Department of Clinical Laboratories
User Handbook

Home to the:

- Golden Jubilee National Hospital
- NHS Scotland Academy
- National Centre for Sustainable Delivery
- Golden Jubilee Research Institute
- Golden Jubilee Conference Hotel

Delivering care through collaboration

Telephone enquiries

Specimen reception	0141 951 5912
Clinical Chemistry	0141 951 5917
Haematology	0141 951 5928
Blood Transfusion	0141 951 5920
Microbiology	0141 951 5931
Frozen sections (on-site)	0141 951 5842
Frozen sections (off-site)	0141 354 9513

Pager Numbers

Clinical Chemistry	0127
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1. Introduction

The department of Clinical Laboratories at the Golden Jubilee National Hospital is a UKAS accredited medical Laboratory (No 9616). It serves to provide a high quality Clinical Laboratory Service and is located on level 2 of the hospital adjacent to the East lifts. The department provides a consultant led service in Clinical Chemistry, Haematology, Blood Transfusion and Microbiology. In addition, there is a small satellite pathology laboratory which is staffed by NHS Greater Glasgow & Clyde to carry out minimal onsite investigations. The majority of pathology samples are received into the laboratory for logging and are sent off site for testing.
To view our Schedule of accreditation please follow the link to the UKAS website – https://www.ukas.com/wp-content/uploads/schedule_uploads/00007/9616-Medical-Single.pdf
Quality is fundamental to the service and our well-trained and experienced staff are committed to providing such a service. As defined in the Departmental Quality Policy, the Department shall comply with standards as assessed by the United Kingdom Accreditation Service and is committed to meeting the needs and requirements of service users by operating a Management System that includes comprehensive internal quality control and external quality assurance to cover the entirety of the Departmental service and test repertoire.

Our aspirations to maintain a high quality service are further reflected in our commitment to:

- Set quality objectives and plans to meet with requirements as defined in the Departmental Quality Policy
- Manage laboratory specimens, to include collection, transport and handling, in such a way that ensures the correct performance of laboratory examination procedures
- The use of examination procedures that will ensure the highest achievable quality for all tests performed
- Reporting results of examination procedures in ways that are timely, confidential, accurate and clinically useful
- The assessment of user satisfaction and complaints, in addition to internal audit and external audit and assurance, in order to ensure continual quality improvement
- The health, safety and welfare of all staff, and all visitors to the Department
- Staff recruitment, training and development, and retention
- The proper procurement and maintenance of equipment and other resources as required for the provision of the service

This Handbook is designed to assist you in using the service, and the Quality Manager welcomes suggestions and comments to ensure that, together, we can provide the best possible service and care for patients.
Your compliance with a few simple rules concerning safety, transport, and specimen and request form identification, all outlined within this Handbook, will greatly help us deliver our aims for the best possible service.

2. User Satisfaction & Complaints Procedure

The department of clinical laboratories is committed to continual quality improvement of the services we provide in meeting the needs and requirements of our users. The laboratory follows a programme of self-inspection where the pre examination, examination, post examination and supporting processes and procedures are continually audited to ensure that they are conducted in a manner which meets the needs and requirements of our users. A Laboratory User Questionnaire is distributed biennially to ensure feedback can be given directly to the Laboratory.
If a user wishes to raise a complaint this could be a verbal or written complaint and will be dealt with in a professional manner. Verbal complaints will be initially dealt with by reception staff if the complainant attends the laboratory reception. If the complaint cannot be, or is difficult to resolve, the member of Laboratory staff will immediately seek the advice of a Senior BMS or the Departmental Quality Manager. In some instances, it may be appropriate, and helpful to the complainant, to refer the issue on to the Head of Laboratories, or most senior duty manager. If a user wishes to make a written complaint, this should be addressed to the Quality Manager or Head of Laboratories if felt appropriate. The Laboratory has a robust system for dealing with all incidents and complaints at the monthly Laboratory Incidents and Performance Meeting and the complainant will receive feedback after it has been discussed and investigated.

3. Arrangements for Visitors & Contact Details

3.1 Arrangements for Visitors

Visitors must report to the main hospital reception and arrangements will be made for any visitors to be escorted to the laboratory by appropriate staff member. All visitors are required to sign in and out at laboratory reception.

3.2 Laboratory staff and contact numbers

Enquiries relating to interpretation of results or clinical advice should be directed to the appropriate Consultant listed below. General enquiries should be directed to the appropriate Senior Biomedical Scientist in the first instance who will refer you to the appropriate Consultant/Physician as required. Any enquiries for Dr Travers in her role as Laboratory Director, or Lynne Ayton, Ric Atalla or Jules Henderson should initially be made through the Head of Laboratories. Any complaints or concerns relating to quality of service should be directed to either the departmental Quality Manager or the Head of Laboratories.

Laboratory Director
Dr Jennifer Travers

Director of Heart, Lung and Diagnostic Services
Lynne Ayton

Deputy Director of Heart, Lung and Diagnostic Services
Ric Atalla

Diagnostics Service Manager
Jules Henderson

Head of Laboratories
Jacqueline Wales 0141 951 5162

Quality & Training Manager
Fiona Holland 0141 951 5930

Clinical Chemistry

Laura Kelly Advanced Senior Biomedical Scientist Ext 5917

For Clinical Advice Mon-Fri 0900-1800hrs 0141 354 9060
QEUH Duty Biochemistry reporting office Option 4

For Clinical Advice Out of Hours
QEUH Switchboard and request duty biochemist on call 0141 201 1100

Haematology/Blood Transfusion

Lindsey McGuire - Advanced Senior BMS Haematology Ext 5928
Elaine Laurie - Advanced Senior BMS Blood Transfusion Ext 5920 or 5836

For Clinical Advice
Contact Haematology SPR covering Glasgow Royal Infirmary GG&C switchboard
via Greater Glasgow and Clyde switchboard in the 1st instance. 0141 211 4000

Microbiology

Anne Marie Roxburgh Advanced Senior Biomedical Scientist Ext 5931

Consultant Microbiologist Dr Sarah Whitehead 0141 951 5773
Consultant Microbiologist Dr Fiona Thorburn 0141 951 5773
Consultant Microbiologist Dr Simon Pybus 0141 951 5773

For Clinical Advice 0900-1700hrs (Mon-Fri):
The above numbers should be tried in the first instance. If unavailable contact Consultant via NHS GJ switchboard. Microbiology laboratory may contacted on 5931.

For Clinical Advice out of hours 1700-0900hrs & weekends:
The on-call Consultant Microbiologist can be contacted via Greater Glasgow and Clyde switchboard on 0141 211 4000 and request Glasgow Royal Infirmary on-call Consultant Microbiologist.

4. Opening Hours of the Laboratory

4.1 Laboratory Reception

The laboratory reception is staffed mainly by support staff during the core hours of Mon-Fri 0730-2000hrs and Sat – Sun 0730-1530hrs. Routine enquiries which do not relate to sample results can be made to laboratory reception (number on front page of this handbook). Out with these hours or for results enquiries contact should be made with the appropriate laboratory section as detailed on front page of this handbook.

4.2 Blood Sciences & Blood Transfusion

The Blood Sciences (Chemistry and Haematology) and Blood Transfusion Laboratory sections are staffed 24/7. Enquiries should be made in the first instance by dialling the appropriate number as detailed above. Out with the hours of 0800-1800hrs Mon-Fri Biomedical Scientists are available on site, however, on the rare occasion that there is no answer please use the appropriate page number above.

4.3 Microbiology

The Microbiology laboratory is staffed 7 days a week 0830-2000hrs. Microbiology enquiries can be made between these hours by contacting the appropriate extension. Out with these hours there is a Biomedical Scientist On-call offsite and can be contacted through switchboard

5. Requests & Sample Collection

5.1 Making a request

Request for laboratory investigations are made by completing the appropriate request form or via the order Comms system. Requests via order Comms can currently be made from all clinical areas with the exception of critical care.

All areas should hold a stock of request forms (these should only be used in the event of an ordercomms failure/downtime) which can be replenished by contacting laboratory reception on Ext 5912. All samples, with exception of order Comms must be accompanied by a request form.

Request forms are colour coded for each laboratory discipline and instructions for completion are included on the form

- Pink form — Blood Transfusion
- Yellow form — Microbiology
- White form (A5) — MRSA
- Blue form — Clinical Chemistry/Haematology/Immunology
- White form (A4) — Histopathology & Cytology
- West of Scotland Specialist Virology Centre request form — Any send-away virology sample

5.2 Requesting additional tests

Routine samples are stored for a maximum of one week for Blood Sciences and Microbiology. Precious microbiology samples e.g. CSF samples are stored at 4°C for 7 days, heart valve tissue is stored at -40°C indefinitely and orthopaedic tissues/fluid are stored at 4°C for a minimum of 21 days post receipt. Additional testing may be possible depending on stability of specimen and test required. Additional test requests onto existing samples held within the laboratory must in general be done within 24 hours of the sample collection time for Haematology and within 4 hours for Coagulation. These times may vary depending on the nature of the test requested and sample type. Contact the relevant discipline for advice on adding tests to existing requests.

5.3 Sample Collection & Labelling

5.3.1 General Rules for Collection

- Explain to the patient that implied patient consent is assumed when the patient presents him/herself to have blood taken including consent to disclose appropriate clinical information which may affect patient care, including medical history, to relevant healthcare professionals
- Check Patient identifiers prior to venepuncture
- Never pre label specimen tubes
- Avoid taking blood from a drip arm
- Avoid prolonged application of the tourniquet both for patient comfort and to avoid haemolysis
- Samples should be filled to the line as marked on the bottle to ensure correct ratio of blood to anti-coagulant (essential for Coagulation tests)
- Following collection, specimen bottles containing anti-coagulants should be inverted several times to ensure adequate mixing.
- Samples must be dispatched to the laboratory as soon as possible after venepuncture.
- All equipment used in the collection of samples e.g. needles, syringes must be disposed of in sharp safe boxes
- The laboratory reserves the right to reject specimen tubes or request forms which are blood soiled

Please refer to the recommended order of draw cards available in clinical areas.

5.3.2 Patient Collected Samples

The only patient collected samples received and processed by the Golden Jubilee Laboratory are 24 hour urine samples which are collected into 2 different containers dependent on request (see table under section 6.3 Chemistry referred tests)

1. Yellow lid – no additives
2. Green lid – contains acid

Users must ensure that they distribute the correct container to patients.

5.3.3 Labelling

The patient must be positively identified by asking name and date of birth and ensure information provided by patient or on wrist band match details on request. Implied consent is assumed as the patient has presented themselves and so the necessary blood samples can be collected.

The following table summarises minimum labelling requirements.

	All samples except transplant donor samples	Transplant donor samples only
Sample	Patient's surname Patient's first name Unique patient identifier **In addition Blood transfusion samples only:** Date of Birth, gender and signature of person taking the sample.	Unique patient identifier Gender
Request form	Patient's surname Patient's first name Unique patient identifier Relevant Clinical details **In addition Blood transfusion samples only:** Date of Birth Gender Signature of person taking sample Name and signature of person completing the request form	Unique patient identifier Gender Ward Consultant Signature of person taking sample

NB. Blood Transfusion operates a zero tolerance policy i.e. all identifiers including signature must be present on both sample and form. Sample tube expiry dates will be checked. Any expired tubes will be rejected and repeat samples requested.

Unlabeled/mislabeled samples will be rejected. Pre-printed patient CHI labels should be used to label samples where available **with the exception of Blood Transfusion specimens which must be hand written and signed by the individual collecting the sample**. It is hospital procedure that all samples are labelled at the patient's bedside and the patient's identity checked before sampling occurs.

The appropriate request form as listed above must be fully completed with the appropriate details, including details of the primary sample taker, and, if it is a Blood Transfusion sample, signed by the practitioner collecting the sample. If there is insufficient clinical information the ward will be contacted and asked to provide details.

Please **do not remove Vacutainer caps** when collecting blood samples: this affects the integrity of the fitting of the cap and is likely to cause leakage of the sample. This results in inconvenience and delay for patients and increases waste as a repeat sample may be required. It also presents a health and safety risk to staff transporting and receiving the samples.

5.3.4 Sample Acceptance & Rejection Criteria

The number of samples rejected will be monitored on a monthly basis to identify trends e.g. identification of a particular clinical area from which unsuitable samples are persistently received.
Sample rejection criteria can be categorised under 2 broad categories:

- Labelling problems
- Sample problems

5.3.4.1 Unlabelled, inadequately or inappropriately labelled samples or forms

Any samples or forms that are received unlabelled, inadequately or inappropriately labelled will not be analysed.
On receipt of unlabelled, inadequately or inappropriately labelled samples reception staff will:

- Clearly mark reason for rejection on the request form
- Number the sample and request form with a laboratory number
- The request will be booked into the Laboratory Information Management System and the reason for rejection added.
- Rejected samples and reason for rejection are recorded on internal incident reporting system – Laboratory Quality Management
- Inform relevant clinical area
- Rejected samples will be disposed of

5.3.4.2 Sample Problems

There are several reasons why a sample may not be suitable for analysis. The following list identifies some of the more common reasons for sample rejection:

- Incorrect sample type for assay
- Sample too old for analysis
- Incorrectly filled sample
- Sample clotted

Please note: A zero tolerance policy exists for all inadequately labeled Blood Transfusion samples.
All request forms for HIV test **MUST** be signed as Regional Virus Laboratory will not process if signature is missing.

5.4 High Risk Specimens

Compliance with the Advisory Committee on Dangerous Pathogens (ACDP) necessitates additional labelling to denote a high risk of infection.
The Approved List of Biological Agents guideline (2013) divides micro-organisms into four hazard groups and identifies high risk patients as these infected (confirmed or suspected) with hazard groups 3 and 4 pathogens.

Samples from patients of known high risk must be marked as such. In the event that samples are received where there is suspicion e.g. based on clinical details, that the samples are high risk and do not contain the appropriate hazard label, the ward must be informed.

Any aliquots from primary samples identified as high risk must also be labelled appropriately.

"DANGER OF INFECTION" labels should be fixed to both samples and request forms for all patients known or suspected as a danger of infection e.g. TB, HIV, Hepatitis B or C

5.5 Sample Processing Categories

Samples are categorized as Routine or Urgent. Urgent requests should be phoned in advance to the Laboratory. The laboratory staff will telephone the ward or requesting Doctor with results that breach action limits, and/or a Lab comment will be added to the result.
Target turnaround times for individual tests are detailed in section 6 within discipline specific tables, these apply to routine tests. Urgent requests will be prioritized and dependent on tests will be available between 30minutes and 60minutes from the receipt of sample. Turnaround times for referral tests are established by referral laboratory and are quoted where available.

5.6 Transporting samples to Laboratory

5.6.1 General

Please notify the lab in advance if sending an urgent sample. Please note that referral laboratories require advance notification of urgent requests by the requester.

The sample must be placed in a sealable transparent plastic specimen bag. The accompanying request form should be placed in the connecting pocket. **Request forms should never be placed in the sealable compartment beside the specimen**.
The samples must be transported to the lab in plastic sample transport boxes (available at nurses' station or porters) or via the air-tube system (if suitable – see 5.7.2). Samples must not be transported by hand in sample bags alone as these do not provide adequate protection against spillage or breakage.
For larger samples, containers may be enclosed in large clear plastic bags tied at the neck. The request form should be placed in a sealable specimen bag and taped to the outside of the container.

The request form, sample container and bag must not become contaminated on the outside. If so it will be returned.

Samples for testing out with GJNH should be sent via the onsite laboratory to ensure packaging is in accordance with all relevant regulatory requirements and to allow tracking of samples and subsequent results.

5.6.2 Air Tube System

In order to use the air tube system the following general rules apply

1. Each station will have a carrier(s) dedicated for **Laboratory use only** which must be identified as such and marked with the home station's number.
2. Under no circumstances should other carriers be used for transportation of specimens.
3. Before despatching a carrier, ensure that the contents are correctly labelled and loaded.
4. The following items must NOT be sent via the Pneumatic Tube System:
    - Blood culture bottles
    - Samples for Blood Gas Analysis
    - All samples for Pathology
    - Samples of Cerebrospinal fluid
    - All fluids from normally sterile sites e.g. pleural, peritoneal or joint fluids and tissues.
    - High-risk specimens.
    - Sputum
    - Urine volumes which exceed 30mls

    Please note – Any issues with the Air Tube System must be reported to the engineering department and not the laboratory.
5. The spillage of contents could have serious consequences for the functioning of the equipment, distribution pipe work and safety of the recipient of the carrier. Spillages of blood or body fluids into the delivery system must be avoided. This should be achieved by the proper packaging of specimens.

5.6.3 External Specimen Transport Arrangement

The hospital transport department receives specimens for GG&C from laboratory reception twice per day Monday to Friday and once a day, in the morning, for Monklands. Specimens for onward referral must reach the laboratory by 9am or 1.30pm for same day transport. Clinically urgent specimens will be transported by taxi or courier if necessary. The hospital transport service is not available at weekends. Please note it is the responsibility of Clinical Staff to make arrangements for the processing of urgent specimens with the referral laboratory before taking samples
All specimens for referral must come through GJNH laboratory to allow for a full audit trail.

5.7 Key factors affecting test performance or result interpretation

Up to 75% of sample errors occur in the pre-analytical phase. Proper patient identification, following hospital policy, and good collection technique are key.

The following table lists some of the common sources of pre-analytical error

Physiological	Collection	Transcription	Storage/ Transport
Patient preparation	Incorrect needle size	Incorrect sample labelling	Delayed delivery
Medication	Incorrect anticoagulant	Incorrect test order	Incorrect transport method
Posture	Draw order	Incorrect bar-coding	Incorrect temperature
Diet	Inadequate mixing	Incorrect computer entry	Leakage
Cyclical changes	Short sample volume		Light
Age	Haemolysis		
Sex	Lipaemia		
Ethnicity	Icterus		
Exercise	Removing Vacutainer lids		
Stress	Incorrect timing		
Smoking	Centrifugation time		
	Freeze/thaw time		

6 Discipline Specific Information

The clinical laboratories within the Golden Jubilee National Hospital offer a wide range of investigations, the majority of which are processed on site. The laboratory refers certain investigations to other laboratories either due to the specialist nature of the test being requested or the cost effectiveness of offering certain tests on site for which there are low numbers of requests.

The laboratory management team continues to monitor workload and will review on an annual basis the test repertoire offered to ensure continued effectiveness of the service provided. The following section provides information on test repertoire and sample requirements on a discipline specific basis including tests referred to other sites

Target turnaround times are also listed were available and users should note that those quoted are based on routine processing and urgent samples should be marked as such and the laboratory informed

Please note for all disciplines - clinical information, as appropriate, is essential for the safe and effective provision of the Laboratory service. Accordingly, service users are instructed to provide appropriate clinical information with all laboratory requests.

6.1 Haematology

6.1.1 Inclusion of Clinical Details on Request form

In order for the department to provide the best possible service, relevant clinical information included on the Request Form is essential to allow staff to accurately assess, interpret and validate laboratory results and to identify the requirement for further testing or additional analyses.

The Haematology department specifically request that clinical details, specifically for Coagulation tests include details of any anti-coagulant therapy that the patient is undergoing allowing laboratory staff to accurately interpret Coagulation results and prevent unnecessary repeat or further testing

Additional test requests onto existing samples held within the laboratory must in general be done within specified times – please contact the Haematology Laboratory for individual add on times. These times may vary depending on the nature of the test requested and sample type.

6.1.2 Key Factors Affecting the Performance of Haematology Analyses

There are many physiological and physical factors (including the effects of anticoagulants, effects of storage, and the effects of delayed analysis) known to affect the collection & handling of blood, and hence, the performance of Haematology Analyses - to detail all such factors is beyond the scope of this Handbook. Where required, specific advice can be sought by contacting the Department. Generally, however, the following factors can be considered as fundamental for all laboratory tests:

- Good quality venepuncture
- Appropriate type of tube for specimen is essential
- Appropriately filled specimen tubes (fill lines indicated on specimen bottles)
- Timely arrival at the Haematology laboratory

6.1.3 Tests performed on site

The department operates a 24-hour shift system; however, users are encouraged to restrict requests for anti-thrombin III, and sickle cell screens to routine hours (some of which are referral tests). Please contact the laboratory if these tests are required out with core hours.

Request (request code)	Sample Requirements	Target Routine TAT	Urgent results available within:
Full Blood Count	Lavender EDTA	2 Hours	30 minutes
Blood Film Examination	Sample from FBC	24 Hours	1 Hour
Coagulation Screen (PT, INR, APTT, APTT Ratio and Thrombin time (TT))**	Light blue top - citrated	2 Hours	30 minutes
International Normalised Ratio (INR – Warfarin dosage)	Light blue top - citrated	2 Hours	30 minutes
Heparin control APTT-APTT Ration	Light blue top - citrated	2 Hours	30 minutes
*Synovial fluid white cell count	Lavender EDTA	2 Hours	30 minutes
Sickle cell screen	Lavender EDTA	2 Hours	30 minutes
*APTA (Actin)	Light blue top - citrated	2 Hours	30 minutes
*Anti-Xa	Light blue top - citrated	2 Hours	30 minutes

* This test is not included in the scope of the Laboratory accreditation

**Please note Clauss Fibrinogen is not routinely performed on request but will be reflex requested when TT > or = 17.5 seconds. The Thrombin time will pick up any low Fibrinogen levels and reflex to the measurement of fibrinogen as described above.

6.1.4 Action Limits and reference ranges

Normal Values for FBC (Sysmex XN-2000)

Test	Male	Female
WBC x 10^9/L	4.0 - 10.0	4.0 – 10.0
RBC x 10^12/L	4.50 - 6.50	3.80 - 5.80
Hgb g/L	130 - 180	115 - 165
HCT L/L	0.400 - 0.540	0.370 - 0.470
MCV fL	83 - 101	83 - 101
MCH Pg	27.0 - 32.0	27.0 - 32.0
MCHC g/L	310 - 360	310 - 360
PLATELETS x 10^9/L	150 - 410	150 - 410
NEUTROPHILS x 10^9/L	2.0 - 7.0	2.0 - 7.0
LYMPHOCYTES x 10^9/L	1.1 - 5.0	1.1 - 5.0
MONOCYTES x 10^9/L	0.2 – 1.0	0.2 – 1.0
EOSINOPHILS x 10^9/L	0.02 - 0.5	0.02 - 0.5
BASOPHILS x 10^9/L	0 - 0.10	0 - 0.10
RETICS x 10^9/L	25 - 100	25 - 100
RDW %	11.5 - 14.5	11.5 - 14.5

Source: GG&C Haematology Dept.
WEF: 1st March 2010

Test	Therapeutic Range for ECMO and VAD
*Anti-Xa	0.3 – 0.5 IU/ml

* This test is not included in the scope of the Laboratory accreditation

Normal values for Coagulation

Test	Reference Range
PT	9.0 - 13.0 seconds
INR	Ratio (target range INR (Disease state dependent))
APTT	27.0 - 36.0 seconds
APTT Ratio Therapeutic range	0.9 – 1.1 Ratio
APTR	0.87 - 1.23 Ratio
TT	11.0 -15.0 seconds
FIBC (QFA)	1.7 - 4.0 g/L
*APTA (Actin)	23.0 - 31.9 Seconds

Normal Ranges Source: Greater Glasgow and Clyde

* This test is not included in the scope of the Laboratory accreditation

The laboratory will telephone or add appropriate Lab comments if any of the action limits below are breached for previously unknown patients. This does not replace the ward's responsibility for checking results.

Action limits for severely abnormal results: Haematology			
Analyte	**Lower action limit**	**Upper action limit**	**Units**
Haemoglobin	<70 Critical Care <80 All other areas	>185	g/l
WBC	<1.5	>30.00	$X10^9/l$
Neutrophils	<1.0		$X10^9/l$
Platelets	<100	>800	$X10^9/l$

Action limits for severely abnormal results: Coagulation			
Analyte	**Lower action limit**	**Upper action limit**	**Units**
Patients not on anti-coagulants			
PT		>18	seconds
APTT		>50	seconds
Fibrinogen	<1.0		g/l
Patients on anti-coagulants (please specify anti-coagulant)			
INR		>5.0	
APTT Ratio		>7.0	

Tests referred to external laboratories

Request (request code)	Sample Requirements	Reference Range	Target TAT
Coagulation Factor Assays			
Factor II	*Light blue top - citrated	97 - 141 IU/dL	1 Week
Factor V		66 - 167 U/ dL	
Factor VII		67 - 153 IU/ dL	
Factor VIII		58 - 152 IU/ dL	3 Days
Factor IX		81 - 157 IU/ dL	
Factor X		79 - 155 IU/ dL	1 Week
Factor XI		82 - 151 IU/ dL	
Factor XII		59 - 164 U/ dL	
Factor XIII		70 - 140 IU/ dL	4 Weeks
Von willebrands Factor (Vwf) Antigen		51 – 170 IU/ dL	1 Week
Von willebrands Ricof		52 - 172 IU/ dL	

Request (request code)	Sample Requirements	Reference Range	Target TAT
Thrombophilia Screen			
Activated Protein C Resistance	*Light blue top - citrated	Ratio 0.90-1.17	1 Week
Anti-thrombin III		82-123iu/dl	1 Week
Protein C		71 - 146 IU/dL	1 Week
Protein S		Male - 75 - 148 IU/dL Female - 65 - 137 IU/dL	
Lupus anti-coagulant		NA	1 Week
Prothrombin Gene 20210A		NA	3 Weeks
Factor V Leiden		NA	4 Weeks
D Dimer	Light blue top - citrated	? VTE 0-230ng/ml Other 0-243ng/ml	2 hours
CD Markers	Lavender EDTA	NA	1-3 Days
CD34	Lavender EDTA	NA	1.5 Hours
PNH Screen	Lavender EDTA	NA	1 Day

6.2 Blood Transfusion

The principle function of the Blood Transfusion Department is to supply blood and blood products to the clinical areas in a timely manner appropriate to the clinical situation. In the event of life threatening or potential life threatening blood loss, communication is key and it is imperative that the blood transfusion department is kept informed of patient's condition and blood requirements.

6.2.1 Blood/Blood Components and Products Available

Product	Instructions	General Use	Comments
Cryoprecipitate	Use within 4hrs of Preparation	Replacement of fibrinogen.	Available from stock as 5 unit pools
Fresh Frozen Plasma	Use within 4hrs of removal from blood fridge	Replacement of clotting factors	Available from stock
Platelet Concentrate		Replacement therapy in platelet deficiency/ dysfunctional states	Available from stock
Red Blood Cell Concentrate (RBCC)	Transfusion to be completed within 4 hours of removal from blood fridge	Haemoglobin optimisation	Available from stock

Novoseven, if required, should be discussed with the Haematologist on call.
Other products, including anti thrombin III, immunoglobulin, and coagulation factor concentrate are available by prior arrangement.

"Use of Prothrombin Complex Concentrate for reversal of warfarin Anticoagulation" is available on Sharepoint for guidance on the use of Prothromplex. (CS-LAB-GEN-NOT-44 on the Quality Management system for Laboratory staff)

6.2.2 Sample collection requirements

6.2.2.1 General requirements

Samples can only be taken by trained competent staff that have completed level 1 Safe Transfusion Practice. Sample tubes must be hand written and signed at the bedside with the patient's forename/surname, patient number (CHI), D.O.B, Gender location and date/time of sample. Patient ID labels (CHI) are permitted on request form but not on the sample tube. Patient's identity must always be confirmed verbally where possible. The request form must match the sample and should then be signed by the person taking the sample, also the name and signature of the person completing the request form must be provided.

In line with national recommendations, GJNH operates a zero tolerance policy for accepting Blood Transfusion samples where the above criteria are not met.

6.2.2.2 Special Requirements

Patients for transfusion or potential transfusion of any blood or blood products must have an appropriate special requirements form completed by clinical staff, a copy of which must be forwarded to the Blood Transfusion Department to ensure up to date records. Special requirement forms can be accessed via NHS Golden Jubilee Policies and Guidelines page. In addition, a link to this form is embedded in the Clinical Transfusion Policy.

6.2.2.3 Tests performed on site

Request (request code)	Sample Requirements	Target Routine TAT	Urgent results available within:
Group & Save	6ml Pink EDTA	2 hours	45 minutes
Serological Crossmatch	2x6ml Pink EDTA	2 hours	35 minutes
Electronic Crossmatch	2x6ml Pink EDTA (see 6.2.4 below)	30 minutes	10 minutes
Direct Coombs Test	6ml Pink EDTA	2 hours	45 minutes
Antibody Identification	2x6ml Pink EDTA	4 hours	2 hours
Transfusion Reaction Investigation	6ml Pink EDTA + Lavender EDTA + Blood Cultures		

Please Note - Unknown groups will take up to 50-60minutes to crossmatch blood and 35- 40 if the group is known. Electronic crossmatch is available in 5-10 minutes. Blood held for minimum 24 hours after theatre date. Antibody identification turnaround time may vary dependent on complexity of antibody.

6.2.2.4 Sample Requirements for Serological and Electronic Crossmatch:

To prevent patient identification error, 2 samples are required to be sent that have not been drawn simultaneously. For crossmatch and electronic issue, 1 in-date Group & Save sample plus at least 1 historic blood group on file at the Golden Jubilee. The individual drawing the blood is accountable for patient identification and labelling of the samples.

Patients requiring transfusion – sample is valid for 7 days from date and time of withdrawal.
Patients transfused/pregnant/or been pregnant with the last 3 months – sample is valid for 72 hours from date and time of withdrawal.

6.2.3 Requesting Blood, Blood Products and/or Blood Components

The Golden Jubilee National Hospital uses Electronic Issue (EI) of blood as the routine method of issuing blood, providing the patient's antibody status or transfusion (pregnancy) history meets the BCSH guidelines for "Pre-transfusion compatibility procedures in Blood Transfusion Laboratories". Patients who qualify need to have two confirmed blood groups from 2 separate samples with a current negative antibody screen sample available (See 6.2.2 for detailed sample requirements).
Pre-op blood must be requested in accordance with Maximum Surgical Blood Ordering Schedules (MSBOS). All other requests (verbal or paper) must be authorized by a doctor.

6.2.3.1 Routine Request:

Any request not designated as emergency or urgent is assumed to be routine and will be processed in the course of the routine work schedule. Work requested in this manner will usually take about 2-4 hours to complete.

6.2.3.2 Pre-operative Blood Ordering:

In order to have blood available for the morning theatre schedule, it is essential that the Blood Transfusion Laboratory receive these requests in a timely manner prior to surgery. Blood Transfusion maintains a list of recommended blood orders for common operations MSBOS. These guidelines should be followed unless a patient's clinical situation indicates a modification. Maximum Surgical Blood Ordering Schedule (CS-LAB-GEN-NOT-22).

6.2.3.3 Urgent Request: (Blood is required within 1-2 hours)

Depending on circumstances and workload these will be processed as soon as is possible. Blood Transfusion Biomedical Scientist will advise on blood availability turn-around time.

The Blood Transfusion laboratory should be telephoned in advance of sample receipt or if a sample is already held in the lab, this can be converted to a crossmatch request by telephone with full patient details.

6.2.3.4 Emergency release of Blood

In an emergency, a patient's physician can approve the use of emergency O Rh Negative blood. Three units are available within the Theatre Fridge with up to a further 3 in the main Blood Bank Fridge. In the event of emergency O Neg blood being used blood bank must be informed and a retrospective sample must be sent to blood bank with all patients details attached. On commencement of the transfusion the person administering the unit must complete the whole blue "tear off" section of the compatibility label, with details of DATE, TIME, SIGN & PRINT NAME, and place into boxes supplied by the Hospital Transfusion Laboratory. (Discard the empty bags as clinical waste.) **This is a legal requirement** by The Blood Safety and Quality Regulations 2005. This will ensure that the final fate traceability is adhered to.

6.2.4 Collection of blood, blood products and/or components for Transfusion

Only staff that have been appropriately trained and competency assessed can participate in the collection of blood, blood products and/or components. The Blood Bank collection form CS-LAB-BT-FOR-010 must be used. The Laboratory Information Management system is used at each fridge to log blood in and out of each fridge. Blood removed but not used can only be placed back into the fridge within 30 minutes. The Laboratory Information Management System will highlight any red cell blood that exceeds this time. All other blood components should be returned to BT staff. During downtime, the form CS-LAB-BT-FOR-018 should be used to document blood removal and return but this should not be used routinely.

6.2.5 Traceability of Blood, blood products and blood components

The Blood Safety and Quality Regulations 2005 demand that blood is traced from donor to recipient. On commencement of the transfusion the person administering the unit must complete the whole blue "tear off" section of the compatibility label, with details of DATE, TIME, SIGN & PRINT NAME, and place into boxes supplied by the Hospital Transfusion Laboratory. (Discard the empty bags as clinical waste.) **This is a legal requirement**.

6.2.6 Tests referred to external laboratories

Request (request code)	Sample Requirements	Referral Centre	Target TAT
Heparin Induced Thrombocytopenia (HIT)	1x Blue citrate	GRI	2 days
Un-identified antibody	3 x 6ml pink	SNBTS	7 days
Platelet antibodies	*	SNBTS	2 days

*Please contact the Blood Transfusion Laboratory for further information regarding the above specimen requirements.

- See CS-LAB-BT-EDR-7 HIT Antibody Assay Request form
- See CS-LAB-BT-EDR-23 for sample requirements, Platelet Immunohaematology Request Form
- See CS-LAB-BT-EDR-5 SNBTS User Handbook for detailed information

6.3 Clinical Chemistry

Please refer to the recommended order of draw cards available in clinical areas.

6.3.1 Tests performed on site

Request (request code)	Sample Requirements	Adult Reference Range	Target TAT
Urea & Electrolytes	**Yellow Top SST**		**2 Hours**
Sodium	Minimum volume required 1ml	136-146mmol/L	
Potassium		3.5-5.3mmol/L	
Chloride		95-108mmol/L	
Bicarbonate		22-29mmol/L	
Urea		2.50-7.80mmol/L	
Creatinine		40-130umol/L	
Liver Function Tests	**Yellow Top SST**		**2 Hours**
AST	Minimum volume required 1ml	<40U/L	
ALT		<50U/L	
Gamma GT		<14 days 25-280U/L <1 year 10-155U/L >1 year (Male) <70U/L >1 year (Female) <40U/L	
Total Protein		60-80g/L	
Albumin		35-50g/L	
Bilirubin (Total)		0-20µmol/L	
Alkaline Phosphatase		30-130U/L	
Bone profile	**Yellow Top SST**		**2 Hours**
Calcium	Minimum volume required 1ml	2.20-2.60mmol/L	
Phosphate		0.80-1. 50mmol/L	
Lipid profile inc HDL	**Yellow Top SST**		**2 Hours**
Cholesterol (total)	Minimum volume required 1ml	2.8-5.7mmol/L	
Triglycerides		0.2-2.30mmol/L	
HDL		>1.00mmo/L	
Cholesterol/HDL ratio		0.0-5.0	
Thyroid Function Tests	**Yellow Top SST**		**4 Hours**
TSH	Minimum volume required 1ml	0.35-5.00mU/L	
FT4		9.0-23.0pmol/L	

Urine Chemistry			1 Day
*Urine Amylase	Plain Universal 5mL Aliquot	<600U/L	
Urine Calcium	24hr urine - no preservative	2.5-7.5mmol/24hours	
Urine Creatinine	24hr urine - no preservative	9.0-18.0mmol/24hours	
Urine Osmolality	Plain Universal 5mL Aliquot	50-1200mmol/kg	
Urine Phosphate	24hr urine - no preservative	13-39mmol/24hours	
Urine Potassium	24hr urine - no preservative	25-125mmol/L	
Urine Potassium - Random	Plain Universal 5mL Aliquot	Varies with Diet	
Urine Sodium	24hr urine - no preservative	Varies with Diet	

* This test is not included in the scope of the Laboratory accreditation

Request (request code)	Sample Requirements All tests listed below require minimum volume of 1ml.	Reference Range	Target TAT
Amylase	Yellow Top SST	<100U/L	2 Hours
C Reactive Protein	Yellow Top SST	<10mg/L	2 Hours
Creatine Kinase	Yellow Top SST	Male 40-320U/L Female25-200U/L	2 Hours
Digoxin	Yellow Top SST	0.5 – 2.0 µg/L	2 Hours
Ferritin	Yellow Top SST	10-275µg/L	2hours
Gentamicin	Yellow Top SST	Contact Pharmacy	2 hours
Glucose	Fluoride Oxalate	3.5-6.0mmol/L	2 Hours
Haemoglobin A_1C	Lavender EDTA	Refer to report DCCT 4.0-6.0% New IFCC 20-42mmol/mol	24 hours (Mon-Fri)
Beta HCG*	Yellow Top SST	<5 IU/L	2 Hours
Iron	Yellow Top SST	10-30µmol/L	2 Hours
Lactate**	Fluoride Oxalate	0.6-2.2mmol/L	2 Hours
LDH	Yellow Top SST	80-240 U/L	2 Hours
Magnesium	Yellow Top SST	0.70-1.00mmol/L	2 Hours
Nt-Pro BNP	Lavender EDTA	*** see note below	24 hours (Mon-Fri)
Serum Osmolality	Yellow Top SST	275-295mosmol/kg	2 hours
Serum Folate*	Yellow Top SST 5 mL	3.1 – 20 µg/L	2 hours
Transferrin	Yellow Top SST	2.0-4.0g/L	2 hours
Troponin T	Yellow Top SST	Males 17ng/L Females 9ng/L	2 hours
Vancomycin Continuous infusion	Yellow Top SST	Contact Pharmacy	2 hours (available between 6am and 10pm, requests out with this time require advanced notice)
Vancomycin Pulsed infusion	Yellow Top SST	Contact Pharmacy	
Vancomycin Trough level	Yellow Top SST	Contact Pharmacy	
Vitamin B12*	Yellow Top SST 5 mL	200-900pg/mL	2 hours
Uric Acid	Yellow Top SST	Male 200-430µmol/L Female 140-360µmol/L	2 Hours

* This test is not included in the scope of the Laboratory accreditation

****Collect on ice and send to the laboratory immediately**

*****Nt-ProBNP**

- **If the NT-pro-BNP level is above 2000 ng/L** (236 pmol/L), refer urgently for specialist assessment and echocardiography to be seen within 2 weeks.
- I**f the NT-pro-BNP level is between 400–2000 ng/L** (47–236 pmol/L), refer for specialist assessment and echocardiography to be seen within 6 weeks.
- **If NT-pro-BNP is less than 400 ng/L (47 pmol/L)**, be aware that a diagnosis of heart failure is less likely. Consider discussion with a physician with subspecialty training in heart failure if a clinical suspicion of heart failure persists.

Please note the Chemistry analysers undergo daily, weekly and monthly maintenance which occasionally can lead to delay in analysis. When sending urgent samples please inform the laboratory.

6.3.2 Tests referred to external laboratories

Request (request code)	Sample Requirements and Minimum Volume	Reference Range	Target TAT
Albumin/Creatinine	Plain tube 5 mL EMU	Male <2.5mg/mmol creatinine Female <3.5mg/mmol creatinine	1day
Aldosterone	Yellow Top SST or Heparin 1.5 mL	Adult (supine) 100-400pmol/L Adult (upright) 100 - 800pmol/L	10days
AFP (Tumor marker)	Yellow Top SST or Heparin 1 mL	<6U/mL	1day
Alpha 1 anti-trypsin	Yellow Top SST or Heparin1 mL	1.1-2.1g/L	3 days
Amikacin	Yellow Top SST or Heparin 2 mL	See prescribing protocol	1 day
Ammonia*	Dark Green Lithium Heparin ***Collect on ice and send to the laboratory immediately.** 0.5 mL	Adult 20-50µmol/L	Not stated by referral laboratory.
Amylase urine	Plain Universal 5 mL	<600U/L	1day
Angiotensin Converting Enzyme	Yellow Top SST or Heparin 0.5 mL	<88U/L	1 day
Bence Jones Protein	Plain Universal 2 mL	Qualitative test	7days
CA125 (Tumor marker)	Yellow Top SST 2 mL	<35kU/L pre-menopause <25kU/L post menopause	1day
CA19-9 (Tumor marker)	Yellow Top SST 2 mL	<37kU/L	7days
Carbamazepine	Yellow Top SST or Heparin 1 mL	4.0-12.0mg/L	2 hours
Carcino-embryonic antigen (CEA)		<5µg/L	1day
HCG Tumour Marker		<5U/L	1 day

Request (request code)	Sample Requirements and Minimum Volume	Reference Range	Target TAT
Catecholamines	**24 hour/acid**		**7 days**
Adrenaline	10 mL Aliquot	<230nmol/24hr	
Nor adrenaline		<900nmol/24hr	
Dopamine		<3300nmol/24hr	
Cortisol serum	Yellow Top SST 1 mL	7-9am 240-600nmol/L 9pm-12am 50-290nmol/L	1day
Creatinine Clearance – urine and blood required.	Yellow Top SST (1 ml blood) + 24hr urine - no preservative	Male 90-139ml/min Female 80-125ml/min	1day
CSF Glucose	Fluoride Oxalate 0.5 mL	2.5-4.5mmol/L	1 day
CSF Protein	Plain Universal or fluoride oxalate 0.5 mL	0.10-0.60g/L	1 day
Ciclosporin	**Lavender EDTA**		**1-2days**
>6 months	0.5 mL	120-150µg/L	
1-3months		212-270µg/L	
3-6months		180-210µg/L	
Toxicity		>360 µg/L	
Copper	Heparin 1 mL	Male 10-22µmol/L Female 11-25µmol/L	4days
Chromium	Lavender EDTA 1 mL	<40nmol/L	6days
Ethanol/Alcohol	Fluoride Oxalate 0.5 mL	Reported in mg/dL	1day
FSH	Yellow Top SST/heparin 1 mL	Sex/Age/Cycle related	1day
Haptoglobin	Yellow Top SST 1 mL	0.3-2.0g/L	1 day
Immunoglobulins	Yellow Top SST 5 mL	IgG – 6-16g/L IgA – 0.8-4.0g/L IgM – 0.4-2.4g/L	1day
Lithium	Yellow Top SST 1 mL	0.4-1.0mmol/L (Therapeutic range 12 hours post dose)	1 day
Luteinising hormone	Yellow Top SST 1 mL	Sex/Age/Cycle related	2days
Oestradiol	Yellow Top SST/heparin 1 mL	Sex/Age/Cycle related	1day
Paracetamol	Yellow Top SST/heparin 0.5 mL	Refer to BNF for guidance on toxicity.	1day
Protein electrophoresis	Yellow Top SST 5 mL	Paraprotein quantitation & typing	6days
Phenytoin	Yellow Top SST/heparin 0.5 mL	5.0-20.0mg/L	1day
Progesterone	Yellow Top SST 1 mL	Male<5nmol/L Female Follicular <2nmol/L Luteal 18-72nmol/L Postmenopausal <2nmol/L	1day
Prostate Specific Antigen	Yellow Top SST 2 mL	50-59years <3.0µg/L 60-69years <4.0µg/L >70years <5.0µg/L	1day

Request (request code)	Sample Requirements and Minimum Volume	Reference Range	Target TAT
PTH	Lavender EDTA 1 mL	1.6-7.5pmol/L	1day
Renin concentration	Lavender EDTA 1.5 mL	Adult(supine) <40mIU/L Adult(ambulant)<52 mIU/L	Not specified
Salicylate	Yellow Top SST/heparin 0.5 mL	Intoxication>350mg/L	1day
Sex hormone binding globulin	Yellow Top SST/heparin 1 mL	Male >17yrs 13-70nmol/L Female >12yrs 20-155nmol/L	1day
Selenium blood	Green top/heparin 1 mL	Calculated – interpreted by Consultant Biochemist	4days
Tacrolimus	Lavender EDTA 0.5 mL	5-15µg/L	3 days
Teicoplanin	Yellow Top SST 2 mL	Staph Aureus Pre dose >20 but <60mg/L – Bone joint. Staph Aureus infective endocarditis Pre dose 30-40 but 60mg/L	None available
Testosterone	Yellow Top SST 1 mL	Male 10.0 – 36.0nmol/L Female 1.0 – 3.2nmol/L	1 day
Theophylline	Yellow Top SST 1 mL	10.0-20.0mg/L	1day
Valproic acid	Yellow Top SST 1 mL	50-100mg/L (only useful to detect toxicity or non-compliance) Conversion µmol/l x 0.14 = mg/l	1day
Vitamin B1	Green top 2 mL	275-675ng/gHb	10days
Vitamin D screen	Yellow Top SST 1 mL	<25nmol/L = deficient 25-49nmol/L = borderline >50nmol/L = adequate levels	14days
Zinc (Blood)	Heparin 1 mL	11-18µmol/L	4days
Zinc (Urine)	24h plain UC 10 mL	3.0-21.0µmol/L	10days

6.3.3 Clinical Chemistry Action Limits

The laboratory will telephone all results, falling outside the limits specified below, to the relevant nursing or medical staff on the ward. This does not replace the ward's responsibility for checking results.

Analyte	Lower action limit	Upper action limit	Units
Sodium	<120	>155	mmol/L
Potassium	<3.0	>6.5	mmol/L
Total Bicarbonate	<12		mmol/L
Glucose (adult)	<2.5	>30.0	mmol/L
Adjusted Calcium	<1.8	>3.0	mmol/L
Magnesium	<0.4	>2.0	mmol/L
Phosphate	<0.4		mmol/L
AST		>1000	IU/L
ALT		>1000	IU/L
Amylase (serum)		>200	IU/L
Lactate		>2.2	mmol/L
*Urea		>30	mmol/L
*Creatinine		>400	umol/L
Creatine Kinase		>5000	U/L

6.3.4 Therapeutic Drug Monitoring

The Laboratory recommends that samples for the drugs listed are collected at the following times.

Drug	**Collection Time**
Amikacin Trough Amikacin Peak	Immediately pre dose 1 hour post dose IM or end of infusion
Carbamazepine	Immediately pre dose
Cyclosporine	Immediately pre dose (at least 12 hours post dose)
Digoxin	6 hours post dose or end of infusion
Gentamicin Trough Gentamicin Peak	Immediately pre dose 1 hour post dose IM or end of infusion
Lithium	12 hours post dose (trough)
Methotrexate	According to treatment protocol
Netilmicin Trough Netilmicin Peak	Immediately pre dose 1 hour post dose IM or end of infusion
Paracetamol	4 hours post dose (seek urgent advice if overdose is suspected)
Phenytoin	Immediately pre dose
Salicylate	As required, may need sequential analysis
Theophylline IV Theophylline Oral	1-2 hours from end of infusion 8 hours post dose
Tobramycin Trough Tobramycin Peak	Immediately pre dose 1 hour post dose IM or end of infusion
Valproic Acid	Immediately pre dose
Vancomycin Trough Vancomycin Peak	Immediately pre dose 2 hours post dose IM or end of infusion

Where the drug has been given IV the time should be calculated from the end of the infusion.

6.4 Microbiology

This section of the handbook is an overview of the microbiology diagnostic service at NHS Golden Jubilee and provides guidance for specimen collection for diagnosis of infection. It is not intended to be a complete guide to all situations and advice may be sought from the microbiology consultants or biomedical scientists.

A proportion of our testing is sent to external laboratories. West of Scotland Specialist Virology Centre (WoSSVC) provide the majority of our virology testing. Where specimens are processed by external providers, this is indicated on the Golden Jubilee report. Further details of testing by external laboratories are at the end of this section of the handbook.

6.4.1 Sending specimens to the microbiology laboratory

In addition to labelling with sufficient patient identifiers (outlined in section 5.3.3), microbiology request forms should also include:

- Date and time of sampling
- The following clinical details as applicable:
  1. Suspected diagnosis
  2. Site of sampling; please be as specific as possible
  3. Antimicrobials at time of sampling and to be commenced after sampling
  4. Travel history
  5. Details of any suspected/confirmed pathogen which may present a biohazard to laboratory staff, particularly hazard group 3 pathogens.

Please note: For all microbiology requests, except MRSA screening swabs, please use a separate form for each sample. The reverse of the request form is used as a worksheet; please allow space for lab staff to record findings by sending no more than 4 MRSA samples per request form. Please use one form for MRSA screening swabs and a separate form for other MRSA samples e.g. wound swabs.

All request forms for HIV test must be signed by requestor as Regional Virus Laboratory will not process if signature is missing.

Where multiple samples are sent for the same patient during a procedure, please number the specimen containers and ensure each of these correspond with a numbered form that describes the site taken in clinical information, e.g. in orthopaedic revision surgery, specimens 1-5 should each correspond to a separate form labelled with the exact site of sampling.
Each specimen should be sent in a separate bag with accompanying form.
Wherever possible, samples for microbiology should be taken before antimicrobial therapy is initiated. Antimicrobial exposure may decrease yield from samples and microbiology reports should be interpreted with caution for samples obtained on antimicrobials.
Samples should be delivered to the laboratory without delay. Delays in specimen processing may lead to degradation of the sample, suboptimal yield and bacterial overgrowth. In other hospitals, refrigeration of particular specimen types may be recommended, however in NHS GJ temperature-monitored refrigeration for microbiology specimens is unavailable outside of the laboratory. Given the small geographic footprint of the site, storage of specimens prior to transport is not required. The hospital portering service may be able to assist if necessary. In exceptional circumstances where transport is not available immediately, blood cultures may be stored at room temperature.

Acceptance criteria for specimens in the microbiology laboratory:

- All samples to be labelled with patient identifiers as set out in section 5.3.3
- Sample container lids must be securely tightened and samples must not leak
- Specimens should be received by the lab no more than 3 days from collection
- Precious samples (not easily repeatable, e.g. CSF, tissues, blood cultures) not meeting the above criteria may be processed on discretion of the Consultant Microbiologist with a cautionary comment on the report
- Repeatable specimens not meeting criteria above will be discarded
- Duplicate specimens for bacterial culture of urine, sputum and faeces from the same patient on the same day may be rejected and specimen discarded

Specimens the laboratory will process urgently 24/7:

- Sterile site fluids
- All CSFs
- Bone / Tissues
- Extracted devices and pacing leads

For specimens requiring urgent processing:

1. Telephone the laboratory prior to specimen transport during working hours (08:30 – 20:00) on 0141 951 5931 or outside these hours, the on-call microbiology biomedical scientist via switchboard
2. Include name and contact number on the form for urgent results to be telephoned
3. Mark the specimen form as Urgent
4. Hand-deliver the specimen to the laboratory

For urgent specimens processed by external laboratories, it is expected the clinician discusses their needs with the external laboratory directly AND telephones the GJ microbiology laboratory as above to arrange transport.

6.4.2 Standard procedures for safe collection of microbiological specimens

These procedures concern all clinical staff who collect diagnostic specimens from patients. Staff must always follow aseptic techniques when handling blood, body fluids, excretions, or secretions, even when these have not been specified as infectious.

All staff must be aware of the potential physical and infectious hazards, associated with the collection of samples for microbiological investigation.

Potential Hazards

- Follow all local procedures to protect personal safety, prevent injury and exposure to biological hazards.
- Follow all local procedures to reduce the risk to colleagues who are involved with the handling, transport and laboratory investigation of specimens.

Safety precautions

- Staff collecting specimens must take care to prevent contaminating themselves, their environment, the external surfaces of the specimen containers, or the accompanying test request forms.
- Before collecting specimens, staff should assess any likely exposure to blood and/or other body fluids, non-intact skin or mucous membranes and wear personal protective equipment (PPE) that protects adequately against the risks associated with the procedure. Hand hygiene should always be performed after taking specimens.
- Staff should refer to the relevant infection prevention policy for PPE where exposure to bodily fluids may be anticipated and when collecting specimens from patients with

suspected transmissible diseases. Relevant policy documents are available on the NHS GJ Policies and Guidelines Sharepoint, for example:

- PPE Policy
- Management of a patient with/suspected to have COVID-19
- Respiratory Protective Equipment (RPE) Policy
- Influenza Policy

In addition, specimens should be collected aseptically, without allowing contamination by extraneous and, therefore, irrelevant micro-organisms.

Contaminated specimens can adversely affect the validity of many laboratory results. All waste generated from obtaining a specimen should be disposed of according to the Waste Management Policy available on the NHS GJ Policies and Guidelines Sharepoint.

6.4.3 Tests performed on site

Request / Investigation	Sample Requirements	Reference range	Target TAT
Tissue / fluid / device cultures			
Blood cultures	BACTALERT culture media bottles (pair – aerobic and anaerobic)	Qualitative test	2-3 days
Bronchoalveolar lavage	Sterile 30 mL container Or Sterile 60 mL container Or sterile 350 mL container (found in theatre packs)		2-3 Days
Endotracheal aspirate			2-3 Days
Sputum			2-3 Days
Pleural/pericardial fluid			2-3 Days
Heart valves			2-3 Days
Pacing/device leads			2-3 Days
Tissue sample			2-3 Days
Bone			2-3 Days
Orthopaedic screws/pins			2-3 Days
Joint aspirate			2-3 Days
Pus			2-3 Days
IV catheter tip			2-3 Days
Ascitic fluid			2-3 Days
CSF			2-3 Days
Vitreous humour	Syringe (WITHOUT needle) in sterile container		2-3 Days
Aqueous humour			2-3 Days
Swab cultures			
Throat	TRANSWAB (brand) – black top Amies transport swab with charcoal	Qualitative test	2-3 Days
Mouth			2-3 Days
Eye			2-3 Days
Ear			2-3 Days
Wound			2-3 Days
Ulcer			2-3 Days
Pus			2-3 Days
IV catheter			2-3 Days

High/low vaginal			2-3 Days
Vulval			2-3 Days
Penile			2-3 Days
MRSA/MSSA screen			1-2 Days
VRE / CPE screens (rectal swabs must have visible faecal soiling)			2-3 Days
Viral swabs	Please review WoSSVC user manual		
Urinary tract samples			
Midstream urine	Sterile 30ml red top boric acid container	Qualitative test	1-2 Days
Catheter specimen urine			1-2 Days
Early morning urine for TB culture	150 mL EMU container (phone laboratory)		6-12 weeks (AAFB 2-3 days)
Legionella urinary antigen	Sterile 30ml universal container		1 Day
Faecal samples			
Faeces bacterial gastroenteritis culture	Container with spoon (Blue top)	Qualitative test	2-3 Days
Clostridioides difficile testing	Container with spoon (Blue top) Must be diarrhoeal.	Qualitative test	1 Day
Viral enteric PCR	Please review WOSSVC user manual		

6.4.4 Additional guidance for tissue / fluid / device cultures

Blood cultures

- The request form should clearly state if endocarditis is suspected / travel history / suspicion of a hazard group 3 pathogen.
- It must be made clear on the request form if blood culture bottles have been inoculated with other bodily fluid.
- Blood cultures must be taken with aseptic technique. Contaminated blood cultures can lead to unnecessary treatment and patient harm.
- Please check the blood culture bottles are in date and good condition, i.e. clean, the rubber septum does not bulge and the indicator disc on the base have not changed colour to yellow.
- The sample label must not cover the barcode on the bottle and this barcode must not be removed as it is required by the laboratory.
- A blood culture set is comprised of two bottles – aerobic and anaerobic, which should be inoculated in that order. 10 mL of blood should be inoculated into each bottle, there are fill lines on the side of the bottles. Care should be taken not to introduce air into the anaerobic bottle.
- In patients with suspected sepsis, preferably collect two sets of blood cultures from separate venepuncture sites.
- In patients with suspected endocarditis or fever of unknown origin, preferably collect three sets of blood cultures from separate venepuncture sites.
- In patients with suspected catheter-related bloodstream infection, paired blood cultures should be sent peripherally and from each lumen of the line. Consider sending the line tip as a separate specimen if removal is indicated.
- If clinically appropriate, blood cultures should ideally be collected prior to commencing antimicrobial therapy to optimise yield.

- Insufficient volumes may result in false negatives and a repeat sample will be requested.
- Excessive volumes (>10 mL per bottle) is associated with false positives.
- Bottles are checked by laboratory staff on arrive to ensure the bottles are in good condition and they have not flagged positive. The bottles are then loaded onto an continuously monitored automated analyser.
- A negative report is issued after 48 hours incubation but incubation is continued to 5 days as standard and 21 days in suspected endocarditis.
- Please review the NHS GJ Blood Culture policy for more information.

Bronchoalveolar lavage

- Samples should be sent in a sterile universal container.
- Broncho-alveolar lavage fluid (BAL) is routinely investigated for typical bacterial respiratory pathogens, TB and fungi. Legionella and prolonged fungal cultures are performed on request.
- Gram stains will be reported in real time on the electronic patient record.
- Bacterial culture is undertaken for 48 hours on samples and so a final report with susceptibility testing where indicated may be expected within 2-3 days.
- Please state on the request form if the patient has cystic fibrosis.
- Please state on the request form if any other investigations are required along with a relevant clinical history and discuss with the Consultant Microbiologist if required.
- As part of TB investigation, AAFB and Cepheid GeneXpert TB PCR will be performed provided there is sufficient specimen. The specimen will also be sent to NHSGGC for TB culture.
- Cepheid GeneXpert TB PCR result is reported within 24 hours
- AAFB result should be available within 24-48 hours
- TB culture result should be available within 6-12 weeks
- If urgent processing is required for Cepheid GeneXpert or AAFB please contact the laboratory.

Sputum / endotracheal aspirate

- Sputum and endotracheal aspirates are collected in a sterile container.
- Duplicate specimens sent for the same patient on the same day may be rejected.
- Sputum results are greatly improved following collection of a supervised, deeply coughed specimen.
- The physiotherapist may be useful in obtaining a good quality sputum specimen, or in obtaining induced sputum where the patient is unable to expectorate.
- Sputum bacteriology is often of doubtful value due to inadequate sampling of the lower respiratory tract and inevitable contamination with upper respiratory and mouth flora.
- Gram stains will not be undertaken on sputum samples.
- Bacterial culture is undertaken for 48 hours on samples and so a final report with susceptibility testing where indicated may be expected within 2-3 days.
- Please state on the request form if the patient has cystic fibrosis.
- Please state on the request form if investigation for Legionella, fungal infection or TB is required and if available send additional samples for microbiological investigation.
- Investigation of sputum specimens for TB is not be routinely performed unless suspicion is stated in clinical information.
- For investigation of TB, three early morning samples of deeply coughed sputum collected on separate days before eating, drinking or cleaning teeth should be sent for this investigation.
- If TB is suspected and included in clinical information, AAFB and Cepheid GeneXpert TB PCR will be performed provided there is sufficient specimen. The specimen will also be sent to NHSGGC for TB culture.
- Cepheid GeneXpert TB PCR result is reported within 24 hours

- AAFB result should be available within 24-48 hours
- TB culture result should be available within 6-12 weeks
- If urgent processing is required for Cepheid GeneXpert or AAFB please contact the laboratory.

Pleural/pericardial fluid

- Ensure aseptic technique while taking the sample.
- Send in a sterile container. Please state if TB is suspected and where possible send an additional sample requesting AAFB & TB culture.
- The results of a Gram film will be reported to the electronic patient record and available in real time.

Heart valves

- Heart valves and samples of these should be sent in a plain sterile container with no formalin.
- For small samples a few drops of sterile saline may be added to the specimen container to prevent desiccation.
- Please indicate on the request form if infective endocarditis is suspected and if the causative pathogen is known.
- Any positive Gram stains will be telephoned to the ward and reported in real time on the electronic patient record.
- Initial culture results are reported within 2-3 days but extended enrichment culture is also performed for 14 days.
- Residual sample is frozen and stored indefinitely.

Pacing/device leads

- Device leads should be collected in an aseptic manner into a sterile container.
- Please indicate on the form if infection is suspected and whether there is macroscopic evidence of infection in the device pocket.
- Exercise caution in interpretation of culture results with low virulence skin commensal organisms. These may be pathogens in the context of cardiac devices, however they also commonly contaminate leads during extraction underlining the importance of careful aseptic technique during explantation.
- Initial culture results are reported within 2-3 days but an enrichment culture is also performed for 7 days.

Tissue, bone and orthopaedic screws

- Samples of tissue and bone (usually from theatre) should be obtained using aseptic technique and sent in a plain sterile container with no formalin.
- For small samples a few drops of sterile saline may be added to the specimen container to prevent desiccation.
- Where prosthetic joint infections are suspected a minimum of 5 sites should be sampled.
- Use a separate set of instruments and containers for each site.
- Orthopaedic screws and pins may be sent to the microbiology laboratory where infection is suspected.
- Please do not send metal plates, larger screws or entire prosthetic joints as the laboratory cannot process these.
- Any positive Gram stains will be telephoned to the ward and reported in real time on the electronic patient record.
- Initial culture results are reported within 2-3 days but enrichment culture is also performed for up to 10 days depending on sample type.
- Specimens are stored for a minimum of 4 weeks.

Joint aspirates

- Ensure aseptic technique when collecting the specimen.
- Send in a sterile 30ml container (joint aspirates in blood culture bottles will be accepted as an additional sample).
- Any positive Gram stains will be telephoned to the ward and reported in real time on the electronic patient record.
- The Microbiology laboratory does not examine for crystals in joint aspirates.

Pus

- Samples of pus should be collected using aseptic technique and sent in a plain sterile container.
- Pus itself is preferred to a pus swab, however the latter is accepted if obtaining a specimen of the pus itself is not feasible.
- Any positive Gram stains will be telephoned to the ward and reported in real time on the electronic patient record.
- Initial culture results are reported within 2-3 days but enrichment culture is also performed for up to 10 days depending on sample type.
- Specimens are stored for a minimum of 4 weeks.

IV catheter tips

- Tips from removed intra-vascular lines can be sent for culture.
- Please send with a paired blood culture.
- Use aseptic non touch technique to remove venous catheters and collect the specimen.
- Use sterile scissors to cut the tip at 4-5cm from the end (max 7cm) and collect into a sterile universal container.
- Any sample longer than 7cm is not optimum for culture and render contamination more likely.
- Urinary catheter tips, drain tips, and peripheral cannula tips will not be cultured. Please do not send these.

Ascitic fluid

- Ensure aseptic technique while taking the sample.
- Where possible samples should be sent prior to starting antibiotics.
- Samples should be collected in a sterile universal container, ideally directly from the body site rather than drainage bags. The latter is more likely to represent colonising flora.
- Blood culture bottles can be used but must also be accompanied by a portion of the sample in a sterile container if a cell count is required. Any positive Gram films will be telephoned to the ward.
- Where the diagnosis is unknown it is prudent to consider additional samples e.g. cytology. Where examination is required by laboratory disciplines other than microbiology, a separate specimen container must be sent.

Cerebrospinal fluid

- Use aseptic technique
- When multiple samples are taken, the second and third should be sent to microbiology. For routine microbiology culture 1-3 ml of fluid in a sterile universal container is required.
- This is an urgent specimen so please follow the process outlined above and ensure the laboratory is telephoned prior to transporting the specimen.
- The cell count is considered unreliable when performed >2 hours from time of collection.
- If TB investigation of CSF is required, please send 10 mL of CSF in a sterile universal container. This test is processed by NHSGGC. AAFB results will be reported on the

electronic patient record within 48 hours and TB culture results available in 6-12 weeks.
- Cell counts and Gram film are reported in the electronic patient record and are available in real time. These results will be phoned to the ward.
- Note that xanthochromia, protein and glucose is not performed in the microbiology laboratory and require separate sample containers for other laboratory disciplines. Please discuss with Biochemistry if these tests are required.
- If the patient is immunocompromised, further tests may be discussed with the Consultant microbiologist.

Vitreous / aqueous humour
- Aspirate the relevant chamber using sterile technique and a small syringe
- Sharps must not be sent to the microbiology laboratory.
- Avoid accidental injury during specimen collection. It is the responsibility of the clinician to be satisfied they are competent to collect the specimen safely. Specimens are usually collected by expert practitioners.
- Deposit the syringe without the needle into a sterile 30 mL universal container
- This is an urgent specimen so please follow the process outlined above and ensure the laboratory is telephoned prior to transporting the specimen
- Gram film results will be telephoned to the clinician
- Initial culture results are reported within 2-3 days but enrichment culture is also performed for 10 days.

6.4.5 Additional guidance for swab cultures

All swabs for culture should be sent using a plain swab in Amies charcoal transport media (available as the branded TRANSWAB).

Throat swabs
- Use a tongue depressor to visualise the back of the throat.
- Vigorously swab the tonsillar areas, posterior pharynx and areas of inflammation, exudation, ulceration or membrane formation.
- To prevent contamination, avoid touching any anterior parts of the oral cavity, tongue and uvula.
- If a viral infection is suspected please contact WoSSVC.
- It must be clearly stated on the request form if the specimen is part of an MRSA screen.
- Any recent travel history must be included on the request form.

Mouth swabs
- Patients should not eat/drink/brush teeth/use mouth disinfectant rinses within the 2 hours prior to swabbing.
- Swab any lesions or inflamed areas. Samples of denture fitting surfaces should also be swabbed as these are more sensitive sites than the palatal mucosa to recover Candida species. The use of a tongue depressor or spatula may be helpful.

Eye swabs
- Conjunctival discharge or pus is should be swabbed if present.
- Gently pull the lower lid down or gently part the eyelids and role the swab over the conjunctival sac inside the lower lid.
- If possible, swabs should be taken before administration of topical or systemic antibiotics.
- Please contact the laboratory if you require culture of corneal scrapings.

Ear swabs

- No antibiotics or other therapeutic agents should have been in the aural region for about three hours prior to sampling the area as this may inhibit the growth of organisms.
- Swabs should only be collected under direct visualisation to avoid damage to the tympanic membrane.
- If there is purulent discharge this should be swabbed.

Wound / ulcer / pus swabs

- Sample the wound at the base or advancing margin of the lesion and if an abscess is present, sample material from the wall of the abscess.
- **Pus is preferred** if available, collect in a sterile container. Refer to guidance around collection and laboratory processes on pus.
- Gram stains are not routinely carried out on swab specimens. Wound swabs are processed for aerobic and anaerobic organisms. Where possible, samples should be sent before starting antibiotics.
- Wound swabs should be interpreted in the context of other clinical information such as clinical examination, biochemical markers and concurrent antibiotic therapy. Organisms identified on wound swab may not be represent true causative organisms involved at deeper sites.
- It must be clearly stated on the request form if the specimen is part of MRSA / VRE / CPE screening.

IV Catheter swabs

- Swabs may be taken of the inflamed area / exudate / pus around the catheter insertion sites of peripheral venous cannulae and central venous catheters.
- Strict asepsis must be observed when sampling insertion sites with indwelling vascular access devices.
- Paired line and peripheral blood cultures are the initial investigation of choice for suspected catheter-related bloodstream infection and it should be noted that swabs of IV catheters may sample colonising skin flora rather than an infecting organism.
- It must be clearly stated on the request form if the specimen is part of MRSA / VRE / CPE screening.

Genital tract swabs

- High vaginal swab is the preferred specimen type for investigation of vulvovaginitis and should be taken with the aid of a speculum to avoid contamination.
- Endocervical swabs may be taken with use of a speculum.
- Vulval swabs should be obtained from inflamed areas and ulceration.
- Urethral swabs should be taken with a special small diameter urethral swab inserted 1-2cm into the urethra and rotated several times. These swabs may also be sent in Amies transport medium.
- Penile swabs for investigation of balanitis should be obtained swabbing inflamed areas
- If chlamydial or viral infection is suspected, contact the WoSSVC. Bacterial culture alone is suboptimal for diagnosis of sexually transmitted infections and different swabs are required by WoSSVC for PCR depending on the target pathogen. The clinician should ensure appropriate swab types are used for sampling.

MRSA/MSSA screens

- Sites for swabbing include Nasal and Perineum (Throat if the patient declines Perineum), as well as wounds, swabs of invasive device sites (e.g. CVC, PICC, chest drains). Sputum specimens should mention MRSA screening in clinical details if this is the target pathogen.

- Plain swabs should be sent charcoal Amies (one swab for both nares and separate swab for perineum and any other sites as required).
- Please refer to the NHS GJ MRSA policy for sampling and collection advice.

VRE and CPE screening

- For VRE and CPE screening, rectal swabs should be sent in charcoal Amies and must have visible faecal soiling at collection.
- A rectal swab is taken by gently inserting a swab inside the rectum 3-4 cm beyond the anal sphincter and rotating gently, it may be moistened with sterile saline.
- The rectal swab must be visibly soiled with faeces.
- Stool specimens may be sent as an alternate if patient declines or not feasible to obtain a swab.
- Additional screening sites and screening frequency is detailed by the NHS GJ VRE policy and NHS GJ CPE policy. Additional advice may be obtained from the Infection Prevention and Control Team if required.

6.4.6 Additional guidance for urinary tract and faecal samples

Midstream urine

- Instructions for patients- Wash your hands and genital area, pass some urine into the toilet, then without stopping the flow of urine, catch your urine in the sterile large yellow /blue collection container provided. Finish passing the rest of your urine into the toilet.
- Fill a sterile primary urine container containing boric acid (red cap) to the fill line.
- If insufficient sample (<5 mL) is received for processing, the specimen will be rejected.

Catheter specimen urine

- CSU should only be sent for culture where there is a clinical suspicion of urinary tract infection. Result should be interpreted with caution as bacteruria is expected in the presence of an indwelling catheter. Antibiotic susceptibilities are not routinely issued but are available from the Consultant microbiologist.
- Nephrostomy urine specimens must be clearly labelled as such.
- For catheter specimens, the sample is best taken immediately after the catheter has been inserted
- If the catheter has been in situ for a while the specimen should ideally be taken from the tube of the catheter with a syringe and needle, not from the catheter bag
- Aspirate the urine via a 21-gauge needle and syringe from the rubberised section of tubing connecting the catheter to the bag. Do not collect urine from the tap outlet to the bag. Please note a positive urinalysis does not indicate infection in catheterised patients.
- Fill a sterile primary urine container containing boric acid (red cap) to the fill line.
- If insufficient sample (<5 mL) is received for processing, the specimen will be rejected.

Early morning sample of urine/EMU for TB:

- Take first thing in the morning by completely emptying the bladder into special EMU containers (150 ml) – contact the laboratory to obtain.
- Take samples on three consecutive mornings
- These specimens are processed by NHSGGC, AAFB results will be available on electronic patient record within 48-72 hours and TB culture results within 6-12 weeks.

Urinary Legionella antigen

- If atypical pneumonia is suspected clinically, please discuss investigation with a Consultant microbiologist.
- Urinary Legionella antigen only detects infection with Legionella pneumophila serogroup 1 and a negative result does not exclude the diagnosis.
- Send urine specimen in a 30 mL sterile universal (i.e. not boric acid) and transport immediately to the laboratory.
- A result will be issued in real time on the electronic patient record.

Faeces bacterial gastroenteritis culture and Clostridioides difficile testing

- Any recent foreign travel must be stated on the request form.
- State clearly on request form if part of VRE screen.
- Diarrhoeal outbreaks should be discussed with the Infection Prevention and Control Team.
- Use the blue top stool container with the spoon attached to the inside of the lid to collect samples.
- Please do not contaminate the outside of the container with faeces. Badly contaminated specimens will not be accepted.
- Fresh samples (<2hrs old) are required. Samples should be brought to the laboratory immediately and must not be stored at ambient temperature.
- Specimen may be passed into a clean, dry, disposable bedpan or similar container and transferred into a CE marked leak proof container. The specimen is unsatisfactory if any residual soap, detergent or disinfectant remains in the pan.
- Diarrhoeal stool samples (samples that conform to the shape of the container) are routinely examined for C. difficile but please state if this is clinically suspected.
- Examination for C. difficile is undertaken by initial screening for GDH and if positive, then toxin A/B testing by enzyme immunoassay.
- Clearance testing is strongly discouraged for known C difficile toxin-positive patients and re-testing in cases of suspected relapses/re-infection should not be performed within 28 days of the index positive sample. Persistent positive results may be expected in the weeks following a positive C difficile test despite effective treatment and clinical improvement.
- Faecal samples are cultured selectively for species of Salmonella, Shigella, Campylobacter and for E. coli O157.
- Consider and request faecal parasites if there is a history of foreign travel, HIV infection or if the diarrhoea is chronic. A separate sample container is required for parasite investigation as this is sent to NHSGGC for processing.
- Where stool samples are blood-stained or clinical details raise suspicion of Shiga toxin producing enteropathic E coli (STEC) / haemolytic uraemic syndrome (HUS), the specimen is referred to the Scottish E. coli O157/STEC Reference Laboratory for additional investigations.

6.4.7 Tests referred to external laboratories

Request / Investigation	Sample Requirements	Reference range	Target TAT
West of Scotland Specialist Virology Centre (WoSSVC) West of Scotland Specialist Virology Centre - NHSGGC			
Aspergillus spp/fumigatus PCR	BAL in plain universal / Lavender EDTA	Qualitative test	1-3 days
Bordetella pertussis PCR	Red top MSS		1-3 days
BK polyomavirus PCR	Urine in plain universal / Lavender EDTA		1-3 days
Chlamydia / gonorrhoea PCR	Abbott multi-collect swabs (orange top)		7 days
Cytomegalovirus (CMV) / Epstein Barr Virus (EBV) serology / PCR	Lavender EDTA		1-4 days
Enteric viral PCR, including norovirus	Blue top stool container with spoon		1-3 days
Enterovirus PCR	CSF in plain universal / Blue top stool container with spoon / throat swab red top MSS		1-7 days
Helicobacter pylori serology	Yellow Top SST		5 days
Hepatitis A serology/PCR	Lavender EDTA / Blue top stool container with spoon		1-3 days
Hepatitis B surface antigen	Lavender EDTA		1-3 days
Hepatitis B surface antigen quantification	Lavender EDTA		1-3 days
Hepatitis B core antibody	Lavender EDTA		1-4 days
Hepatitis B surface antibody	Lavender EDTA		1-3 days
Hepatitis B DNA viral load	Lavender EDTA		3-7 days
Hepatitis C serology	Lavender EDTA		1-3 days
Hepatitis D antibody/PCR	Lavendar EDTA		10 days
Hepatitis E antibody/PCR	Lavendar EDTA / blue top stool container with spoon		3-10 days
Herpes Simplex (HSV) / Varicella Zoster (VZV) PCR	Red top MSS / Plain universal for CSF / Lavender EDTA		1-3 days
Human Herpes Virus 6/7 (HHV-6/7)	Plain universal for CSF		1-3 days
HIV Antibody Screen	Lavender EDTA		1-2 days
HTLV I&II	Yellow Top SST		1-3 days
QuantiFERON-TB Gold Plus	Quantiferon tube		5 days
Measles immunity IgG	Lavender EDTA		1-3 days
Mycoplasma pneumonia	BAL or sputum in plain universal / red top MSS		1-3 days
Parvovirus B19 serology/PCR	Lavender EDTA		3 days

Pneumocystis jirovecii PCR	BAL / induced sputum in plain universal		1-3 days
Syphilis serology	Lavender EDTA		1-3 days
Toxoplasma serology	Lavender EDTA		1-3 days
Varicella Zoster Virus (VZV) antibody / PCR	Yellow Top SST / Plain universal for CSF / Lavender EDTA		1-4 days
Viral respiratory PCR	BAL or sputum in plain universal / Red top MSS		1-3 days

Virology cover is provided by the West of Scotland Specialist Virology Centre (WoSSVC). This is located at The New Lister Building Glasgow Royal Infirmary. Samples are forwarded via Laboratory reception twice daily Monday to Friday.

Send all swabs, except for Chlamydia, in red top MSS (viral PCR sample transport solution). This is available from Microbiology (Ext 5931).

In order to ensure effective use of this service:

- Please request specific testing for viruses. Do not request 'viral screen' as this does not indicate whether you are testing for immunity or infection.
- Please refer to WoSSVC User Manual for further detail on any of their tests, including appropriate specimen collection.
- Provide clinical and patient details on sample and request form. Requests with unlabelled samples and/or insufficient clinical details will not be tested.
- Provide date of onset. This is critical in selecting tests and interpreting results.

Virology Contact numbers

During routine service hours: 0141 201 8722
On-call Virologist via GRI switchboard: 0141 211 4000

Urgent requests must be discussed with WoSSVC in advance.
Transport for urgent specimens must be arranged with the laboratory.

Limited tests are available outside normal working hours. This is restricted to testing of transplant patients, acute dialysis patients, significant needle stick injuries and respiratory virus outbreaks in clinically important situations. However, if there is an individual clinical problem for which Virology testing would change the management of an ill patient, the Virologist on-call can be contacted via Glasgow Royal Infirmary switchboard on 0141 211 4000.

Request / Investigation (Sample type)	Sample Requirements	Reference range	Target TAT
The Diagnostic and Reference Parasitology Service (DRPS), Glasgow Royal Infirmary Diagnostic and Reference Parasitology Service - NHSGGC			
Enteric parasites (Faeces)	Blue top stool container with spoon	Qualitative test	10 Days
Bacterial Respiratory Infections Service (BRIS), Glasgow Royal Infirmary Bacterial Respiratory Infections Service - NHSGGC			
Legionella culture / PCR (Sputum, ETA, BAL)	Sterile 60ml universal container	Qualitative test	5-10 days

Scottish E. coli O157/STEC Reference Laboratory (SERL), Royal Infirmary of Edinburgh Scottish E. coli O157/STEC Reference Laboratory | Edinburgh and Lothians Laboratory Medicine			
Shiga Toxin-producing Enteropathogenic E coli (STEC) (Faeces)	Blue top stool container with spoon	Qualitative test	3 days
NHSGGC Microbiology Laboratory, Glasgow Royal Infirmary Microbiology and virology - NHSGGC			
Mycology (Nails, hair & skin scrapings)	Sterile 30ml universal container	Qualitative test	3-4 weeks
NHSGGC Microbiology Laboratory, Queen Elizabeth University Hospital Glasgow Microbiology and virology - NHSGGC			
TB Culture (sputum/trach asp/BAL, urine, sterile fluids)	Sterile container appropriate to type of sample	Qualitative test	6-12 weeks
NHSGGC Biochemistry Laboratory (Glasgow Royal Infirmary) North Glasgow Biochemistry - NHSGGC			
Procalcitonin (blood – specimen stable for maximum of 8 hours)	Yellow top SST	Not defined	1-2 days
NHSGGC Cytology Laboratory (Queen Elizabeth University Hospital Glasgow) Diagnostic Cytology - NHSGGC			
Uric acid crystals Joint fluid	Sterile 30ml universal container	Qualitative test	7-10 days
NHS Blood and Transplant Microbiology Services Laboratory, London MSL Virology - Hospitals and Science - NHSBT			
Human Herpes Virus 8 (HHV-8) – related to donor-derived infection only	Lavendar top EDTA	Qualitative test	20 days
UKHSA Microbiology Services Rare and Imported Pathogens Laboratory Porton Down, Salisbury Rare and imported pathogens laboratory (RIPL) - GOV.UK (www.gov.uk)			
Coxiella burnetti (blood) *Bartonella* (blood)	Yellow top SST	Qualitative test	2-3weeks
Leptospira	Yellow top SST		2-3weeks
UKHSA Colindale Bacteriology Reference Department (AMRHAI) London			
***Consultant Microbiologist request only:** 16S bacterial PCR identification e.g. heart valves or orthopaedic tissue. Tissue/fluid	Sterile container appropriate to type of sample	Qualitative test	10-15days
UKHSA South West Laboratory Mycology Reference Laboratory, Bristol			
***Consultant Microbiologist request only:** 18S fungal PCR identification e.g. heart valves or orthopaedic tissue. Tissue/fluid	Sterile container appropriate to type of sample	Qualitative test	10-15days
Beta 1-3, D-glucan antigen Serum (within 48hrs of collection)	Yellow top SST		1 day from receipt.
Histoplasma Serum/clotted blood	Yellow top SST		2-3 weeks

Galactomannan levels (Aspergillus antigen) Serum/clotted blood	Yellow top SST		7-10days
Mycology antifungal levels Eg. Fluconazole, Itraconazole Whole blood	Red top clotted blood	Qualitative test	2-3weeks
Scottish Toxoplasma Reference Laboratory (STRL) **Microbiology Department, Raigmore Hospital, Inverness** Scottish Toxoplasma Reference Laboratory User Manual			
Toxoplasma antibodies Serum/clotted blood	Yellow top SST	Qualitative test	2-3weeks
Scottish Lyme Disease and Tick-borne Infections Reference Laboratory SLDTRL **Microbiology Department, Raigmore Hospital, Inverness** Lyme disease and tick-borne infections | NHS Highland			
Borrelia (Lymes) Serum/clotted blood	Yellow top SST	Qualitative test	2-3weeks

***There are a wide variety of reflex tests that ONLY the Consultant Microbiologist may order, depending on the results of other tests carried out, in order to provide a full investigation of clinical symptoms.**

6.5 Pathology

6.5.1 Histopathology

Histopathology cover is provided by NHS Greater Glasgow & Clyde Laboratory Services (unless otherwise stated on the specimen request form) located on Level 3 of the Laboratory Medicine building at the Queen Elizabeth University Hospital (QEUH) as part of an SLA. If the destination hospital is for any other Health Board in Scotland it must be clearly indicated on the form or these samples will be sent to QEUH.

Samples must be delivered to the Golden Jubilee Laboratory reception for onward dispatch and accompanied by the appropriate pathology request form. A description of each sample and full relevant clinical information must be written on the request form. The address must also be supplied in addition to the normal GJNH identifiers. Samples in general should be placed in 10% buffered formalin (4% formaldehyde). Please note that this substance is harmful; avoid skin contact. Please ensure that all samples are identified as harmful, by using the formalin containers supplied or manually fill a suitable empty container supplied with formalin and affix the supplied 'harmful' labels. Please record the site where each sample was taken from on the request form and sample. Some samples may require immediate transportation to the QEUH without pre-fixation in formalin. Please check requirements with the referral laboratory.

Danger of Infection stickers should be reserved for samples that are clinically suggestive of high risk infection. These are not required when samples are to exclude a diagnosis of TB along with multiple other conditions.

6.5.2 Cytology

Cytology cover is provided by the Cytology Department at NHS Greater Glasgow & Clyde Laboratory Services located on Level 3 of the Laboratory Medicine building at the Queen Elizabeth University Hospital (QEUH) as part of an SLA.

Each sample must be requested on the form supplied by Greater Glasgow and Clyde and sent to the Laboratory immediately for forwarding to QEUH. Fine Needle Aspiration requirements should be discussed with the Cytologist on duty

6.5.3 Contact Numbers:

Name	Telephone
Histopathology Secretary	0141 354 9476
Histopathology Laboratory	0141 354 9513
Golden Jubilee Frozen Section Lab	0141 951 5842
Cytology Laboratory Reception	0141 354 9524/9502

Please Note: For all histopathology and cytology it is vital that all relevant clinical information is included on the request form.

6.5.4 Availability of Service

The referral laboratories for Histopathology & Cytology are open Monday-Friday 9am-5pm. Samples are dispatch twice daily from Golden Jubilee Laboratories during these periods.
Urgent requests should be received in the lab by 3.00 p.m. Monday to Friday and by 9.30 a.m. on Saturdays and Public Holidays. The laboratory at GJNH should be given prior notice of all urgent requests.

6.6 Referral Samples

Samples assayed in referral laboratories are dispatched daily, Monday to Friday. These include samples for Cytology, Histopathology, MTB culture, some Haematology and Clinical Chemistry requests, Virology tests and other tests ordered infrequently. Referred samples will be subject to the reporting guidelines of the reference laboratory used.
The turn-around time varies according to test and day of request. Some tests may be analysed infrequently and usually take several days, sometimes weeks to be reported. **Results will be available on the relevant Clinical Portal/SCI store so please do not telephone the Golden Jubilee Laboratory for results**. On occasion, paper reports may be issued by referral hospitals – if these are received at the Golden Jubilee Laboratory they will be forwarded to the appropriate Consultant through the internal mail system.
Samples are not normally sent out to referral laboratories on Saturday and Sunday but this may be possible, on a limited basis, by prior arrangement and if requested by Consultants.

Please note: it is the requester's responsibility to contact the referral laboratory to arrange urgent, weekend or public holiday requests. For contact details of specific referral laboratories contact Golden Jubilee Laboratory.

7 Uncertainty of Measurement

Certain tests give results as a numerical value. Within this reported value there is an inherent uncertainty, or variability, in the data generated. Data obtained from these tests enable an assessment of this uncertainty of measurement (UoM). Please contact the laboratory for discussion or advice on results if necessary. The laboratory has a policy for uncertainty of measurement and metrological traceability which can be discussed with a member of staff if required.

8. Patient Confidentiality & Protection of Personal Information

8.1 Data Protection & Patient Confidentiality

The Data Protection Act 2018, along with the UK GDPR, defines six principles that need to be complied with when processing personal data, including processing lawfully, fairly, and transparently, keeping data to the original purpose, minimizing data collection, maintaining accuracy, removing unnecessary data, and ensuring confidentiality and integrity.

The laboratory information management system (LIMS) in use at the Golden Jubilee is supplied and supported by Clinisys Diagnostic Intelligence. The department has various procedures in place to ensure safe and effective use of the functions of the whole system. Data protection and patient confidentiality are central to these procedures and all staff have individual login and password for secure access.

8.2 Protection of Personal Information

Clinical Diagnostic records and reports are made available to requesting clinicians with the expectation that they will be stored within the patient's individual clinical record. It is the responsibility of the Hospital Records Department to ensure the safekeeping and proper maintenance of diagnostic records in individual patient's clinical record or in electronic form.

The laboratory has a responsibility to ensure that personal information received, generated and stored within the laboratory in compliance with the organisation's records management policy and the Laboratory Policy for the Retention and Storage of Quality Management Documentation, Records and Specimens as per Royal College of Pathologists guidance.

9. Reporting & Transmission of Results

9.1 Telephoning Results

The laboratory staff will telephone the ward or requesting Doctor with results that breach action limits, or a Lab comment will be added to the result, as detailed in section 6.1.4 (Haematology) and 6.3.3 (Clinical Chemistry), however, these action limits are a guide and decision to telephone relevant clinical area is also based on previous results as well as clinical information (where available). Results should not be assumed to be normal because a phone call has not been received. The laboratory keeps a record of telephoned results and you will be asked to identify yourself for this record.

Reference ranges and interpretative comments are given for some assays. It is not possible to provide age and sex related ranges for all assays and therefore where no reference ranges are provided contact relevant laboratory discipline for advice.

Note: When communicating results received from the Laboratory to other ward staff, please give the result, the unit of measurement, the reference range (if given) and any comments. Always confirm the information by reading back the results.

9.2 Results Transmission

Laboratory results generated in house will be available to view in Clinical Portal or SCI store within target turnaround times indicated in section 6. Urgent results can be made available quicker if the laboratory is notified of urgency.
Referred sample results can be accessed from SCI store or the relevant Clinical Portal

9.3 Amended Report

Amended results may need to be issued under certain circumstances, for example, if a sample labelling error has occurred or if there is doubt around the result due to a Quality Control issue. Any amendment made to a report is fully auditable within the LIMS and, due to the error which has caused the need for an amendment to be made, these will be reported as a non-conformance in the Quality Management System. If the amendment is of critical significance then a DATIX incident may need to be raised.
In the event of a result being amended, this will be explicit on the revised electronic report and if appropriate will be communicated to the relevant clinical area.

10. Equipment Downtime

10.1 Analytical Equipment Downtime

Analytical equipment used in the laboratory, while very reliable, can occasionally fail. Service contracts are in place with all suppliers to minimize disruption. In the event that patient results are delayed this will be communicated to the affected clinical areas if it is anticipated that results will be delayed beyond quoted target turnaround times.

10.2 IT Equipment Downtime

In the event of prolonged IT downtime resulting in failure of electronic transmission of results, the laboratory will instigate downtime procedures and results will either be phoned or hard copies will be available for collection by clinical areas.

11. Change Control

In compliance with ISO15189 – Standards for Medical Laboratories, Quality and Competence, the laboratory must clearly document any changes to policy, process or procedures. In the event that changes are made which have an impact on patient results e.g. change to reference ranges, this will be communicated to all users prior to implementation.