Department of Clinical Laboratories
User Handbook

Home to the:

- Golden Jubilee University 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 Microbiology and Molecular testing of COVID. In addition, there is a small satellite pathology laboratory which is staffed by NHS Greater Glasgow and 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 and 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 and 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 Mrs Lynne Ayton, Mrs Alex McGuire or Mrs Laura Miller 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
Mrs Lynne Ayton

Deputy Director of Heart, Lung and Diagnostic Services
Mrs Alex McGuire

Diagnostics Service Manager
Mrs Laura Miller

Head of Laboratories
Mrs Jacqueline Wales 0141 951 5162

Quality and Training Manager
Mrs Fiona Holland 0141 951 5930

Clinical Chemistry

Mrs Laura Kelly Advanced Senior Biomedical Scientist Ext 5917

For Clinical Advice Mon-Fri 9am-6pm 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

Miss Lindsey McGuire - Advanced Senior BMS Haematology Extension 5928
Mrs Elaine Laurie - Advanced Senior BMS Blood Transfusion Extension 5920 or 5836

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

Microbiology

Mrs Anne Marie Roxburgh Advanced Senior Biomedical Scientist Extension 5931

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

For Clinical Advice 9am-5pm (Mon-Fri):
The above numbers should be tried in the first instance. If unavailable contact Microbiology GJNH extension 5931.

For Clinical Advice out of hours 5pm-9am and 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 Monday-Friday 7.30am-8pm and Saturday-Sunday 7.30am-3.30pm. 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 and 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 8am-6pm 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 8.30am-8pm. Microbiology enquiries can be made between these hours by contacting the appropriate extension. Outwith these hours there is a Biomedical Scientist on call and can be contacted through switchboard

5. Requests and 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 extension 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 and Cytology
• West of Scotland Specialist Virology Centre request form	Any send-away virology sample
• White COVID request form	COVID PCR test

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. When sending Blood Cultures, we request that you do not remove the Barcodes as these are used by the Laboratory. Following collection Blood Culture samples should be delivered to the laboratory immediately.

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 is stored at 4°C for 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 and Labeling

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 BD tube guide and 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 Labeling

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 **In addition Blood transfusion samples only:** Date of Birth Signature of person taking sample Gender	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.

5.3.3 Sample Acceptance and 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

5.3.3.1 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 – Q Pulse
- Inform relevant clinical area
- Rejected samples will be disposed of

5.3.3.2 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 Collection of Blood Cultures

When collecting blood cultures, if using the adaptor and collector set, the aerobic bottle **must** be filled before the anaerobic bottle. Each set consists of 1 aerobic bottle (blue top) and 1 anaerobic bottle (red top). Refer to the instruction leaflet provided with each set of blood cultures (also found in Q-Pulse for lab staff CS-LAB-MIC-EDR-11). Volume required in each bottle is between 4mls and 10mls. The number of sets required is at the discretion of the clinician. The sample label must not cover the removable barcode label on the bottle, as this is required for laboratory use and so **must not be removed**.

5.5 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

5.6 Sample Processing Categories

Samples are categorized as Routine or Urgent. Urgent requests should be phoned in advance to the Laboratory. In order to avoid transcription errors laboratory staff will not phone results to clinical area unless critical limits are breached and only then to inform of the availability of results on electronic system.

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.

5.7 Transporting samples to Laboratory

5.7.1 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 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.

5.7.2 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.

5.7.3 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.

5.8 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 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 and 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 4hours of Preparation	Replacement of fibrinogen.	Available from stock as 5 unit pools
Fresh Frozen Plasma	Use within 4hours 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.

“Blood Transfusion - Use of BeriplexR [4-factor PCC] for reversal of warfarin anticoagulation” is available on Sharepoint for guidance on the use of Beriplex.

(CS-LAB-GEN-NOT-44 on Q-Pulse 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.

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 and 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 and 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 labeling 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.

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** and **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 and 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 BD tube guide and recommended order of draw cards available in clinical areas.

6.3.1Tests performed on site

Request (request code)	Sample Requirements	Adult Reference Range	Target TAT
Urea and Electrolytes	**Yellow Top SST**		**2 Hours**
Sodium	Minimum volume required 1ml	136-146mmol/L	
Potassium		3.5-5.3mmol/L	
Chlorine		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
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.
- **If 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
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
Request (request code)	**Sample Requirements and Minimum Volume**	**Reference Range**	**Target TAT**
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 and 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
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
Request (request code)	**Sample Requirements and Minimum Volume**	**Reference Range**	**Target TAT**
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 COVID-19 Testing performed on site

The Cepheid Xpert® Xpress SARS-CoV-2 Assay performed in the GeneXpert® Dx System is a qualitative *in vitro* diagnostic test designed for the rapid detection of SARS-CoV-2, utilising automated real time polymerase chain reaction PCR (RT-PCR) to detect target RNA sequences. This is used for some same day admit patients (where deemed clinically appropriate) or where clinically urgent for inpatients.

COVID screening test kits are available from the Laboratory - sample type is a throat/nasal swab in viral transport medium. This test is not included in the scope of the Laboratory accreditation. Results of this qualitative test will be reported to SCI store/Clinical Portal.

6.5 Microbiology

6.5.1Tests performed on site

Request (request code)	Sample Requirements	Reference range	Target TAT
Swab cultures			
Cervical	Black swab with transport medium	Qualitative test	2-3 Days
Drain Site (Swab)			2-3 Days
Ear			2-3 Days
Eye			2-3 Days
High Vaginal			2-3 Days
Drain Site (Swab)			2-3 Days
Mouth			2-3 Days
Penile			2-3 Days
Rectal (must be visibly faecal stained)			2-3 Days
Throat			2-3 Days
Ulcer			2-3 Days
Urethral			2-3 Days
Vulval			2-3 Days
Wound			2-3 Days
MRSA			1-2 Days
Culture and Sensitivities			
Body fluid	Sterile 30ml universal container	Qualitative test	2-3 Days
Bronchial aspirate			2-3 Days
CSF			2-3 Days
Drain Tip			2-3 Days
Gastric aspirate			2-3 Days
IV Catheter tip			2-3 Days
Joint fluid			2-3 Days
Line Tip			2-3 Days
Miscellaneous sample			2-3 Days
Pleural fluid			2-3 Days
Pus			2-3 Days
Sputum			2-3 Days
Sternal Fluid			2-3 Days
Tissue sample			2-3 Days
Urine	Sterile 30ml red top boric acid container	Qualitative test	1-2 Days

Request (request code)	Sample Requirements	Reference range	Target TAT
Blood Culture	Preferably, a total volume of at least 40mL (two sets) should be collected. In case of suspected endocarditis and fever of unknown origin, an extra set is required to improve the sensitivity of the test (a total volume of up to 60 mL). 8-10ml of blood into each bottle – A set consists of 1 aerobic blood culture bottle (blue top) (taken first) and 1 anaerobic blood culture bottle (red top)	Qualitative test	5-7 Days 21 days for suspected endocarditis
Faecal analysis			
Faeces culture	Sterile universal with spoon (Blue top)	Qualitative test	2-3 Days
Other			
Clostridium difficile testing – GDH and/or toxin A&B detection	Sterile blue top universal with spoon containing a diarrhoeal sample i.e. a specimen of faeces that conforms to the shape of its container	Qualitative test	1 Day
Legionella urinary antigen	Sterile 30ml universal container	Qualitative test	1 Day

6.5.2 Tests referred to external laboratories

Request (request code)	Sample Requirements	Reference range	Target TAT
Virology Screening (West of Scotland Specialist Virology Centre)			
Bordetella pertussis (PCR)	Respiratory sample	Qualitative test	7-10days
Cytomegalo Virus (CMV)	Yellow Top SST	Qualitative test	7-10days
Epstein Barr Virus (EBV)	Lavender EDTA	Qualitative test	7-10days
Helicobacter pylori	Yellow Top SST	Qualitative test	7-10days
Hepatitis A Antibody	Lavender EDTA	Qualitative test	7-10days
Hepatitis B Antibody	Lavender EDTA	Qualitative test	7-10days
Hepatitis B Screen	Lavender EDTA	Qualitative test	7-10days
Hepatitis B Surface Antigen	Lavender EDTA	Qualitative test	7-10days
Hepatitis B Core Antibody	Lavender EDTA	Qualitative test	7-10days
Hepatitis B Surface Antibody	Lavender EDTA	Qualitative test	7-10days
Hepatitis B DNA Viral load	Lavender EDTA	Qualitative test	7-10days
Request (request code)	**Sample Requirements**	**Reference range**	**Target TAT**
Hepatitis C	Lavender EDTA	Qualitative test	7-10days
Herpes Simplex Virus	Red top plain	Qualitative test	7-10days
HIV Antibody Screen	Lavender EDTA	Qualitative test	7-10days
HTLV I&II	Yellow Top SST	Qualitative test	7-10days
Rubella	Yellow Top SST	Qualitative test	7-10days
SARS-CoV-2/COVID 19	Sputum	Qualitative test	7-10days
Syphilis serology	Lavender EDTA	Qualitative test	7-10days
Varicella Zoster Virus	Yellow Top SST	Qualitative test	7-10days

Virology cover is provided by the West of Scotland Specialist Virology Centre (SVC). 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 VPSS (viral PCR sample solution). This is available from Microbiology (Extension 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.
- 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

Availability of Virology service

9am-5pm	Monday – Friday
9am-12pm	Saturday

Please check SCI store for results.

Urgent requests must be phoned to SVC in advance.

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 (request code)	Sample Requirements	Reference range	Target TAT
Scottish Microbiology Reference Laboratory (Glasgow Royal Infirmary)			
Faecal parasites (microscopy)	Sterile universal with spoon (Blue top)	Qualitative test	10 Days
Urine parasites (microscopy)	Sterile 30ml universal container		7-10 Days
Legionella (Sputum)	Sterile 60ml universal container	Qualitative test	10-14days

Request (request code)	Sample Requirements	Reference range	Target TAT
Microbiology Laboratory (Glasgow Royal Infirmary)			
Mycology (Microscopy and culture)	Nails, hair and skin scrapings in a sterile 30ml universal container	Qualitative test	3-4 weeks
Microbiology Department (Glasgow Queen Elizabeth University Hospital)			
TB Culture	Sterile container appropriate to type of sample	Qualitative test	8-12weeks
Cytology Department (Glasgow Queen Elizabeth University Hospital)			
Uric acid crystals	Joint fluid	Qualitative test	7-10days
Public Health England (Porton Down) Rare and imported pathogens laboratory (RIPL) - GOV.UK (www.gov.uk)			
Coxiella Burnetti (Q Fever)	Yellow top SST	Qualitative test	2-3weeks
Public Health England (Colindale)			
***Consultant Microbiologist request only:** 16S rDNA real time PCR identification e.g. heart valves or orthopaedic tissue.	Tissue/fluid	Qualitative test	10-15days
Bartonella	Yellow top SST	Qualitative test	2-3weeks
Public Health England - Mycology Reference Laboratory Antimicrobial Reference Laboratory | North Bristol NHS Trust (nbt.nhs.uk)			
Beta-D-Glucan	Yellow top SST	Qualitative test	1 day from receipt.
Histoplasma	Yellow top SST	Qualitative test	2-3weeks
Galactomannan levels (Aspergillus antigen)	Yellow top SST	Qualitative test	7-10days
Mycology antifungal levels	Red top	Qualitative test	2-3weeks
Leptospira Reference Unit (Hereford County Hospital) National leptospirosis service - GOV.UK (www.gov.uk)			
Leptospira	Yellow top SST	Qualitative test	2-3weeks
Microbiology Department (Raigmore Hospital) Scottish Toxoplasma Reference Laboratory User Manual			
Borrelia (Lymes)	Yellow top SST	Qualitative test	2-3weeks
Toxoplasma	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.**

6.6 Pathology

6.6.1 Histopathology

Histopathology cover is provided by NHS Greater Glasgow and 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.

6.6.2 Cytology

Cytology cover is provided by the Cytology Department at NHS Greater Glasgow and 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

6.6.3 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.

6.6.4 Availability of Service

The referral laboratories for Histopathology and 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 3pm. Monday to Friday and by 9.30am on Saturdays and Public Holidays. The laboratory at GJNH should be given prior notice of all urgent requests.

6.7 Referral Samples

Samples assayed in referral laboratories are dispatched daily, Monday to Friday. These include samples for Cytology, Histopathology, TB 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 and Protection of Personal Information

8.1 Data Protection and Patient Confidentiality

The Data Protection Act 1998 is based upon eight enforceable principles:

1. Personal data will be obtained and processed fairly and lawfully.
2. Personal data will be held only for specified and lawful purpose and shall not be further. processed in a manner incompatible for those purposes.
3. Personal data will be adequate, relevant, and not excessive in relation to the required purpose.
4. Personal data will be accurate, and where required, up-dated.
5. Personal data will not be retained longer than is necessary.
6. Any individual will be entitled to access any data held in their name.
7. Appropriate measures must be taken to ensure against unauthorised or unlawful processing of data, and against accidental loss or destruction of the data.
8. Personal data will not be transferred to sources out with the EU unless adequate levels of data protection can be assured.

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 and 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 Q-Pulse. 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.