the sample cannot be processed until the labelling error has been resolved.

A comment will be included in the final report of any discrepancy with the sample or request form.

11.3.2 Sample packaging

Standard precautions must be exercised in handling and transporting all cellular pathology specimens.

Specimens for routine histology should be placed in appropriately sized, tightly sealed, approved containers with a sufficient volume of 10% neutral buffered formalin. Proper and timely fixation is a critical step in tissue preparation and the importance of this step cannot be overemphasised. If this procedure is not followed it may affect the interpretation of the result of the specimen.

The specimen(s) together with request form must be placed in a suitable plastic pathology biohazard bag for collection.

FORMALIN IS A CATEGORY 1B CARCINOGEN.

MUTA: 2 H341 SUSPECTED OF CAUSING GENETIC DEFECTS
CARC 1B: H350 MAY CAUSE CANCER.

FORMALIN AND GLUTARALDEHYDE ARE POTENT EYE AND NASAL IRRITANTS AND CAN CAUSE RESPIRATORY DISTRESS AND ALLERGIC DERMATITIS.

GLOVES, SAFETY GOGGLES AND APRONS MUST BE USED WHEN USING THESE FIXATIVES.

Personnel using formalin must be aware of the proper procedure for dealing with small or large formalin spills. (CP-LI-0265 Formalin/Solvent Spill Instruction).

Other specimen types e.g. fresh samples may have different handling and packaging requirements. See section 11.5 for further information.

11.4 URGENT SERVICES

11.4.1 Frozen Sections

A frozen section service is offered between 9-5. Monday to Friday, frozen sections outside of these hours may be provided on an individual basis by prior agreement with a Consultant Histopathologist.

Specimens from patients with risk of infection (HepB, HepC, HIV, TB etc.) and radioactive samples should not be submitted for frozen section. If a suspicion of an infection exists, the clinical staff concerned have a duty of care to inform laboratory personnel.

- If the laboratory inadvertently processes such a specimen, a decontamination procedure must be carried out on all frozen section equipment. Decontamination takes a minimum 24 hours. During this time the frozen section service will be limited or unavailable.

Booking a frozen section

- Frozen sections should be booked at least 24 hours in advance by contacting the Cellular Pathology Lab (Ext 3973) with the following details:
    - Theatre
    - Consultant Surgeon
    - Patient Name and MRN
    - Type and Site of Surgery
    - Time of surgery.

- If a frozen section is required on a specimen that has not been booked, the Laboratory must be informed by telephone (ext. 3973) as soon as possible to ensure that personnel are available to perform the frozen section.

- **The Theatre Porter or Theatre Staff must bring the fresh specimen with completed request form and <u>contact phone number</u> directly and without delay to the Cellular Pathology Laboratory.**

- The laboratory must be informed in the case of cancellation of or delay to a frozen section.

Reporting of frozen sections
The frozen section report will be phoned to the contact number supplied. Failure to supply a contact number will result in a delay in the report being communicated to the clinician. A typed report will be available following routine paraffin processing of the specimen. The turnaround time of frozen section diagnosis varies from specimen to specimen depending on the complexity of the case.

11.4.2 Other Urgent Specimens

Urgent specimens are dealt with on an individual case basis. The request form for an urgent case must be clearly marked by ticking the urgent box, and the clinical details must reflect the reason for urgency. A phone or bleep number should also be provided so that the urgent report can be communicated. **Failure to provide these details may result in the sample being processed as routine.**

If a sample that has been already sent to the laboratory subsequently becomes urgent, the laboratory should be contacted (ext. 3928/3985) clearly outlining the reason as to why the status of the specimen has changed, consultation with the appropriate consultant histopathologist may be required.

Occasionally urgent samples may be de-prioritised and processed as routine at the discretion of a consultant histopathologist.

11.5 SPECIMEN REQUIREMENTS

11.5.1 Histology

Sample type	Sample requirements	Cut off time	Referred out	Comment
Tissue for routine histology	Specimens must be immersed in an adequate volume of 10% neutral buffered formalin in an appropriately sized container	N/A	No	Tissue must be fully immersed in formalin
Medical liver biopsy ie not those which are query tumour/metastasis	Send in formalin	N/A	Yes	Must be accompanied by a letter with full clinical details and recent serology testing. Cases can't be referred for reporting unless this information is received
Temporal artery biopsy	Send in formalin, no need to send fresh	N/A	No	
Products of conception	Send in formalin	N/A	No	**Must** be accompanied by consent form: intranet homepage under departments → laboratory medicine → documents
Tissue for frozen section	Must be sent fresh to the laboratory and without delay.	Book in advance	No	See section 11.4.1 above
Muscle biopsy	Fresh: wrap in saline-moistened gauze. Send immediately to the lab	**2pm**	Yes	
Nerve biopsy	Fresh: wrap in saline-moistened gauze. Send immediately to the lab	**4.30pm**	Yes	
Renal Biopsies	Place in saline, send immediately to the lab	**2pm**	Yes	Must be accompanied by the multipart Beaumont Hospital request form. Please attach an addressograph label to **all parts** of this form. Notify the lab in Beaumont Hospital in advance.
Skin punch for Direct immunofluorescence (DIF)	Send two samples – one fresh and one fixed in formalin	**4pm**	No	
Duodenal biopsy for disaccharidase analysis	Fresh: placed on parafilm. Send immediately to the lab	**4:30pm**	Yes	Samples are snap frozen and stored at -70°C until a paediatric pathologist

Sample type	Sample requirements	Cut off time	Referred out	Comment
				has decided whether disaccharidase analysis is required
Samples for electron microscopy eg nasal or bronchial brushings	3% Glutaraldehyde supplied by Cellular Pathology	N/A	Yes	Please fill out "Southampton PCD diagnostics Service" form, available from the laboratory
Skin biopsy for B/T cell clonality	Fresh in PBS	**2pm**	Yes	PBS is not provided by the lab
Molecular testing e.g. HER2, EGFR, ALK, RAS, BRAF, GIST	Formalin-fixed, paraffin-embedded tissue selected by a pathologist	N/A	Yes	Complete molecular request form and request through: cellular.pathology@tuh.ie  CMD request form Version 6- Molecula  Poundbury Request form.pdf

11.5.2 Cytology

All non-gynae cytology samples must be received fresh or in Cytolyt (see table below). To avoid cellular deterioration samples must be delivered to the laboratory during routine hours (09:00-16:30). Samples which cannot be transported to the lab during working hours must be refrigerated (there is a specimen fridge in the cytology lab).

Specimen and completed request form should be submitted to the laboratory in a plastic biohazard bag, please ensure that container lids are screwed tightly onto the body of the container.

The requirements for Cytology samples are outlined in the table below:

Sample type	Sample requirements	Comment
Cervical smear samples	ThinPrep® liquid based sample vials	Referred out to the Coombe Hospital
Slides	Samples may be air-dried or fixed immediately using a spray-fixative. Place slides in a plastic slide mailer labelled with patient's details.	**Patient name** and **MRN** must be clearly written in **pencil** on the frosted end of the slide. Distinguish Air-Dried slides from Spray-Fixed slides by writing AD (air-dried) or SF (spray-fixed) on the frosted end of the slide.
Sputum	Ideally an early morning, deeply coughed specimen is sent down to the laboratory on three consecutive days. Sample should	

	be submitted in a sterile container.	
Urine	Voided urine taken into a sterile 50ml Universal Container. The specimen should be taken from the patient approximately 3 hours after the first early morning specimen.	
Serous fluids ie Pleural and Ascitic fluid	Material should be submitted in a sterile 50ml Universal Container.	At least 20ml of sample is needed for processing. **Under no circumstances are drainage bags accepted,** please aliquot the sample from the bag into a 50ml universal container.
Bronchial Washings/ Bronchial Lavages	Material should be taken into a sterile 50ml Universal Container	
Cyst /Fluid Aspirate	Material should be taken into a sterile 50ml Universal Container	
Bronchial/Bilary Brushings	Cut the tip of the brush off and submerge the brush in **Cytolyt Preservative** (not formalin or saline)	Cytolyt Preservative is available from the Cytology Lab
Cerebro-Spinal Fluid (CSF)	Ideally at least 10ml is required for cytological analysis. Taken into a white top sterile container.	CSF for full laboratory investigation (culture, white cell count, biochemistry profiles, cytology etc) must be submitted to the Microbiology department. Samples for cytological investigation only should clearly state this on the request form and be submitted directly to Cellular Pathology.
Fine Needle Aspirate (FNA)	Needle rinsed in **Cytolyt Preservative.**	**Under no circumstances should the needle used to take the aspirate be submitted in the specimen container.** Cytolyt Preservative is available from the Cytology Lab
Semen	See specific instructions in 8.6.3	By appointment only. Sample **must** reach the lab within 1 hour of production

11.5.3 Andrology

The andrology service incorporates semen analysis for fertility studies and post vasectomy screening.

The laboratory follows the WHO laboratory manual for the examination and processing of human semen (6th edition):
https://www.who.int/publications/i/item/9789240030787

The reference ranges used for andrology tests are derived from these guidelines.

Please note: There are **no sample production facilities** available to patients in the hospital. Please refer to the instructions contained in the Andrology pack.

A) Post Vasectomy Specimens:

These specimens are processed Monday to Friday by **patient appointment only**. Appointments are made by patients or by clinical staff at 4143971/29. Patients post vasectomy packs containing the specimen container, request form and instructions are available from the Cellular Pathology Laboratory. Packs are also available from the Urology Day Ward.

B) Semen Analysis for fertility studies:

These specimens are processed on Tuesday and Thursday mornings and are **strictly by appointment.** Appointments are made by submission of a referral letter from GP or Clinician containing the following information which must be legible:

- Patient's name
- Date of birth
- Address
- Mobile phone number
- Clinician's details

Send referral letter to:
The Andrology Department,
Cellular Pathology Laboratory,
TUH (Tallaght Hospital,)
Dublin 24

- On receipt of the letter an appointment will be sent out to the patient with the time and date of their appointment and when they can collect their semen analysis pack from the laboratory.
- The pack contains the specimen container, request form and instructions
- It is vital that patients follow the instructions contained in this pack. For appointment enquiries please phone 3929.

C) EES Samples

The Cytology Lab will endeavour to process samples collected under EES. Please give prior notice to the Lab (Ext 3971) to ensure the Andrology Scientists are available.

11.6 REPORTING ARRANGEMENTS

Reports are available for viewing on the "ICE"Order Communications System (OCS) immediately post authorisation. A printed copy of the report is also generated and sent to the relevant clinical area/team.

For enquiries about reports please phone the Cellular Pathology office (Ext 3928/3929/2985)

11.6.1 Turnaround times

The following are **target** turnaround times (TATs) and are subject to the factors outlined below and the impact of various resource issues. These target turnaround times have been agreed following consultation with the users of our service.

Histology	**20** Working Days
Non-Gynaecologic Cytology /Andrology	**5** Working Days

Turnaround times refer to the availability of an authorised report for 80% of uncomplicated specimens. Turnaround time may vary according to the type of specimen to be processed including requirement for decalcification, the optimum fixation time required and complexity of the case. Certain additional investigations such as special stains, immunohistochemistry etc. will impact on turnaround times.

Turnaround times are continuously monitored and may need to be revised at times. Any adjusted TATs will be communicated to users by memo.

11.6.2 Turnaround times (TATs) for samples that are referred out

Molecular testing is batched and done once a week in CMD, SJH and Poundbury Cancer Institute in the UK.
The cut off for referral of molecular tests is Wednesday at 12 noon. Requests received after this time will be sent out the following week. The current turnaround time for molecular test results SJH is 3 weeks. Additional time is required for older samples (> 4 years) which must be retrieved from an external location.

	Referral centre	**TAT**
Molecular testing	Cancer Molecular Diagnostics Laboratory, SJH	3 weeks
HER2 status	Poundbury Cancer Institute	3 weeks
Muscle and nerve biopsies	Neuropathology, Beaumont Hospital	3 weeks
Renal biopsies	Renal Pathology Lab, Beaumont Hospital	3 weeks for final report
Medical liver biopsy	St Vincent's University Hospital	
Duodenal biopsy for disaccharidase analysis	Paediatric Biochemistry/Haematology, Royal Hospital for Sick Children, Edinburgh	13 weeks
Nasal brushings for electron microscopy	Biomedical Imaging Unit/Southampton General Hospital	13 weeks

11.6.3 Specimen retention time and requesting additional tests

- Histology specimens are kept for approximately 6 weeks post receipt or 4 weeks following authorisation of the report.
- Cytology specimens are kept for 2 weeks post receipt.
- Paraffin blocks and stained slides are retained permanently.
- Any additional tests must be arranged through direct contact with the reporting consultant pathologist, they can advise whether the sample is still available to perform the additional test.

11.7 CLINICO-PATHOLOGICAL CONFERENCES (MDTS)

Clinico-pathological conferences are held in the Seminar Room in the Laboratory Medicine Department and in the Seminar Room in the Radiology Department.

Details of cases for discussion (Name, MRN, Specimen Type, Date of Procedure) must be supplied to the cellular pathology office, extension number 3929/3928 at least **2 working days** before the date of the conference (See chart below). This is to allow sufficient time for slides to be retrieved from the archive and reviewed by the pathologist prior to the meeting. Recent cases may be discussed but only by prior arrangement with the Consultant Pathologist.

DEPARTMENT OF CELLULAR PATHOLOGY

CLINICO-PATHOLOGICAL CONFERENCES

Subject	Day/Time	Location	Frequency	Deadline	Co-Ordinator
GI MDT	Tuesday 7am	Radiology MDT room	Weekly	Friday 1pm	Dr.P. CrottyDr. D Mullen/ Dr P De La Harpe Golden
Urology MDT	Tuesday 8am	Radiology MDT room	Weekly	Wednesday before scheduled conference	Dr K O'Hare/ Dr D Mullen/ Dr S Crowther/
Haematology MDT	Wednesday 12 noon	Radiology MDT room	Weekly	Monday 12 noon	Dr.M.Jeffers/ Dr P Crotty
Dermatology	Wednesday 1.30pm	Laboratory seminar room	Weekly	Thursday 1.30pm	Dr S Crowther/ Dr K O'Hare
Melanoma MDT	Wednesday 1pm	Radiology MDT room	Fortnightly	Thursday 1.30pm	Dr S Crowther/ Dr K O'Hare
UPMC Skin	Wednesday 5pm	Laboratory seminar room	Fortnightly		Dr S Crowther/ Dr K O'Hare/ Dr.M. Jeffers
Colposcopy	Monday 4.45pm	Laboratory seminar room	Monthly	N/A	Dr.M. Jeffers/ Dr D Mullen
GI Medical	Monday 1pm	Laboratory seminar room	Monthly (2nd Monday of the month)	Thursday 12.30pm	Dr P Crotty/ Dr S Crowther/ Dr K O'Hare
IBD MDT	Friday 8am	Radiology MDT room	Monthly (3rd Friday of each month)	Wednesday 12.30pm	Dr.P. CrottyDr. D Mullen/ Dr P De La Harpe Golden
Respiratory	Friday 10am	Radiology MDT room	Weekly	Tuesday 12.30pm	Dr.S.Crowther/ Dr.M.Jeffers
TVAG (vasculitis)	Friday 8am	Robert Graves seminar room	Monthly (2nd Friday of each month)		Dr K O'Hare

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Author(s): Alison Harper, Ciaran Love, Deborah Ennis, Donal Smith, Eoin Begley, Fionnuala O Dwyer, Lorraine Mc Mahon, Louise Johnston, Sarah Delaney

11.8 AUTOPSY (POST MORTEM) SERVICES

Autopsy services are provided by the Department of Cellular Pathology at the direction of a coroner

Tallaght Hospital is under the jurisdiction of the Dublin Coroner, the current Dublin Coroner is Dr Myra Cullinane (telephone 01-8746684/ 01-8743006; e-mail coroners@dublincity.ie)
Circumstances where a death should be reported to the Coroner are listed in the link below.

http://www.coronerdublincity.ie/faqs/death.htm

Post mortem reports for Coroner's cases are sent to the Coroner's office only and all related inquiries should be directed to that office.

If a Post Mortem is required, the clinical staff must also inform the mortuary extension 2593/ bleep 7079.

11.8.1 PAEDIATRIC POST MORTEMS

Paediatric post mortems are routinely carried out at Children's Health Ireland (CHI), Crumlin. The pathologist on-call at CHI Crumlin must be contacted through the switch board on 01-4096100 without delay when a death has occurred. In non-coroner's cases, the pathologist conducting the examination will discuss the extent of the procedure with the family.

12.0 MICROBIOLOGY

The Microbiology Department provides Bacterial, Virology, Parasitology, Mycology and Serology services.
The Department complies with the International Standard ISO 15189 (Registration Number 330 MT), and the policies, regulations, terms and conditions of the Irish National Accreditation Board (INAB).

The tests available and the sample requirements are listed in the tables below. Please note *Service restrictions may apply from time to time due to staff shortages.*

12.1 MICROBIOLOGY PERSONNEL

Consultant Microbiologist	Dr. Susanna Frost	3919
Consultant Microbiologist	Dr. Jerome Fennell	3936
Consultant Microbiologist	Dr. Anna Rose Prior	3920
Consultant Microbiologist	Dr Sarah Bergin	3936
Consultant Microbiologist	Dr. Daniel Hare	3919
Microbiology Registrar		4707/2733
Infection Control Team	Shaini Paul Matthew (ADON) Selbin Chacko Attokaran Maura Rushe Alyson Daly Patricia McLoughlin Linda Reynolds Sheeja Chacko Sarah Whoriskey Marie Lynskey-Admin	2061 2065 2840 2840 3810 3809 3938
Chief Medical Scientist	Donal Smith	3906

12.2 LABORATORY NOTIFICATION OF EMERGENCY WORK

DURING ROUTINE HOURS

Within routine hours, please telephone the Microbiology laboratory (Ext. 3940//3942) or the **Microbiological Secretarial Office (3934/3935)**

This is **essential** to ensure that the specimen is expected and is handled as an urgent test. Please note that marking a sample "Urgent" **will not** cause it to be handled urgently unless the Microbiology laboratory has been notified.
CSF specimens and Blood cultures are always processed urgently and should be delivered immediately to the Microbiology Laboratory.

OUTSIDE OF ROUTINE HOURS

The emergency service is available on a 24-hr basis and is restricted to true emergencies. Other tests may be requested but these would require authorisation by the microbiology consultant on call

Outside normal working hours from **5pm** until **8am the following morning** the scientist on call for microbiology must be contacted by bleeping 7280

Microbiology Medical Scientist On-call, Bleep No. 7280, which has a voice mail facility - information on Patient name / Ward/Sample must be supplied each time the Medical Scientist is bleeped.

12.3 LIST OF TESTS AVAILABLE OUT OF ROUTINE HOURS

LIST OF TESTS AVAILABLE 5PM - 12 MIDNIGHT

1. All CSF specimens
2. All Blood cultures
3. Urgent urine specimens from patients less than six months old by request
4. The supply and processing of *B. pertussis* plates
5. The supply of Buccal swabs
6. Cell counts on fluids by request
7. Gram stains for fluids and tissues: **Contact the Consultant Microbiologist**.
8. All Antibiotic assays: **Contact the Consultant Microbiologist**.
9. Hepatitis B/C: Acute pre-dialysis patients or Hepatitis B needle-stick injuries (source only):
   Please contact the laboratory prior to sending the sample.
10. *C. difficile* toxin test: **Contact the Consultant Microbiologist.**
11. CPE GeneXpert, 8am- 8pm:
12. Rapid respiratory testing, 8am - 8pm.
13. Urgent ZN stains: **Contact the Consultant Microbiologist**.
14. Any other tests requested: **Contact the Consultant Microbiologist.**

LIST OF TESTS AVAILABLE POST 12 MIDNIGHT

1. All CSF specimens
2. Urgent urine specimens on patients less than six months old by request
3. All blood cultures

All other tests: **Contact the Consultant Microbiologist**

For specimens that cannot be sent via the Pneumatic Tube System (PTS), please contact the portering pool to transport the specimens to the Microbiology Laboratory.

12.4 CLINICAL CONSULTATION

A Clinical consultative service is available through the Microbiology Registrars and Consultants during routine hours at the above numbers and by the Consultant Microbiologist out of hours via the Hospital switch.

12.5 ROUTINE RESULTS AND REPORTING

Where VDUs are available, reports for both routine and emergency requests will be available on screen in your ward as soon as they are validated by laboratory personnel. Please make use of this facility. Non-urgent phone calls create a significant workload and cause unnecessary delays in processing samples.

All positive **CSF** specimens, all **positive Blood cultures**, **Mycobacteria, Salmonella, Shigella, Campylobacter, VTEC, Group A Streptococcus, C. *difficile* toxin positive, HIV, Hepatitis, Sars-CoV-2, Legionella and pneumococcal urinary antigen** results are telephoned. In addition, isolates from normally sterile sites which are deemed significant by the medical Microbiology team are telephoned.

Results are available electronically.

The Infectious Diseases Regulations 1981 (and subsequent amendments) require diagnostic laboratories to notify the Medical Officer of Health (MOH)/Director of Public Health (DPH) of certain *diseases.* This Laboratory complies with this legislation. A comprehensive list of causative agents notifiable to the HPSC under the *Infectious Diseases (Amendment) Regulations 2016 (S.I No.276 of 2016)* is available at: http://www.hpsc.ie/NotifiableDiseases/ListofNotifiableDiseases/File,678,en.pdf

12.6 GUIDELINES FOR MICROBIOLOGICAL SPECIMENS

The value and reliability of the results of many diagnostic bacteriological tests is largely dependent on correct procedures being followed when tests are requested. Microbiology results depend critically on the type and quality of the material received. Therefore this material should be **representative** and **fresh**. All specimens of infectious material should have their container lids **securely tightened** prior to transportation to ensure **safe arrival** in the laboratory. **Package all specimens in a biohazard bag before transport to the laboratory.**

Please inform the laboratory in advance of any 'Hot' specimens that require processing. A lead box is available in the laboratory for transport of such specimens.

TRANSMISSIBLE SPONGIFORM ENCEPHALOPATHY AGENTS (NvCJD)

Samples should be clearly marked with clinical details. **If a patient presents with a suspected TSE/CJD, the laboratory must be informed** prior to sending samples as separate protocols are required for handling these specimens.

REASONS FOR REJECTING SPECIMENS FOR BACTERIOLOGICAL EXAMINATION

- Incomplete or illegible request form
- Improperly labelled samples and samples where details on sample do not correspond with details on the request form. The sample should be labelled with two unique identifiers (Full name, Date of Birth or Hospital number). The accompanying request form should also be labelled with the corresponding details. See below.
- Specimens submitted in an unsterile container
- Tissue/ specimen received in formalin or other fixative
- Specimens which have leaked, either because the container has been damaged or the lid has not been tightened correctly.
- Incorrect sample type
- Unnecessary repeat requests

All non OCS specimens sent to the laboratory should be accompanied by a legible, fully completed and signed request form (YELLOW).

Information on **all** request forms should include:

1. Full patient identification data, name, sex, date of birth and hospital number.
2. Brief clinical details and history, **including date of onset**.
3. Time, date taken and nature and source of specimen including ward and consultant, or GP name and address and GP code
4. Recent and current antibiotic therapy
5. Investigation requested.
6. Name and bleep number of requesting doctor.

It is essential that all the above information is provided on a legible, fully completed and signed request form in order to maximise patient benefit. Failure to provide sufficient information may delay reporting and/ or lead to inappropriate investigation.

SPECIAL INVESTIGATIONS

All specimens undergo routine culture and sensitivity (C/S), if other specific investigations are required, please contact the Microbiology Laboratory.

REPEAT EXAMINATION DUE TO ANALYTICAL FAILURE

A repeat sample may be requested. A comment will be added to report form. The lab will also contact the source by telephone to inform them that a repeat sample is required.

REQUESTING ADDITIONAL TESTS

Bacteriology Samples

Due to the instability of bacteria over time and the processing undertaken for some samples, it is advisable that adding additional tests to a sample already submitted to the laboratory should be made as close as possible to the date of collection of sample. Please phone relevant section in Laboratory with additional request. Laboratory will advise as to possibility of adding additional tests requests. Please send a request form with the additional test required to the laboratory.

Serology Samples

The time limit for testing blood samples for various antibodies / antigens is variable. Please contact the Microbiology Laboratory for further information.

The following pages contain guidance on the taking and submission of samples for the most frequently requested bacteriological investigations. In addition advice is always available from medical and/or scientific staff of the department, both regarding tests described and others which may occasionally be required. Please read these notes and follow the advice given.

Turnaround times
The stated target turnaround times cover routine working hours Monday-Friday excluding bank holidays
The microbiology laboratory monitors turnaround times and investigates any instance where turnaround times extend outside these limits
In cases where turnaround times are extended due to difficulties with the identification and susceptibility testing of certain organisms all significant isolates would be communicated in the interim by the medical microbiology team

12.7 SPECIMEN REQUIREMENTS

Please label all samples clearly with the patient's name, DOB or Hospital number, date and time collected and the specimen site.

12.7.1 Urinary Tract Infection

Test	Sample Type	Sample Volume	Special Conditions	PTS	Frequency of Test	Cut-Off Time	Turnaround Time
Urine culture & sensitivity **Urgent Microscopy requests during routine working hours must be phoned to the Microbiology Laboratory**	MSU	At least 1ml in a sterile urine container		No	Daily	4.30pm (Mon-Fri)* 11.30 (Sat)	Microscopy result: by 5pm on day of receipt Culture Target TAT: 85% ≤ 3 days
	CSU			No			
	Suprapubic aspirate			No			
	EMU			No			
	Bag Urine			No			
	Pad Urine			No			
	Clean Catch Urine			No			
	Ileal conduit			No			
	Cystoscopy urine			No			
	Nephrostomy urine			No			

	Ureteric urine			No			

Test	Sample Type	Sample Volume	Special Conditions	PTS	Frequency of Test	Cut-Off Time	Turnaround Time
Schistosoma	Urine	A minimum volume of 10ml taken between 10.00h and 14.00h		YES	Mon-Fri	4.30pm (Mon-Fri)	Same day result

N.B. It is essential to tighten container lids to prevent leakages.
It should be stressed that urine specimens submitted for culture are screened for 'significant' growth. If a special situation is being investigated, please inform the laboratory.
It is important to instruct the patient to cleanse the genitalia prior to micturition when collecting a mid-stream specimen.
Any sample which may be subjected to delay of more than 2 hours before being sent to the laboratory should be refrigerated.

* Urine specimens from adult and paediatric A/E are processed up to 5pm. For processing of urgent urine specimens (paediatrics < 6 months old) outside of routine hours (5pm to 8am the following morning), please contact the microbiology medical scientist on-call on Bleep 7280.

White cell counts and red cell counts in urine samples are reported according to the following bands

WCC RCC	**0**	**<10**	**10-20**	**20-50**	**50-100**	**100-200**	**200-1000**	**>1000**

If there are epithelial cells present they are quantified as Scanty, +, ++ or +++
If there are organisms present they are quantified as Scanty, +, ++ or +++
If there are yeasts present they are quantified as Scanty, +, ++ or +++
The absence of epithelial cells is reported as nil.

If examination for casts is required this must be indicated on the request form

12.7.2 ENT Infection

Please label all samples clearly with the patient's name, DOB or Hospital number, date and time collected and the specimen site.

Swabs should be taken before antimicrobial therapy where possible. Specimens should be transported and processed as soon as possible. If processing is delayed, refrigeration is preferable to storage at ambient temperature.

Test	Sample Type	Sample Volume	Special Conditions	PTS	Frequency of Test	Cut-Off Time	Turnaround Time
ENT culture & sensitivity	Mouth Swab 			YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	Target TAT 85% ≤ 4 days

	Eye Swab 			YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	
	Nasal Swab 			YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	
	Ear Swab 			YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	
	Throat Swab # 			YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	
	Bordetella pertussis Perinasal Swabs		A "Bordetella pack" is available on request from the Laboratory	NO	Daily	4.30pm (Mon-Fri) 11.30(Sat)	Culture: Negative result :7 days

Note: A nasal swab is **not useful** for the investigation of sinusitis. Antral lavage or pus from sinus should be sent if acute maxillary sinusitis is suspected.

Nasal swabs **are useful** for the investigation of carriage of Staphylococcus aureus, and Methicilin Resistant Staphylococcus aureus (MRSA).

 # Swabs for investigation of Diphtheria should be clearly stated in the clinical details

12.7.3 Respiratory Tract Infection

Please label all samples clearly with the patient's name, DOB or Hospital number, date and time of collection and the specimen type.

Salivary samples are unsuitable. Purulent or mucopurulent samples should ideally be collected before anti-microbial therapy where possible. Specimens should be transported and processed as soon as possible. Sputum may be refrigerated for up to 2-3h without an appreciable loss of pathogens. Any delay beyond this time may allow overgrowth of certain organisms.
If the patient has difficulty in producing sputum, a physiotherapist can help in sputum collection, or sputum may be induced by saline inhalation.

Test	Sample Type	Sample Volume	Special Conditions	PTS	Frequency of Test	Cut-Off Time	Turnaround Time
	Sputum*	At least 1ml in a sterile universal container	Please send a separate specimen for TB culture	YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	Target TAT for culture and sensitivity for routine samples

Cough Swab 			YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	85%≤ 5 days Target TAT for samples collected from patient suffering from Cystic fibrosis 70% ≤ 7days
Broncho Alveolar lavage (BAL)	As large a volume as possible		YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	
Bronchial Aspirate	At least 1ml in a sterile universal container		YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	
Tracheostomy Aspirate	At least 1ml in a sterile universal container		YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	
Bronchial Brushes	Placed in a sterile universal container		YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	
Sinus Secretions	In a sterile leak proof container		YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	
Nasopharyngeal Aspirate	In a sterile leak proof container		YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	

Note: BALs are routinely cultured for bacterial pathogens as well as TB and fungi.
Specimens requiring examination for *Pneumocystis jiroveci (*formerly *carinii*) are referred to National Virus Reference Laboratory*
Please send a separate sputum sample if TB culture is required.
Requests for examination for CMV are referred to the National Virus Reference Laboratory.

Test	**Sample Type**	**Sample Volume**	**Special Conditions**	**PTS**	**Frequency of Test**	**Cut-Off Time**	**Turnaround Time**
SARS-CoV-2, RSV, Flu A and Flu B	Green topped viral swab/Red topped naso-pharyngeal swab	N/A		Yes	Monday-Friday	8pm	75% ≤ 1 day
SARS-CoV-2, RSV, Flu A and Flu B	GeneXpert red topped naso-pharyngeal swab	N/A		YES	Monday-Sunday	8pm	75% ≤ 1 day

Section 12.7.3.1 Urinary antigen testing

Test	Sample Type	Sample Volume	Special Conditions	PTS	Frequency of Test	Cut-Off Time	Turnaround Time
Legionella Urinary antigen*	Urine	20ml		No	Mon-Fri	4.30pm (Mon-Fri)	Target TAT 80% ≤ 1 days
Pneumococcal Urinary antigen*	Urine	20ml		No	Mon-Fri	4.30pm (Mon-Fri)	Target TAT 80% ≤ 1 days

* If transportation is delayed, please refrigerate at 4º C

12.7.4 Gastrointestinal Infection

Please label all samples clearly with the patient's name, DOB or Hospital number, date and time of collection and the specimen type.
Please send separate specimens and forms for each test request. If only one specimen is received with multiple requests it will cause delays in referring specimens to external laboratories.
If transportation is delayed, please refrigerate at 4º C

Test	Sample Type	Sample Volume	Special Conditions	PTS	Frequency of Test	Cut-Off Time	Turnaround Time
Faeces culture & sensitivity	Faeces	1-2g in a sterile universal container		YES	Mon-Fri	4.30pm (Mon-Fri)	Please refer to note 2 below table
	Faecal Fluid	1-2ml in a sterile universal container		YES	Mon-Fri	4.30pm (Mon-Fri)	
Ova & Parasites detection†#	Faeces	1-2g in a sterile universal container	Samples will only be examined for ova and parasites when relevant clinical details have been provided				
Helicobacter pylori antigen stool test	Faeces	1-2g in a sterile universal container		YES	Mon-Fri	4.30pm (Mon-Fri)	Target TAT 75% ≤ 2 days
Faeces for Molecular Testing including Clostridium difficile	Faecal Fluid Faeces	1-2g in a sterile universal container		YES	Mon-Fri	9am (Mon-Fri)	Target TAT 90%≤ 2 days

† Please contact the laboratory for information on the appropriate specimen required for the detection of certain parasites.
 # Samples for ova & parasite detection are referred to Eurofins Biominis daily

Note 1: The following is the acceptance and rejection criteria for specimens for *C. difficile* toxin testing;
- Non diarrhoeal stools are unsuitable for *C. difficile* toxin test.

- Specimens from patients less than 3 years old are not processed for *C. difficile* toxin.
- Specimens > 5 days old are unsuitable for *C. difficile* toxin test.
- If a patient has had a positive *C. difficile* test in the last 4 weeks the specimen is not processed. The assay is not a test of cure.
- If patient has tested negative in the previous 48 hours, test is not performed.

Please state on the request form whether antibiotic therapy could have induced the diarrhoea, or if pseudo-membraneous colitis is suspected.

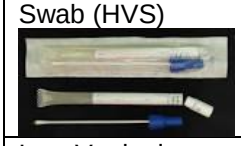
Note 2: Stool sample submitted to the laboratory for routine culture and sensitivity are tested using a molecular diagnostic test for the direct detection of Salmonella, Shigella, Enteroinvasive E. Coli, Campylobacter jejuni/Coli/Lari, cryptosporidium parvum/hominis, Giardia lamblia and VTEC.
Any stool sample requesting other faecal pathogens or with clinical details suggestive of infection with other faecal pathogens will be cultured using conventional methods

Specimens for viral detection are referred to the National Virus Reference Laboratory. Please refer to the Referral section.

12.7.5 Genital Infections

Please label all samples clearly with the patient's name, DOB or Hospital number, date and time of collection and the specimen type.

If transport is delayed, please keep sample at room temperature.

Test	Sample Type	Sample Volume	Special Conditions	PTS	Frequency of Test	Cut-Off Time	Turnaround Time
Genital Tract Specimens Culture& sensitivity	High Vaginal Swab (HVS) 			YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	Target TAT 80% ≤ 4 days
	Low Vaginal Swab (LVS) 			YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	
	Endocervical Swab			YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	
	Cervical Swab			YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	
	Vaginal Swab 			YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	
	Penile Swab 			YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	

Urethral Swab 			YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	
Intrauterine Contraceptive Device (IUCD)	Send entire device		YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	
Fluids& Pus	At least 1ml in a sterile universal container		YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	
Tissue& biopsies	Placed in a sterile universal container		YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	

Chlamydia detection- Aptima Collection Kits and sampling protocols for inpatients are available on request from the Microbiology Laboratory.

For GP's, please contact the National Virus Reference laboratory for the Aptima Collections Kits. They can be ordered through the NVRL website at the following link **www.nvrl.ie**

Instructions for sample collection are detailed on the packaging of the device.

Please note it is **ESSENTIAL** to ensure urine specimen containers are filled to the correct volume as indicated by the black lines on the SCD. Over- or under-filled SCD will not be processed in line with manufacturer recommendations as it may impact on the sensitivity of the test.

- Please send **vesicle/ulcer viral swab** for investigation of **herpes simplex** investigation
  These specimens are referred to the National Virus Reference Laboratory. Viral transport swabs are available from the Microbiology Laboratory.
- Appropriate swabs for *N. gonorrhoeae* investigation include; urethral, endocervical, cervical, rectal and pharynx.
- A HVS swab is suitable for candida and trichomonas detection
- For the investigation of PID, please send a cervical swab
- Syphilis, hepatitis B and HIV-send serum samples (Please refer to referral and serology sections)

12.7.6 Pus & Wound Specimens

Please label all samples clearly with the patient's name, DOB or Hospital number, date and time of collection and the specimen type.

FOR HEALTH & SAFETY REASONS DO NOT SEND PUS IN SYRINGES WITH NEEDLE ATTACHED.

Test	Sample Type	Sample Volume	Special Conditions	PTS	Frequency of Test	Cut-Off Time	Turnaround Time
Wound swabs Culture & sensitivity	Wound swabs 			YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	Target TAT 85% ≤ 5 days

Pus Culture & sensitivity	Pus	In a sterile leak proof container- transported to the lab within 30 mins		YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	
Fluids (non-sterile sites) culture & sensitivity	Fluids-wound/abscess /drain	At least 1ml in a sterile leak- proof container		YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	

Note: Samples of pus are preferred to swabs.
Ideally, a minimum volume of 1 ml of pus should be sent. If swabs are used, sample the deepest part of the wound and soak well in pus.
Specimens should be transported and processed as soon as possible. The volume of specimen influences the transport time that is acceptable. Large volumes of purulent material maintain the viability of anaerobes for longer.

Wound or Pus samples are screened for all likely bacterial pathogens and, if present, these organisms and their antibiotic sensitivity results are reported. The inclusion of relevant clinical information on the request form assists in deciding the relevance of some bacterial isolates. If transport is delayed please, refrigeration is preferable to storage at ambient temperature. Delays of over 48 hours are undesirable.

12.7.7 Fluids/Aspirates from Sites Normally Sterile

Please label all samples clearly with the patient's name, DOB or Hospital number, date and time of collection and the specimen type.

Test	Sample Type	Sample Volume	Special Conditions	PTS	Frequency of Test	Cut-Off Time	Turnaround Time
Fluids/ Aspirates Culture & sensitivity	Pleural Fluids†	At least 1ml in a sterile leak- proof container	An aliquot of sample in an EDTA tube if cell count required.	YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	Target TAT 85% ≤ 5 days
	Continuous ambulatory peritoneal dialysis (CAPD) fluid	At least 20ml in a sterile leak- proof container	An aliquot of sample in an EDTA tube if cell count required.	YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	Target TAT 85% ≤ 5 days
	Peritoneal dialysis(PD) Fluid	At least 20ml in a sterile leak- proof container	An aliquot of sample in an EDTA tube if cell count required.	YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	
	Joint Aspirates*	At least 1ml in a sterile leak- proof container	An aliquot of sample in an EDTA tube if cell count required.	YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	

	Ascitic Fluid*	At least 1ml in a sterile leak- proof container	An aliquot of sample in an EDTA tube if cell count required.	YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)
	Bile	1-2ml In a sterile leak proof container		YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)

† All pleural fluids are sent for TB culture and sensitivity

⁕ Requests for crystal examination on joint aspirates are performed by the Cellular Pathology department

* Ascitic fluid may be inoculated into Blood Culture bottles in acute peritonitis cases.

Notes on transport: Specimens should be transported and processed as soon as possible. The volume of specimen influences the transport time that is acceptable. Large volumes of purulent material maintain the viability of anaerobes for longer; however the recovery of anaerobes is compromised if the transport time exceeds 3 hours.
If processing is delayed, refrigeration is preferable to storage at ambient temperature. Delays of over 48 hours are undesirable.

12.7.8 Tissues/ Biopsies & Bone Specimens/Chest Drain tips

Please label all samples clearly with the patient's name, DOB or Hospital number, date and time of collection and the specimen type.

SPECIMENS RECEIVED IN FORMALDEHYDE ARE NOT SUITABLE FOR CULTURE.

Test	Sample Type	Sample Volume	Special Conditions	PTS	Frequency of Test	Cut-Off Time	Turnaround Time
Culture & sensitivity	Tissue	In a sterile leak proof container- transported to the lab within 30 mins	**N.B. Do not add formaldehyde as this will kill any bacteria present**	YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	Target TAT 85% ≤ 5 days
	Biopsies	In a sterile leak proof container		YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	
	Gastric biopsies for H.pylori †	In portagerm pylori transport media		NO	Mon-Fri	4.30pm	19 days
	Bone	In a sterile leak proof container		YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	Target TAT 85% ≤ 5 days

† Biopsies for H. pylori: Antral/corpus biopsies for H. pylori culture and sensitivity should be placed in portagerm pylori transport media and brought directly to the microbiology laboratory. These samples are referred to the Gastrointestinal Bacteria Reference Unit, Colindale, UK

Other tissues and biopsies: Place in a sterile container for transport as soon as possible. The volume of the specimen influences the transport time that is acceptable. Larger pieces of tissue maintain the viability of anaerobes for longer.
Tissue or biopsy material in a sterile container has an optimal time for transport to the laboratory of up to **30 mins**. If processing is delayed, refrigeration is preferable to storage at ambient temperature. Delays of over 48 hours are undesirable

Test	Sample Type	Sample Volume	Special Conditions	PTS	Frequency of Test	Cut-Off Time	Turnaround Time
Culture & sensitivity	Chest Drain Tip	In a sterile leak proof container		YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	Target TAT 75% ≤ 4 days
	Pacemaker	In a sterile leak proof container		YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	Target TAT 75% ≤ 4 days

12.7.9 MRSA/ Vancomycin Resistant Enterococci (VRE)/ Carbapenem resistant enterobacteriaceae (CPE) & Environmental Screens

Please label all samples clearly with the patient's name, DOB or Hospital number, date and time of collection and the specimen type.

Test	Sample Type	Sample Volume	Special Conditions	PTS	Frequency of Test	Cut-Off Time	Turnaround Time
MRSA Screen* Culture & sensitivity	Nasal & groin swabs 			YES	Mon-Sat	4.30 pm (Mon-Fri) 11.30 (Sat)	Target TAT 90% ≤ 3 days
VRE Screen Culture & sensitivity	Faeces Rectal swab 	1-2g of faeces		YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	Target TAT 75% ≤ 4 days
CPE Screen Culture& sensitivity	Faeces Rectal swab 			YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	Target TAT 75% ≤ 4 days
CPE Screen Routine molecular testing	Rectal swab orange topped copan Fecal swab ™ 				Mon-Fri	9 am (Mon-Fri)	Target TAT 75% ≤ 1 day
CPE Screen Environment	Green topped swab 				Mon-Fri	9 am Mon-Fri	Culture: 18-72 hours
CPEscreen (GeneXpert) Urgent request for rapid CPE testing	Red topped swab** 				Mon-Sun	8 pm	Result available within 90 mins
Environmental samples Culture	Pharmacy Plates/ Swabs 			NO	Mon-Friday	4.30pm	48 hours
Culture & sensitivity	Environmental swabs 			YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	Culture: 16-72 hours
Culture	Settle plates			NO	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	48 hours

* An MRSA screen consists of a nasal swab and a groin swab only. Use one swab only for left and right nostrils.

** Red topped swabs for CPE GeneXpert testing are available from the department of microbiology.

12.7.10 Blood Cultures

The Blood culture system in use in the laboratory is a continuous monitoring system. The instrument is checked and samples are processed on a 24 hour basis.

The blood culture bottles and system in use is the BACT/ALERT® VIRTUO®(Biomerieux) system. There is an expiry date on each bottle and bottles should not be used after this date.

Please label all samples clearly with the patient's name, DOB or Hospital number, date and time of collection and the specimen type.

DO NOT place addressograph label over the Bar Code on bottle

Blood culture bottles may be transported in the hospital pneumatic tube system (PTS)

Test	Sample Type	Sample Volume	Special Conditions	PTS	Frequency of Test	Cut-Off Time	Turnaround Time
Blood Culture-Adults	2 bottles green top (Aerobic) purple top (Anaerobic)	10 ml of blood	Do not exceed the manufacturer's recommended maximum volume for each bottle. **Send immediately to the laboratory**	**Yes**	Mon-Sun (blood cultures are continuously monitored)		Culture: **Negative**- 5 days **Positive**- Telephoned on day of detection
Blood Culture-Paediatrics	1 bottle; a yellow top bottle (If paediatric bottle unavailable, use 1green (aerobic) bottle	Neonate; 1-2 ml Infants; 2-3ml Pre-teen children; 3-5ml	Do not exceed the manufacturer's recommended maximum volume for each bottle. **Send immediately to the laboratory**	**Yes**	Mon-Sun (blood cultures are continuously monitored)		Culture: **Negative-** 5 days **Positive-** Telephoned on day of detection

Optimal time of collection Before Antimicrobial therapy where possible and as soon as possible after a spike of fever, except in endocarditis where timing is less important.

NOTE: If blood for other tests such as blood gases or ESR is to be taken at the same venepuncture, the blood culture bottles should be inoculated first to avoid contamination. It is preferable to take blood for culture separately.

Notes on transport: Where there is a delay in transport to the laboratory and/or loading on to the automated system, blood cultures should be incubated at 33-37°C as soon as possible after inoculation, pending processing, and **must not be refrigerated**. If an incubator is unavailable on the ward, storage at ambient temperature is preferable to refrigeration before transportation

Method of Collection

Disinfect the skin at the venepuncture site with 2% chlorohexidine and 70% isopropyl alcohol and allow to dry. Remove the flip caps and disinfect the septum of the blood culture bottle with 2% chlorohexidine and isopropyl alcohol and allow to dry (the use of iodine-based disinfectants is **NOT** recommended for some commercial systems as this is said to affect the integrity of the butyl rubber septum). If inoculating more than one type of BacT/Alert blood culture bottle using a butterfly blood collection set and direct draw adapter cap, inoculate first the aerobic culture bottle and then the anaerobic culture bottle so that any oxygen trapped in the tubing will not be transferred to the anaerobic bottle. Monitor the direct draw process closely at all times during collection to assure proper flow is obtained and to avoid flow of the bottle contents into the adapter tubing. Due to the presence of chemical additives in the culture bottle, it is important to prevent possible backflow and subsequent adverse reactions.

- Hold the culture at a position below the patients arm with the bottle in an upright position.
- Blood may be collected with a butterfly blood collection set and the Blood collection adapter cap. NOTE the manufacturer has informed us of an issue where the leur connector may disengage from the adapter, exposing the needle and giving a risk to needle-stick injury. Maintain control of the leur connector by securing it between thumb and forefinger. To prevent overfilling monitor the blood volume intake into the blood culture bottle, using the 5ml incremental markings on the blood label.
- Do not use a bottle that contains media exhibiting turbidity, excess gas pressure (bulging septum); these are signs of contamination

Samples should not be taken through an intravenous catheter or other access device unless no other access is available.

Take two sets during any 24h period for each septic episode. For neonates, take a single aerobic bottle or special paediatric bottles.

12.7.11 Intravascular Cannulae

Please label all samples clearly with the patient's name, DOB or Hospital number, date and time of collection and the specimen type.

Test	Sample Type	Sample Volume	Special Conditions	PTS	Frequency of Test	Cut-Off Time	Turnaround Time
Culture & sensitivity	Cannula/ Lines/Tips	4cm of the tip into a sterile container	Tips will only be processed if a Blood Culture has been contemporaneously received in the preceding 48hrs or by specific request All rejected tip sample will be held in the microbiology laboratory for a period of 72 hours	YES	Mon-Sat	4.30pm (Mon-Fri) 11.30 (Sat)	Target TAT 75% ≤ 4 days

Ideally the specimen should be obtained prior to antimicrobial therapy

Method of Collection

Cannulae
Disinfect the skin around the cannula entry site, remove cannula using aseptic techniques, and cut off 4cm of the tip into a sterile container using sterile scissors

Specimens should be transported to the laboratory and processed as soon as possible. If processing is delayed, refrigeration is preferable to storage at ambient temperature. Delays of over 48h are undesirable

NOTE: Vascular tips will not be cultured unless accompanied by a blood culture that has been drawn within the same 24 hour period

12.7.12 CSF

Please label all samples clearly with the patient's name, DOB or Hospital number, date and time collected.

N.B.: IT IS VERY IMPORTANT TO SPEAK WITH THE CONSULTANT MICROBIOLOGIST BEFORE ANY SPECIMENS ARE TAKEN FROM PATIENTS SUSPECTED OF TSE/vCJD AND TO NOTE THIS IN CLINICAL DETAILS ON REQUEST FORM

Test	Sample Type	Sample Volume	Special Conditions	PTS	Frequency of Test	Cut-Off Time	Turnaround Time
Culture & sensitivity	CSF	1-2ml in 3 sterile universal containers sequentially marked 1, 2 & 3	**Send immediately to the laboratory**	**NO**	Mon-Sun 24 hours a day	No cut-off time	Microscopy & Gram results are available on day of receipt. Culture: 16-72 hours
Biofire/ FilmArray Molecular Encephalitis panel *	CSF	1-2ml in 3 sterile universal containers sequentially marked 1, 2 & 3	**Send immediately to the laboratory**	**NO**	Mon-Sun 8am-8pm	No cut-off time	24 hours
RT-QuIC Test (Real Time Quaking Induced Conversion) for diagnosis of Sporadic CJD	CSF	1-2ml in a universal container	**Send immediately to the laboratory. The sample needs to be frozen within 30 mins of aspiration.** **Referral Form (LF-NCJD-CSFQuestions) must accompany the sample†**	**NO**	Mon-Fri 9am-4pm	No cut-off time	10-15 days

Please note: CSF samples are never sent via the PTS

Please send as large a volume as possible. CSF is normally collected sequentially into three or more separate sterile universal containers, which should be numbered consecutively. Send all samples

immediately to the Microbiology laboratory, unless the CSF is from a Haematology patient in which case the CSF is sent directly to Haematology Laboratory. Do not refrigerate.

All samples and forms should be sent to Microbiology who will distribute samples to other laboratories as required.
Samples will be forwarded to the clinical chemistry laboratory for protein and glucose.
If oligoclonal bands are requested the clotted blood sample and CSF will be forwarded to the clinical chemistry laboratory.

* Biofire/ FilmArray Molecular Encephalitis panel *-Performed in consultation with Clinical Microbiology Team on specimens with raised WCC only.

Ideally a minimum volume of 1 ml should be sent for culture for Mycobacterium species.

† **RT-QuIC Test (Real Time Quaking Induced Conversion) for diagnosis of Sporadic CJD request form can be found at;** https://www.cjd.ie/resources/INCJDSU%20Referral%20Form.pdf
The RT-QuIC Test is performed at THE IRISH NATIONAL CJD SURVEILLANCE UNIT**,** Beaumont Hospital

Where Meningococcal meningitis/ pneumococcal meningitis/ *Haemophilus influenazae* meningitis, *E. Coli* meningitis or Group B streptococcal meningitis are suspected, CSF and/or EDTA blood samples can be referred to the Irish Meningitis and sepsis Reference Laboratory (IMSRL) for PCR.
Please complete **Irish Meningitis and sepsis Reference Laboratory (IMSRL) Request form**
Please find below link to download IMSRL request
https://www.childrenshealthireland.ie/documents/35/IMSRL-Request-Form-Jul-2022.pdf

Samples will be referred for requested virology or viral PCR tests to the National Virus Reference Laboratory (NVRL)

CSF References ranges and Critical values
Normal CSF values

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

These values represent the upper and lower limits of normality. Bacterial or viral infection may still need to be considered where leucocyte counts are near the upper normal limits in neonates and young children.
Due to this any WCC above 5 are fully investigated.

Abnormalities associated with bacterial meningitis are:

- reduced glucose concentration
- elevated protein concentration
- raised white blood cell (WBC) count
- elevated intracranial pressure

12.7.13 Specimens for the TB Laboratory

Please label all samples clearly with the patient's name, DOB or Hospital number, date and time collected.
If the patient is suspected of having T.B. wear appropriate PPE as identified by local risk assessment during collection and discard any waste material into clinical waste bags.

Test	Sample type	Sample volume	Special conditions	PTS	Frequency of test	Cut-off time	Turnaround time
TB Culture & sensitivity	Sputum*	At least 5mls in a sterile universal container	3 early morning sputum specimens collected on 3 consecutive days	YES	Monday, Wednesday & Friday	By 9am on day of processing	**Microscopy:** On day of processing **Culture**: **Negative: 8 or 12 weeks**** **Positive:** Telephoned on day of detection Target TAT 75% ≤ 10 weeks
	Urine†*	At least 5mls in a sterile universal container	3 early morning urine specimens collected on 3 consecutive days	YES	By request only. See note below.	By 9am on day of processing	
	BAL/ bronchial brushes/ bronchial washings	At least 5mls in a sterile universal container		YES	Monday, Wednesday & Friday	By 9am on day of processing	
	Pleural Fluids	At least 1ml in a sterile universal container		YES	Monday, Wednesday & Friday	By 9am on day of processing	
	Body fluids	At least 1ml in a sterile universal container		YES	Monday, Wednesday & Friday	By 9am on day of processing	
	Gastric lavage#	At least 5mls in a sterile universal container		YES	Monday, Wednesday & Friday	By 9am on day of processing	
	CSF	At least 1-2ml in a sterile universal container		**NO**	Monday, Wednesday & Friday	By 9am on day of processing	
	Pus	In a sterile universal container		YES	Monday, Wednesday & Friday	By 9am on day of processing	
	Skin/ tissue biopsies	In a sterile universal container		YES	Monday, Wednesday & Friday	By 9am on day of processing	
	Bone	In a sterile universal container		YES	Monday, Wednesday & Friday	By 9am on day of processing	
	Blood	Please contact the laboratory for the appropriate blood culture bottles		**NO**	Processed at the Irish Mycobacterium Reference Laboratory, St. James's Hospital (IMRL)	12pm on day of collection as samples must be transported to St. James's Hospital	7 weeks

TB Culture & sensitivity	Bone Marrow	Please contact the laboratory for the appropriate blood culture bottles		**NO**	Processed at the Irish Mycobacterium Reference Laboratory, St. James's Hospital (IMRL)	By 12am on day of processing	7 weeks
GeneXpert MTB/RIF Ultra Assay	Sputum	At least 1ml in a sterile universal container		Yes	Mon-Fri	Cut-off 3pm	24 hours
Quantiferon Assay	Blood	Please contact the laboratory for the appropriate blood collection tubes	This test is for a respiratory or pre-immunosuppr-ession screen only. Please contact Clinical microbiology team for any queries	YES	Batched Once weekly	Monday-Friday 5pm	Target TAT 70% ≤ 7 days

Specimens should be transported and processed as soon as possible. Sputum may be refrigerated for up to 2-3h without an appreciable loss of pathogens.

* **If routine culture is required, a separate specimen and request form are required.**

**If infection with mycobacterium other than tuberculosis (atypical mycobacteria) is suspected based on clinical details or patient group the incubation time of culture will be extended for a further 4 weeks

† TB testing is only carried out on urines at the request of the urology or respiratory services following discussion with the Consultant Medical Microbiologist.

Please contact the laboratory prior to sending Gastric Lavage specimens.

Sputum specimens can be referred for **GeneXpert MTB/RIF Ultra Assay** (molecular techniques for the detection of mycobacteria) following discussion with Microbiology Medical Team.

Quantiferon Specimen Collection

Quantiferon-TB gold *Plus* uses the following collection tubes:

Nil Control (Grey cap),
TB1 Antigen (Green cap),
TB2 Antigen (Yellow Cap)
Mitogen Control (Purple cap)

The following procedures should be followed for optimal results

1 For each patient collect 1ml of blood by venepuncture directly into each of the Quantiferon-TB Gold IT blood collection tubes. Blood should be collected into the Nil tube (Grey) first then the TB1 Antigen tube (green), followed by the TB2 (yellow) & finally the Mitogen tube (Purple).

- As 1ml tubes draw blood relatively slowly, keep the tube on the needle for 2-3 seconds once the tube appears to have completed filling, to ensure that the correct volume is drawn.
- **The black mark on the side of the tubes indicates the 1ml fill volume.**
- If a butterfly needle is being used to collect blood a purge tube should be used to ensure that the tubing is filled with blood prior to the Quantiferon-TB Gold tubes being used.

Antigens have been dried onto the inner wall of the blood collection tubes so it is essential that the contents of the tubes are mixed thoroughly with the blood.

- Mix the tubes thoroughly by turning the tube end over end 8-10 times or shaking the tubes for 5 seconds.
- Label the tubes appropriately and deliver the sample to the specimen reception area in the microbiology laboratory.
- Samples should be stored at 33-37°C if there is a delay – this will be done in the laboratory**. They should not be refrigerated or frozen.**
- Any queries regarding the collection and transport of samples please contact Microbiology specimen reception at 4143940

Please complete separate request form for Quantiferon and place only the blood tubes for Quantiferon in the biohazard bag

12.7.14 Antibiotic Assays

Please label all samples clearly with the patient's name, DOB or Hospital number, date and time collected.

Test	Sample Type	Sample Volume	Special Conditions	PTS	Frequency of Test	Cut-Off Time	Turnaround Time
Gentamicin	Clotted blood sample (red topped) 	**Adults:** 5-10ml **Neonates:** 1-2 ml **Infants:** 2-3 mls **Pre-teen:** 3-5 mls		YES	Mon-Sun each day	3 pm weekdays 11am Sat, Sun & Bank holidays	Weekdays: Result by 5pm Weekends & Bank holidays: Result by 1pm
Vancomycin	Clotted blood sample (red topped) 	**Adults:** 5-10ml **Neonates** 1-2 ml **Infants:** 2-3 mls **Pre-teen:** 3-5 mls		YES	Mon-Sun each day	3 pm weekdays 11am Sat, Sun & Bank holidays	Weekdays: 5pm Weekends & Bank holidays: Result by 1pm
Amikacin	Clotted blood sample (red topped) 	**Adults:** 5-10ml **Neonates:** 1-2 ml **Infants:** 2-3 ml **Pre-teen:** 3-5 ml		YES	Mon-Sun each day	3 pm weekdays 11am Sat, Sun & Bank holidays	Weekdays: 5pm Weekends & Bank holidays: Result by 1pm
Tobramycin	Clotted blood sample (red topped) 	**Adults:** 5-10ml **Neonates:** 1-2 ml **Infants:** 2-3 ml **Pre-teen:** 3-5 ml		YES	Mon-Sun each day	3 pm weekdays 11am Sat, Sun & Bank holidays	Weekdays: 5pm Weekends & Bank holidays: Result by 1pm
Teicoplanin*	Clotted blood sample (red topped) 	**Adults:** 5-10ml **Neonates:** 1-2 ml **Infants:** 2-3 mls **Pre-teen:** 3-5 mls	Lithium Heparin blood samples are unsuitable for this assay	YES	Mon-Thursday	2 pm Mon-Thursday This service is not available at the weekends	By 5pm the following day

A few antibiotics e.g. aminoglycosides, exhibit a narrow range between therapeutic and toxic concentrations. Assays of antibiotic levels in the blood may be necessary to confirm that adequate concentrations of antibiotic are being achieved in blood OR to avoid excessive blood concentrations when the drug is known to be toxic especially if the patient has impaired renal or hepatic function, or in neonates whose renal and hepatic handling of drugs is imperfectly developed.

Sample required A minimum of 1ml clotted blood in a sterile screw capped bottle.

*Teicoplanin assays are referred out to The Antimicrobial Reference Laboratory, Southmead Hospital, Bristol, England. Serum samples need to be in the laboratory by 2pm Monday to Thursday. Results are available by 5pm the following day.

OPTIMAL TIME OF SPECIMEN COLLECTION

Trough Level: Trough levels should be taken immediately prior to the administration of the next dose.
Peak Level: Due to limited clinical utility the microbiology laboratory no longer processes peak levels for glyocpeptide (Vancomycin, Teicoplanin) and aminoglycoside antibiotics (gentamicin and amikacin).

Details of dose and timing should be recorded on the request form.
Random levels are difficult to interpret. If taken to determine whether another dose should be given they should be considered trough levels and the time from last dose recorded on the request form.

Causes of inaccurate, sometimes patently pharmocokinetically impossible results include:

1. Mistiming of dosing/ levels
2. Omission of dose
3. Administration of dose into a slowly flowing infusion
4. Drawing a blood sample back down an IV cannula used for administering antibiotics.

THERAPEUTIC DRUG LEVEL MONITORING – REFERENCE RANGES

ANTIBIOTIC	NORMAL REFERENCE RANGE (µg/ml)	
	Single Daily Dose	**Multiple Daily Dose**
Gentamicin	**Trough: <1** -For OD dosing, Trough levels should be taken >18 hours post dose. If Normal Renal Function, monitor level once weekly	**Trough: <2** If Normal Renal Function, monitor level twice weekly.
Vancomycin		**Trough: 10 – 20** For complicated infections, e.g. Endocarditis, Hospital Acquired Pneumonia, a higher Trough of 15-20 is recommended. If advice required, please discuss with clinical microbiology or pharmacy
Amikacin	**Trough: <5**	**Trough: 5 - 10**
Tobramycin	**Trough: <1**	**Trough: <2**
Teicoplanin	**Standard Trough: ≥15** For severe infections higher Trough's are required. See medicines guide. **Peak: Not routinely required**	

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12.7.15 Specimens for Mycology

Specimens for mycology (e.g. skin, hair and nails) should be placed in a sterile universal container and sent to the Microbiology Laboratory. These specimens are referred to external laboratories. See Reference lab section for a list of commonly referred tests.

12.8 LIST OF TESTS SENT TO REFERRAL LABORATORIES

All Microbiology specimens for referral to external laboratories must be processed through the TUH Microbiology Laboratory.

12.8.1 List of Tests referred to National Virus Reference Laboratory (NVRL)

Requests for virology are referred to the National Virus Reference Laboratory. University College Dublin, Belfield, Dublin 4.

Please contact the Microbiology Laboratory with any queries relating to specimens for virology testing.

Some virology requests may be sent to other reference laboratories (see below)

Please label all samples clearly with the patient's name, DOB or Hospital number, date and time collected

Samples are dispatched to NVRL daily Monday-Friday at **13.00**

TESTS AVAILABLE

Requests for Urgent investigation must be arranged by telephone with the NVRL clinical team

See website for additional information relating to diseases, pathogens and specimens required.

www.nvrl.ie

Requests for 'Viral screen', 'routine virology' or 'atypical screen' without accompanying clinical information will not be processed. Failure to supply the required information will lead to delays in reporting

Specimens must be collected in appropriate plastic leak proof containers with a screw top lid.

- **Virology swabs**  and **salivary collection system** for **measles** are available from Microbiology.

- **Chlamydia swabs for eyes** are also available. See below. White top only. 

- **Blood Sample**
  It is preferable that blood tubes are filled to their stated capacity. This minimises the risk of insufficient volume for completion of testing. The NVRL will endeavour to maximise the use of any sample. In cases where sample collection is difficult or the volume collected is small please indicate the tests that are of highest priority.
- **Clotted Blood/ Serum**

For serological investigations serum samples or a container of clotted blood should be sent to the NVRL. At a minimum, 5ml of clotted blood (2ml for paediatric samples) or 2ml of serum (1ml for paediatric samples) is required for testing.

- **EDTA Whole Blood/Plasma**

At a minimum, 5ml of EDTA whole blood (2ml for paediatric samples) or 2ml of plasma (1ml for paediatric samples) is required for testing.

Serum and plasma samples required for **molecular investigations** should be separated from whole blood within 24 hours of venepuncture and frozen immediately at -20°C to maintain the integrity of the viral genetic material. These samples should be transported to the NVRL in a frozen state.

- Please send blood to the microbiology department within 2 hours of taking. **Arrange with Microbiology laboratory during routine working hours. Notify the scientist out of routine hours on bleep 7280 if you are sending a sample**

Please note that specimens anti-coagulated with heparin are not suitable for PCR.

- **Stool**
  5 to 10g should be transported in a sterile universal container. Transport medium is not required. For Molecular detection of Norovirus, specimens should be transported to the laboratory as soon as possible post collection. Alternatively specimens may be stored at 4^{O}C for up to 72 hrs before dispatch. For Norovirus (Winter Vomiting Bug), faeces samples should be restricted to 1 in 4 patients.

- **Cerebrospinal Fluid**
  If possible, collect 1ml into a sterile container for virus isolation and molecular investigation. Transport medium is not required. Specimens should be transported without delay.

- **Urine**
  10 to 20ml of urine should be sent in a sterile container. Specimens should be transported without delay.

- **Respiratory Secretions**
  Respiratory viruses are extremely thermolabile and therefore should be transported to the laboratory without delay. The quality of the sample is a major determinant in identifying the causative agent. Secretory specimens are therefore the specimens of choice.

  Throat swabs and other swabs are obtained by swabbing the affected site with Viral Transport Swabs.

  Nasopharyngeal secretions should be aspirated into a sterile plastic mucous extractor. Transport the mucous extractor with the secretions to the NVRL. At a minimum, 1 ml of sample is required for testing

  Throat washings are collected by asking the patient to gargle with 10ml of saline solution, which is then put into a sterile screw-capped container.

A broncho-alveolar lavage should be transported in a sterile container. At a minimum, 1 ml of sample is required for testing

Sputum samples should be transported to the laboratory in a sterile container. At a minimum, 1 ml of sample is required for testing.

- **Eye Swabs / Scrapings**
  Conjunctival swabs and scrapings for virus isolation should be taken into VTM. Specimens should be transported without delay.

- **Skin Lesions**
  Virus isolation: Vesicular fluids and cellular material from the base of lesions should be collected during the first 3 days of vesicle eruption. Vesicle fluid may be aspirated with a needle and syringe into a sterile bottle or collected onto a swab, which is then placed, into VTM. The base of the opened vesicle can then be scraped with a sterile scalpel and the cellular material washed into VTM.

- **Post - mortem or Biopsy specimens**

- The NVRL accepts post mortem serum and tissue samples, but it is important to realise that the majority of commercial assays used in this situation has not been validated for PM use.
- In addition, the sensitivity of molecular assays raises the possibility of identifying a viral pathogen that is not actually implicated as a cause of death. As such, it is vital that the NVRL be contacted
- (ideally in advance) about PM samples to ensure that the samples can be investigated promptly and appropriately, generating usable results.
- As a general rule, PM tissue samples will be placed in cell culture for viruses. This approach has the advantage of being non-specific ('catch-all'), while demonstrating the presence of viable ('live') virus if it yields a positive result.
- Specific molecular (PCR) testing is best performed in conjunction with the pathologist when a particular pathogen is suspected: molecular testing is far more sensitive than culture, but it does not distinguish between viable and non-viable virus.
- Fresh unfixed tissues should be collected aseptically from the probable sites of infection using separate sterile instruments to cut and remove each sample. Place each sample in a separate sterile container and label appropriately. Specimens should be transported without delay.
  Scabs or biopsy material for electron microscopy should be sent in a dry bottle.
  Rapidly frozen tissue may also be sent for electron microscopy.

- **Oral fluid (Saliva) specimens**
  Oral fluid (Saliva) specimens should be collected using a foam swab supplied by the NVRL or using commercially available collection devices. Please contact the NVRL laboratory with queries.

- **Chlamydia trachomatis**
  Ophthalmic specimen: Use APTIMA UNISEX SWAB (Gen-Probe). Specimen Collection Kit and instructions available from the Microbiology Laboratory for inpatients. For GP's please contact the NVRL to order.

  Chlamydia trachomatis/ Neisseria gonorrhoeae samples
  Only specimens collected in APTIMA collection devices can be tested in the NVRL. Instructions for sample collection are detailed on the packaging of the device.
  Please note it is ESSENTIAL to ensure urine specimen containers are filled to the correct volume as indicated by the black lines on the SCD. Over- or under-filled SCD will not be processed in line with manufacturer recommendations as it may impact on the sensitivity of the test.

Investigation	Sample Required SW=swab Respiratory=SP(sputum),NPA (nasopharyngeal aspirate),BAL(broncho-alveolar lavage) SCD=self-collection device
Adenovirus	Serum  Stool Swab Respiratory
Arbovirus screen includes West Nile, Japanese Encephalitis, Yellow Fever, Tick- borne Encephalitis and Dengue Viruses	Clotted blood/serum,  CSF
Astroviruses	Stool
BK polyomavirus	Clotted blood/serum,  Urine
Bocavirus	Respiratory
Borrelia burgdorferi/ Lyme's Disease If investigation of CSF for B. burgdorferi is required a contemporaneous serum sample MUST also be collected, CSF samples without a contemporaneous serum cannot be processed	Clotted blood sample (1-10ml)  CSF
Chikungunya virus	Clotted blood sample (1-10ml) 
Chlamydia pneumoniae	Lower respiratory tract
Chlamydia trachomatis	Aptima SCD
Crimean Congo Haemorrhagic Fever Virus ON REQUEST)	EDTA whole blood/plasma  Clotted blood/serum 
CMV (Cytomegalovirus) – Serology	Clotted blood sample (1-10ml) 
CMV (Cytomegalovirus) – Molecular	CSF CSF testing for CMV DNA should only be performed in parallel with serology and DNA testing in blood (EDTA sample) BAL Plasma/EDTA  Urine Post mortem Stool (CMV PCR – Request from Microbiology Consultant)

Coronavirus (SARS CoV)	Resp BAL NPA Post Mortem tissue
Dengue Fever	Clotted blood sample (1-10ml) 
Enterovirus (including Echovirus, Coxsackie, EV71 EV D68)	CSF Stool Swab
EBV (Epstein-Barr Virus) - Serology (Infectious mononucleosis)	Clotted blood sample (1-10ml) 
EBV (Epstein-Barr Virus) – Molecular (Infectious mononucleosis)	EDTA Plasma/whole blood  CSF CSF testing for EBV DNA should only be performed in parallel with serology and DNA testing in blood (EDTA sample)
EBV (Epstein-Barr Virus) – Viral Load (Infectious mononucleosis)	Fresh EDTA 5mL 
Filovirus (Ebola, Marburg) On REQUEST	EDTA whole blood Serum/plasma 
Flavivirus Screen includes West Nile, Japanese Encephalitis, Yellow Fever, Tick- borne Encephalitis and Dengue Viruses	whole blood 
Hantavirus (ON REQUEST)	Clotted blood sample/serum (1-10ml) 
Hepatitis A	Clotted blood sample/serum (1-10ml)  EDTA/plasma 
Hepatitis B – Surface Antigen	Clotted blood sample (1-10ml)  EDTA 

Hepatitis B – PCR/Genotype/Viral Load	EDTA 
Hepatitis B – AUSAB/ Immunity Titres	Clotted blood sample (1-10ml)  EDTA  Sodium Heparin  Sodium Citrate 
Hepatitis C: Active Antibodies PCR/Genotype Viral Load	Clotted blood sample (1-10ml)  EDTA 
Hepatitis D	Clotted blood sample (1-10ml) 
Hepatitis E	Clotted blood sample (1-10ml) 
HHV 6 (Roseola Virus) – Serology (available but not routinely performed)	Clotted blood sample (1-10ml) 
HHV 6 (Roseola Virus) - Molecular	Clotted blood/serum CSF 
HIV 1&2 (serology)	Clotted blood sample (1-10ml) 
HIV 1&2 PCR (Molecular)	Plasma (whole blood) EDTA 
HIV 1&2 Viral load/Titre/Resistance	EDTA  ACE Specimen
HSV 1&2 (Herpes Simplex Virus) - Serology	Clotted blood sample (1-10ml) 
HSV 1&2 (Herpes Simplex Virus) - Molecular	CSF Swabs BAL

	EDTA 
Human Metapneumovirus	Respiratory NPA
HTVL I, II (Human T-Lymphotropic Virus)	Clotted blood sample (1-10ml) 
HTLV Molecular	EDTA 
Influenza Virus	Respiratory NPA
Japanese Encephalitis Virus	Clotted blood sample (1-10ml) 
JC polyomavirus	Clotted blood sample (1-10ml)  CSF Urine
Lassa virus (ON REQUEST)	Clotted blood sample (1-10ml) 
Leptospirosis (Weil's Disease)	Clotted blood sample (1-10ml) 
Measles Virus - Serology	Clotted blood sample (1-10ml) 
Measles Virus - Molecular	CSF Oral Fluid https://nvrl.ucd.ie/sites/default/files/uploads/pdfs/NVRL_Oral_Fluid_Investigation_Request_Form_LF_UM_001m_7.pdf Urine Viral Throat Swab Buccal swabs
MERS CoV (Coronavirus)	Respiratory
Monkeypox virus (MPXV)	Skin swab, vesicle fluid, throat swab; other samples by arrangement

Mumps – Serology	Clotted blood sample (1-10ml) 
Mumps- Molecular	Oral Fluid https://nvrl.ucd.ie/sites/default/files/uploads/pdfs/LF_UM_001m_rev_8_Oral_Fluid_Investigation_Request_Form.pdf Viral Throat Swab Buccal swabs CSF
Mycoplasma genitalium	Urine, anogenital swab
Mycoplasma pneumoniae	Clotted blood sample (1-10ml)  Respiratory
Neisseria gonorrhoea	Aptima SCD
Norovirus (SRSV) (Winter vomiting Virus)	Stool
Parainfluenzae	Respiratory
Parechovirus	Respiratory Stool CSF Swabs
Parvovirus B19 - Serology	Clotted blood sample (1-10ml) 
Parvovirus B19 - Molecular	EDTA  Amniotic fluid
PJP (*Pneumocystis jirovecii)*	Sputum BAL
Poliovirus (culture)	Stool
Rhinovirus	Viral throat swab Respiratory
RSV (Respiratory Syncytial Virus) - Molecular	Viral throat swab Respiratory

Rotavirus	Stool
Rubella Virus	Clotted blood sample (1-10ml)  Oral fluid
Syphilis (TPHA/ WR Khan/ VDRL/ RPR)	Clotted blood sample (1-10ml) 
Tick borne Encephalitis Virus (TBEV)	Whole Blood
TORCH(S) Screen - (Toxoplasmosis, Rubella, CMV, Herpes Simplex, HIV,(Syphilis))	Clotted blood sample (1-10ml) 
Toxoplasma gondii	Clotted blood sample (1-10ml) 
Toxoplasma gondii – Molecular	CSF
Trichomonas vaginalis	Aptima SCD
VZV (Varicella Zoster Virus) - Serology	Clotted blood sample (1-10ml) 
VZV (Varicella Zoster Virus) – Molecular	CSF Skin swab Vesicular fluid
Viral Haemorrhagic Fevers (ON REQUEST)	EDTA whole blood 
West Nile Virus (ON REQUEST)	Clotted blood sample (1-10ml)  CSF
Yellow Fever Virus	Clotted blood sample (1-10ml)  CSF
Zika Virus	Clotted blood sample (1-10ml)  CSF

Please refer to links for the laboratory user manuals for the National Virus Reference Laboratory at the following link"
https://nvrl.ucd.ie/usermanual

12.8.2 List of Tests referred to Biomnis Ireland

Please label all samples clearly with the patient's name, DOB or Hospital number, date and time collected and the specimen site.

Samples are dispatched daily Monday-Friday from the microbiology laboratory at **14.15**

Investigation	Sample Required
Allergic Alveolitis Screen	Clotted blood sample (1-10ml) Pigeon droppings Pigeon feathers
ASOT	Clotted blood sample (1-10ml)
Aspergillus Fumigatus antibody titre	Clotted blood sample (1-10ml)
M. Faeni Antibody titre	Clotted blood sample (1-10ml)
Bartonella (serology)	Clotted blood sample (1-10ml)
Legionella (serology)	Clotted blood sample (1-10ml)
Mycology - Nail clippings (culture) - Skin scrapings	Nail Clippings in a sterile universal container
Ova & Parasites	Stool sample

12.8.3 List of Tests referred to the Irish Meningitis and sepsis Reference Laboratory (IMSRL)

- Samples being referred to the IMSRL must be sent using the IMSRL request form and not TUH request form.
- Samples are dispatched to the IMSRL daily Monday–Friday at **09.30am** in order to ensure that samples have reached referral laboratory by 11am
- Ensure specimen and request form are correctly labelled with:
    - Patient's Name (Surname and Forename)
    - Patients Hospital number
    - Patients date of Birth
    - Date of onset of Disease
    - Date and time of collection of sample
    - Gender
    - Address
    - Patient Location (Hospital/ Ward)
    - Consultant/Clinician
    - Signature and bleep of person who has taken the specimen (Clinician/Nurse)
    - Test required/specimen type and clinical details

Investigation	Sample required	Frequency of Test	Turnaround Time
Meningococcal PCR	EDTA blood CSF Minimum sample volume is 0.5ml	Mon-Friday	Positive results are phoned to the Microbiology Laboratory by 5pm on day of receipt of specimen by the IMSRL
Meningococcal Serology†	Clotted blood sample (red top)(at least 0.5 ml)	Mon-Friday	
Pneumococcal PCR	EDTA blood CSF Pleural Fluid Minimum sample volume is 0.5ml	Mon-Friday	Positive results are phoned to the Microbiology Laboratory by 5pm on day of receipt of specimen by the IMSRL
Haemophilus influenzae PCR	EDTA blood CSF Minimum sample volume is 0.5ml	Mon-Friday	Positive results are phoned to the Microbiology Laboratory by 5pm on day of receipt of specimen by the IMSRL
*Group B Streptococcal PCR	EDTA blood CSF Minimum sample volume is 0.5ml	Mon-Friday	Positive results are phoned to the Microbiology Laboratory by 5pm on day of receipt of specimen by the IMSRL
Listeria PCR(by request only)	CSF Minimum sample volume is 0.5ml	Mon-Friday	Positive results are phoned to the Microbiology Laboratory by 5pm on day of receipt of specimen by the IMSRL
Staph aureus (Special Request)	CSF Minimum sample volume is 0.5ml	Mon-Friday	Positive results are phoned to the Microbiology Laboratory by 5pm on day of receipt of specimen by the IMSRL
Group A Streptococcus (Special Request)	CSF Minimum sample volume is 0.5ml	Mon-Friday	Positive results are phoned to the Microbiology Laboratory by 5pm on day of receipt of specimen by the IMSRL
E.coli PCR #	CSF Minimum sample volume is 0.5ml	Mon-Friday	Positive results are phoned to the Microbiology Laboratory by 5pm on day of receipt of specimen by the IMSRL
Listeria monocytogenes §	CSF Minimum sample volume is 0.5ml	Mon-Friday	Positive results are phoned to the Microbiology Laboratory by 5pm on day of receipt of specimen by the IMSRL

† Paired serum specimens (at least 0.5 ml) for serology should be obtained. Blood or serum submitted for PCR will serve as a suitable acute specimen, as will any other blood or serum sample taken within 24 hours of admission. Whether or not an acute specimen was obtained, it is still worthwhile to collect a convalescent specimen, ideally 14 to 21 days after admission to hospital.

*Group B streptococcal PCR is performed if child is < 90 days old. Children > 3 months old/Adults will only be processed following consultation
Only if patient has E. coli bacteraemia or UTI and is < 90 days and has evidence of meningitis, or has galactosaemia
§ If specifically requested. If age >90 days, must include clinical indication for testing on request form

Note: Specimens for referral to the IMSRL for investigation need to be in the Microbiology Laboratory by 9am Monday to Friday for specimens to be processed on day of receipt.

Meningococcal PCR/Pneumococcal PCR/Haemophilus influenzae and Group B Streptococcal PCR- If transportation is delayed, please refrigerate sample at 4°C

For specific details of the IMSRL laboratory please refer to the following link at the Childrens University Hospital website. https://www.cuh.ie/contact
Please find below link to download IMSRL request
https://www.childrenshealthireland.ie/documents/35/IMSRL-Request-Form-Jul-2022.pdf

12.8.4 Lists of Tests referred to the Central Pathology Laboratory, St James's Hospital Dublin

Please label all samples clearly with the patient's name, DOB or Hospital number, date and time collected and the specimen site.
Samples are dispatched to CPL St. James hospital from microbiology laboratory, Tallaght University Hospital at 15.30 Monday-Friday

Investigation	Sample Required	Processing Laboratory
Pneumococcal Antibodies	Clotted blood sample (1-10ml)	Immunology Laboratory, St James's Hospital
Tetanus Antibodies	Clotted blood sample (1-10ml)	Immunology Laboratory, St James's Hospital
Hib	Clotted blood sample (1-10ml)	Immunology Laboratory, St James's Hospital
TB Culture & sensitivity	Blood Ω	Irish Mycobacterial Reference Laboratory, St James's Hospital

Ω Please contact the laboratory for the appropriate blood culture bottles

† All TB positive isolates from the Microbiology Laboratory, Tallaght University Hospital are referred to the Irish Mycobacterial Reference Laboratory for identification and susceptibility testing.

Please refer to links for the laboratory user manuals for the Microbiology Laboratory at St James Hospital at the following link"

http://search.stjames.ie/Labmed/

12.8.5 List of Tests sent to other Referral Laboratories

Please label all samples clearly with the patient's name, DOB or Hospital number, date and time collected and the specimen site.

Test Referred to other Laboratories	Sample Type
Colistin/Colomycin levels	Clotted blood sample (1-10ml) 
Flucytosine Levels Galactomannon Levels/ β-d-Glucan Itraconazole Levels Voriconazole levels	Clotted blood sample (1-10ml) 
Echinococcus (serology) Schistomiasis Toxicariasis	Clotted blood sample (1-10ml) 
Rickettsiae (Weil Felix Test)	Clotted blood sample (1-10ml)  EDTA whole blood 
Brucella	Clotted blood sample (1-10ml) 
Bordetella pertussis antibodies (serology) Bordetella pertussis PCR	Clotted blood sample (1-10ml)  Nasopharyngeal swab or aspirate
β-D-glucan	Clotted blood sample (1-10ml) 
CJD/vCJD	CSF (2-5mls)
Chlamydia Psittacosis (PCR assay)	Respiratory sample; sputum, BAL (200µl), lung biopsy, throat swab
Cystic fibrosis genotype	EDTA (3-5mls)
E.coli 0157 Toxins	Stool

Test Referred to other Laboratories	Sample Type
Endoscopy water	Endoscopy Purge Water
Enterics (Identification & typing) Salmonella/Shigella	Cultured isolate sent from laboratory
Galactomannan	BAL Clotted blood sample (1-10ml) 
Hydrotherapy pool water	Hydropool water
Hydatid serology	Clotted blood sample (1-10ml) 
Listeria Gene detection	Normally sterile site clinical samples CSF
MRSA isolates	Cultured isolate sent from laboratory for typing
Teicoplanin Assay	Clotted blood sample (1-10ml) 
Q Fever	Clotted blood sample (1-10ml) 
Verotoxin E.coli O157	Stool
Whipples Disease (Tropheryma whipelii)	Clotted blood sample (1-10ml)  CSF Body Fluids

* If a patient presents with Viral Haemorrhagic Fever (VHF), medical personnel should seek advice from the Consultant Microbiologist. Patients for whom diagnosis of VHF cannot quickly be excluded should be referred to specialist centres without delay.
Please contact the Microbiology Laboratory for further information on the above tests if required.

12.9 INFECTION CONTROL

There is an Infection Control Committee (ICC) responsible for hospital infection control policy and an Infection Control Team (ICT) responsible for the day-to-day control of hospital infection. The ICT is committed to the provision of quality healthcare to all patients. The ICT will facilitate the effective prevention, detection and control of hospital infection in patients, staff and visitors. There is an infection control manual which describes the objectives and content of the infection control programme and contains all policies and procedures.

13.0 AMENDMENTS
Changes to previous version

Laboratory Medicine Section 1.0 – 5.3

Section No	Change	Initials\Date
Use of guide	**Responsibility** The primary responsibility for follow up action on any laboratory test result rests with the person who requested the test. Prior to requesting a test, the practitioner is responsible for ensuring that a process is in place to ensure that they or another competent team member, is available to receive and act on the result when it becomes available. The requestor is also responsible for giving the laboratory a clear indication if there is exceptional urgency or importance associated with processing a particular sample. The timeframe within which they, or a team member, follows up to seek the test result should take account of their clinical assessment of the need for urgency and the time within which a result is likely to be available.[HSE Guideline 2025]	FOD/HB 10/07/2025
	IVDR paragraph moved from Section 2.0 QMS to Use of guide	FOD 23/07/2025
1.0	Each written test request received by the laboratory shall be considered an agreement. A written request is also required for any add-on tests.	FOD 07/07/2025
2.0	TUH is a publically funded entity so laboratory closure, acquisition or merger is extremely unlikely. In the event that the service moves to another location, or is managed by another authority, the current Laboratory Management team will ensure the ongoing integrity of patients' samples (if applicable) and availability of patients' records.- reworded following audit finding	FOD 08/05/2025
2.0	The laboratory identifies potential risks to patient care in the pre-examination, examination and post-examination processes. These risks are assessed and mitigated to the extent possible. Residual risk is considered a low to medium risk from Laboratory processes provided hospital policies and procedures are adhered to. Information on residual risk to patient care is available from each discipline if required and if appropriate.	FOD 23/07/2025

Near Patient Testing Section 6.0

Section No	Change	Initials\Date
	N/A	

Adult Phlebotomy Service Section 7.0

Section No	Change	Initials\Date

Clinical Chemistry Section 8.0

Section No	Change	Initials\Date
8.2	“Specimens together with the Request Form should be placed inside a plastic biohazard bag and dispatched to the laboratory.” amended to “Specimens, together with the Request Form where appropriate, should be placed inside a plastic biohazard bag and dispatched to the laboratory.”	OC 23/07/2025

Haematology Section 9.0

Blood Transfusion Section 10.0

Section No	Change	Initials\Date
10.	Significant changes to layout and content throughout. Review in full.	MOB 15/07/2025

Cellular Pathology 11.0

Section No	Change	Initials\Date
11.5.1	Added specimen requirement for medical liver biopsies	SD 16/7/25
	Deleted specimen requirement for skin biopsies for glutaric acidaemia	SD 16/7/25
	Added request forms to be completed for molecular studies	SD 16/7/25
11.6.2	Molecular tests are batched and there’s a cut off time	SD 16/7/25
	Added TAT for medical liver biopsy	SD 16/7/25
	Deleted TAT for skin biopsies for glutaric acidaemia	SD 16/7/25
11.7	Table updated	KOH 25/6/25

Microbiology 12.0

Section No	Change	Initials\Date

Appendix 1.0

Section No	Change	Initials\Date
1.2	Check that the Velcro straps on the canister are secured	FOD 23/07/2025

APPENDIX 1

1.0 PNEUMATIC TUBE SYSTEM (PTS)

Brief Operating Instructions are located on laminated cards at each Ward PTS station.
Procedure for operating the pneumatic tube system LM-MP-0009T – in draft.
Refer also to Interim Operational Policy Pneumatic Tube Transfer System 2008 available at:
G:\PTS\PTS Operational Policy master.doc version 2

1.1 SYSTEM OPERATION

Follow the summary operation instructions attached to each PTS station. Codes and Names of Departments on the system can be accessed via the station's keypad and the directory.

Correct usage of the PTS system is essential in order to optimise its performance. Porters when collecting pods, should only collect the 2-3 pods assigned to their particular ward.

1.2 CARRIER DISPATCH

Summary Instruction

13. Place the article correctly in the appropriate container and close the top.
14. **Check that the velcro straps are secured on the canister**
15. Enter the destination station code.
16. Open the station door and \or insert carrier depending on PTS Station type
17. **CHECK AGAIN THAT THE DESTINATION NUMBER IS CORRECT.**
18. Close the door – Green indicator light comes on – The carrier will automatically transfer when the system is ready.

1.3 QUEUING

The central processor continuously monitors the status of each station and will hold the carrier until the line is clear for transfer. When possible, users should batch items to reduce traffic in the system. This will speed up transfer times by reducing the queue length.

1.4 RECEIVING A CARRIER

When a carrier is approaching:

- It is automatically slowed down before entering the station.
- The amber "Carrier Arriving" light comes on.
- An audible alarm sounds.
- The carrier pod on arrival will be deposited in the basket attached to the station.
- The alarm and lights go off.
- The station display indicates **ARRIVAL** and the **SENDER STATION**

THE RECEIVER SHOULD EMPTY THE CARRIER AND IMMEDIATELY RETURN TO SENDER STATION.

PLEASE REDIRECT MIS-ADDRESSED CARRIERS TO THE CORRECT LOCATION.

1.5 SYSTEM FAILURE OR MALFUNCTION

In the event of a system failure or malfunction a code will be displayed on the workstations. The system may purge automatically in which case it will dump the 2 carriers in the system down to stations. These stations will require that those carriers are redirected. In the event of a full malfunction the contact numbers for Technical Services are as follows:

In Hours: 414-2901/2902. Email: technicalservices@tuh.ie

Lunch Time: Phone Security Department on 2100.

Out of Hours: Dial switch '0'

1.6 ADDRESSES OF LABORATORY PTS STATIONS

Clinical Chemistry	001
Haematology	002
Microbiology	003
Blood Transfusion	Use Haematology

1.7 SAMPLES WHICH MUST NOT BE SENT VIA PTS

The following sample types MUST NOT BE SENT via the Pneumatic Tube Transfer System:

DISCIPLINE	SPECIMEN TYPE
Clinical Chemistry	▪ 24 hour urines ▪ CSF ▪ Blood Gas samples
Haematology	▪ Hypercoagulation Screens ▪ Hypocoagulation Screens ▪ Coagulation Inhibitor Levels ▪ Protein C. Levels in Meningococcaemia ▪ HIT Screens ▪ Bone Marrow Samples ▪ Osmotic Fragility Samples ▪ Immunophenotyping
Microbiology	▪ CSF ▪ Blood Culture bottles for TB Culture ▪ Bone Marrow for TB culture ▪ *Bordetella pertussis* pack ▪ Pharmacy Plates ▪ Settle Plates
Cellular Pathology	▪ **No specimens** to be sent by PTS

2.0 Non-compliant IVDR tests, equipment, methods etc to date

Audit in progress.

Discipline	**Tests**	**Comment**
Blood Transfusion	NBS antibody panel use in BioVue Cassettes	Used for exclusion cells only. NBS panel suitable for tube use only.
Clinical Chemistry	Aluminium	In house method/based on standard method
Clinical Chemistry	Copper	In house method/based on standard method
Clinical Chemistry	Zinc	In house method/based on standard method
Clinical Chemistry	Cryoglobilin	In house method/based on standard method
Discipline	**Methods**	**Comment**
Blood Transfusion	Electronic Issue of Red Cells using WinPath Software	Laboratory Information System (WinPath) not CE marked by supplier.
Discipline	**Equipment**	**Comment**
To follow		