Department of Microbiology

Microbiology Handbook

Date of Issue – 4th February 2019

REVIEW INTERVAL	**Every 2 years**
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LOCATION OF COPIES	**1. iPassport** **2. Pathology web page** **3. Walsall Healthcare Intranet**

Document Review History

Reviewed by:	Grade	Date	Sign	Next Review Date
D Spiller	Head BMS	12/10/10	DS	12/10/11
S Farley	BMS 2	02/08/11	SF	02/08/12
S Farley J Rudge D Spiller Dr SG Jones Dr U Kumara	BMS 2 BMS 2 Head BMS Consultant Microbiologists	06/11/2012	SF	06/11/13
Dr SG Jones Mr S Farley Mrs J Rudge Mrs R Prince Miss S Patel	Consultant Microbiologist Head BMS BMS 2 BMS 2 BMS 2BMS 2 BMS 2 BMS 2	28/04/2015	SF	28/04/2016
Dr. SG Jones	Consultant Microbiologist.	07/03/2017	SGJ	03/2018
Dr SG Jones Dr AJ Plant Mr S Farley Mrs J Rudge Miss S Patel	Consultant Microbiologist Head BMS Senior BMS Senior BMS	04/02/19	SP	02/2021

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1 Amendment procedure

Any amendments to this document must only be made with the prior agreement of the Laboratory Manager and/or the Quality Manager. The Quality Manager will ensure that the details of all amendments are recorded in the amendment record below. When it is necessary to make minor amendments to the document, create a new version of the document on iPassport and make the relevant changes. Record the amendment(s) on the table below and authorise the document stating a minor revision has been made. All amendments must be circulated to all staff. The previous version will be stored on iPassport.

No.	Date	Page No.	Section(s) involved and amendment Details	Authorised By
1	08/03/2019	5	Amended section 2 and link to UKAS accreditation certificate added	SP
2	08/04/2019	40	27 Measles and Mumps IgM is referred to PHE Heartlands	SP
3	08/04/2019	11	14 Information regarding measurement of uncertainty in the lab	SP
4	08/04/2019	12 45	15 Information regarding chain of evidence included 28 Laboratory chain of evidence form included	SP
5	08/04/2019	29	21.3.1 Helicobacter pylori stool Ag is now an in-house test	SP
6	08/04/2019	10	11 clarification on what can be sent via the pneumatic tube system	SP
7	08/04/2019	31	21.5 Clarification CSF samples should be sent to microbiology urgently as microscopy and culture should be done within 2 hours of collection	SP
8	06/06/2019	39	26 clarification of 3 day age limit for fluids	SP
9	02/10/2019	25, 28	21.1, 21.2.1 – clarification of what samples to send for serology testing	SP
10	02/10/2019	29	21.3.1 – update to Legionella Urine Antigen Testing	SP
11	08/10/2019	Var	Tspot change to ref lab and collection requirements. IGRA test removed	J Rudge
12	09/10/2019	Var	H.simplex type specific serology added	J Rudge
13	25/03/2020	39	26 Stools for Norovirus PCR must be sent to the lab within 2 days	S Patel
14	03/04/2020	Var	COVID-19 added	J Rudge
15	01/07/2020	Var	Amendments to COVID-19 testing	S Patel

2 Overview of Services

The Microbiology Department provides a high quality, cost effective service to the Walsall Healthcare NHS Trust, including GP surgeries.

Qualified and experienced medical and technical personnel staff the department.

This guide gives information on how to use the Clinical Microbiology Department, a separate guide is provided on the rational use of Antimicrobials; see also the Trust Infection Control Policies. It is important that all medical and nursing staff familiarise themselves with these guidelines, to optimise use of these services.

The department is subject to external accreditation by UKAS (United Kingdom accreditation service) to ISO15189 – accreditation number is 9101

Our accreditation is limited to those activities described on our UKAS schedule of accreditation, found here https://www.ukas.com/wp-content/uploads/schedule_uploads/00007/9101%20Medical%20Multiple.pdf. Tests not appearing in the schedule are Not UKAS accredited. These tests however, are performed by the same trained and competent staff.

The laboratory is recognised for training by the Institute of Biomedical Sciences.

All work is performed with due care for the health and safety of staff and visitors and with proper regard for the environment. The laboratory complies with comprehensive safety procedures and Control of Substances Hazardous to Health (COSHH) regulations.

Advice on the microbiological investigation of patients with infection, and their treatment, can be obtained from the Clinical Microbiologists who provide a 24-hour service. To seek advice from the Clinical Microbiologists, relevant telephone numbers are listed below.

3 Key contact numbers

Consultant Microbiologists	
Dr. SG Jones	Ext.6489 / mobile via Switchboard
Dr. Aiden J Plant	Ext.7915 / bleep 2306 / mobile via Switchboard
Medical Secretary	
Sue Page	Ext.6793
Laboratory Manager	
Mr Stephen Farley	Ext.7125
Clinical Nurse Specialist Infection Control	
	Ext.5805, 5830, 5817, 5816 / Bleep 8208, 8079
Microbiology Enquiries	
Routine hours	Ext.7127
Out-of-hours	Available by mobile via switchboard (a rota operates for this service)
	On-call Consultant Biomedical Scientist
Service provided from home	Contact via switchboard

4 Location of Department

The Microbiology Department is located within the main Pathology Services Building at the Manor Hospital on Route 020. On exiting the hospital through the main rotary doors, turn left then continue to walk around the perimeter of the main building. The entrance is 70 metres on the left, signposted '020 Pathology'.

The address of the department is;

Department of Microbiology
Walsall Manor Hospital
Moat Road
Walsall
West Midlands
WS2 9PS

5 Laboratory Opening Hours

The Laboratory is open between 8.45 a.m. and 5.30 p.m. during the week, between 8.00 am and 4.00 pm on Saturdays, Sundays and Bank Holidays (except Christmas Day which is on-call only). Routine samples are accepted in the department between 9.00 a.m. and 5.00 p.m. on weekdays. Samples arriving after 5.00 p.m. will be refrigerated overnight unless pre-arranged by phone.

6 Emergency (on-call) requests

The on-call service is provided by on-call Biomedical Scientists (BMS) from home.

The On-call BMS must be contacted by the **requesting doctor** (after the specimen has been obtained) via the switchboard, and the specimen delivered to the laboratory. The requesting doctor must make all arrangements for specimen delivery to the pathology department. Investigations should only be requested on-call when the results are required for immediate patient management. Advice on specimen management may be obtained from the medical microbiologist on-call via the switchboard.

Guidelines for on-call requests are given below. If asked by the on-call Biomedical Scientist for your reason for requesting a test, you should give the clinical indications, no reasonable request will be refused but the Biomedical Scientist will be at liberty to ask you to consult the on-call Consultant Microbiologist to discuss the necessity for the investigation.

You must complete the request form and include your contact point (telephone or bleep number).

6.1 Guidelines for On-call requests

Sample Type	On-call system
CSF Samples	Will always be examined in cases of suspected infectious meningitis.
Ascitic fluid Synovial fluid	Urgent requests will always be examined
Sputum, Swabs	Emergency investigation is rarely useful.
Urine Samples	All urine samples should be dipstick tested prior to consideration for urgent microscopy. A visually clear sample with a negative result on dipstick testing is very unlikely to grow significant organisms. For the majority of patients, empirical antibiotic therapy may be started, after the appropriate samples are taken for processing the following day.
Pus / Abscess	Emergency microscopy may direct empirical antibiotic therapy; however a Gram stain could be misleading, particularly if the patient is already receiving antibiotics.
Stool Samples	Norovirus may be performed only in agreement with the Consultant Microbiologist.
Respiratory PCR	Seasonal out of hours testing may be performed only in agreement with the Consultant Microbiologist.

7 Laboratory Supplies

Routine items can be found in West Wing Blood Bank. These include:

- Blood culture bottles
- Universal containers
- Charcoal Trans-swabs

The following items can be obtained from the Microbiology Department:

- Viral transport medium
- Chlamydia transport media (for swabs and urine)
- ENT fine Trans-swabs
- Blue topped flexible pernasal swabs
- EMU bottles for TB culture
- Red transport box
- Bags labelled UN3373, 'COVID-19'

GP practices can order supplies using a consumables order form. Spare forms are available from the Department of Pathology.

Advice and information regarding specimen containers is available from the Microbiology department

8 Ordering Tests

Wherever possible requests for Microbiology/Virology should be made using the Order comm. system. Instructions for using the Order comm. are available here.

Please ensure that the sample collection date is completed on the hard copy of the form.

Please supply all appropriate clinical details.

Requests made other than by Order comm. should be sent using Microbiology forms.

ALL MICROBIOLOGY/SEROLOGY REQUESTS FOR VIROLOGY NEED TO BE COMPLETED ON MICROBIOLOGY FORMS. DO NOT USE, OR ADD TO, BLOOD SCIENCES REQUEST FORMS AS THIS WILL CAUSE UNNECESSARY DELAYS.

A separate Microbiology request form is required for each specimen.

Illegible or incorrect information can lead to problems of interpretation of analysis and reporting. Urgent specimens should include contact details (bleep/phone number).

All specimens must be accompanied by a request form fully completed and include:

- The Full name of the patient
- Date of birth
- Sex of patient
- Hospital unit number/NHS Number
- Ward
- Name of requestor (clinician, healthcare provider or other person legally authorised to request examinations
- Investigation required
- Sample type – including site where appropriate
- Significant clinical information – **Quality of results depends on the details provided**
- Antibiotic therapy

- Request date
- The patients GP (if known)
- Date and time of specimen collection

The sample must have a minimum of 2 patient identifiers. NB first and last name equates to one identifier therefore a DOB or NHS/hospital number must also be included.

9 Additional requests

It is possible to perform additional in–house tests on samples that have already been sent to the laboratory. To request an additional test, phone the laboratory to check that this is possible, send a request form to the laboratory, with the required test(s). Write on the form "Specimen in lab".

9.1 Time limits for Additional requests

There is a time limit in which additional requests can be made; this is determined by length of storage in the laboratory and sample integrity*. If requests are made outside of this time limit the request will be rejected.

Specimen type	Storage time
CSF	2 months (Note cell counts and culture must be carried out within 2 hours of sample collection)
Urines	4 days (7 days for urinary Ag)
Swabs and fluid	3 days
Faeces	3 days
Sputum	3 days
Chlamydia swabs	4 weeks
Serum from antenatal screening blood samples, save serum and long term saves	2 years
All other Bloods	Up to 7 days however contact the laboratory as testing is dependent on storage of sample

*NB Sample integrity will depend on sample type and type of request

10 High Risk Specimens

Processing specimens from patients with certain suspected or proven infections may be particularly hazardous to pathology staff. Infections and specimens, which fall into this category, are listed below. These samples must be handled as “DANGER OF INFECTION”. Appropriate Danger of Infection labels should be attached to request forms and specimens. Specimens must be DOUBLE BAGGED.

Stocks of Danger of Infection labels should be available in all wards and departments and can be re-ordered via NHS supplies. Samples requiring labelling and handling as “Danger of Infection” include all specimens from patients suspected or proven to have the following infections:

- HIV
- HEPATITIS B & C
- Severe Acute Respiratory Syndrome (SARS)
- **Fever in returning traveller**. All specimens from patients who have a fever and have travelled outside northern Europe in the last 6 months, i.e. risk of infections such as

typhoid fever, brucellosis, viral haemorrhagic fever, MERS Co-V. FULL DETAILS MUST BE INCLUDED ON REQUEST FORM

- Sputum and other material that may contain tubercle bacilli from patients with suspected or proven tuberculosis.
- CSF, Brain tissues and spinal cord material from patients with, or suspected of having **Creutzfeldt-Jakob disease/Transmissible Spongiform Encephalopathy (CJD/TSE)**
- Stools and blood cultures from patients suspected of having **typhoid fever.**
- CSFs and blood cultures from patients suspected of meningococcal disease
- Other samples as directed by the Infection Control Team or consultant microbiologist.

11 Transport of Specimens

All samples for Microbiological investigation must be placed in the sealable plastic specimen bag attached to the request form. This can then be taken to the nearest specimen collection site, or transported direct to the laboratory or pathology office. Samples may be brought directly to the office in the Pathology Department, via the pneumatic tube system or placed at the reception sites within the Hospital to await collection by the laboratory porter.

Urgent specimens, i.e. CSFs should be brought to the laboratory without delay

The requesting clinician is responsible for the collection of urgent specimens and their transport to the relevant department. Notification of the urgency of the request must be made by telephone to the Microbiology department or the specimen will be treated as a normal batch specimen. Upon telephoning the Medical Officer should stress the degree of urgency.

The following samples may be sent via the pneumatic tube system

- All emergency samples other than the types listed below may be sent via the system. If in doubt, contact the laboratory
- All fluids from normally sterile sites (except CSF samples) are acceptable in universal containers (pleural, peritoneal and joint fluid). Large volumes should be sent by Porter
- Tissue samples for microbiology investigations

High risk samples must be double-bagged and labelled with a danger of infection sticker
During normal circumstances, the following samples should not be sent via the pneumatic tube system,

- Clinical waste, used transfusion bags, plasma bottles and radioactive waste
- Samples from patients known or suspected to have:-
    - Transmissible Spongiform Encephalopathy (e.g. CJD)
    - Tuberculosis
    - Severe Acute Respiratory Syndrome (SARS).
    - Infection with a Hazard Group 4 Organism
    - Exposure to biological warfare organisms such as Anthrax Plague, Smallpox, Botulism, Tularaemia
- Samples of cerebral-spinal fluid
- Specimens with formalin
- Large volume samples, e.g. 24-hour urine collection
- Respiratory samples for SARS – CoV-2 testing

A clinical incident may be raised if such samples are not double bagged.

11.1 COVID – 19

Respiratory samples for SARS – CoV-2 testing or any other sample types from known and suspected COVID-19 patients must be double bagged, labelled with 'Danger of Infection', placed in a transport box or bag labelled UN3373, 'COVID-19' and brought by hand to the laboratory – do not use the pneumatic tube system

11.2 Outside Normal Working Hours

Where available, with the exception of CSFs and high-risk samples, specimens should be sent to the laboratory via the pneumatic tube system. This will ensure correct storage of the samples until they can be processed.

A specimen storage area is available in West Wing Blood Bank but no refrigeration is available. Specimens are collected from here several times between 8am and 4pm every day.

12 Protection of personal information

The Microbiology department recognises that the lawful and correct treatment of personal data is very important to the successful operations and in maintaining public confidence in the service.

Any personal data the Microbiology Department collects, records or uses in any way whether it is held on paper, on computer or other media will have appropriate safeguards applied to it to ensure that the Trust complies with the General Data Protection Guidelines.

As part of Walsall Healthcare NHS Trust, the Microbiology Department also adheres to the Trust's governance and data protection policies which incorporate the General Data Protection Guidelines, as listed below:-

- Freedom of Information Policy and Procedure
- Confidentiality Policy
- Information Governance Management Framework

13 Complaints procedure

Complaints may be made directly to staff within the laboratory via telephone, email or face to face contact. For clinical complaints, please contact Dr S Jones. For all other complaints contact Stephen Farley (ext. 7125). Complaints can also be made through PALS.

14 Uncertainty of measurement

Despite all the safeguards and assurances put into place to ensure the quality of the result, there will always be factors which could introduce an element of uncertainty to a pathology result. Within the laboratory, once a specimen is received, measures are put into place to eliminate or reduce the levels of uncertainty for the results that are issued. However, there are many stages in the patient pathway over which there is no direct control by the laboratory, all of which may introduce a level of uncertainty to a result.

For each test process where there is a measurement step, the laboratory has determined the UoM values for those steps. These values are available upon request to the Microbiology Head BMS.

15 Chain of evidence

It is important to treat samples that may be used in a court of law in a way that complies with the rules of evidence. Failure to do so may mean that the conclusions drawn from examination of the samples are not given in evidence. This could lead to an adverse result, and possible injustice.

The chain of evidence (sometimes called 'chain or labelled production of custody' or 'continuity') is a legal concept, which requires that the origin and history of any exhibit to be presented as evidence in a court of law must be clearly demonstrated to have followed an unbroken chain from its source to the Court. All persons handling the sample and the places and conditions of storage must be documented, with a note of the time, date, place and signatures where appropriate. This must include all specimen handovers and all key stages of processing.

All movements of a potential exhibit must be verifiable. Continuity depends on being able to track when the sample was handled, where it was moved from and to, and by whom. Each movement must be evidenced by a signature. The time and date are also critical. Other information that must be included is the accession number and nature of the sample (e.g. whether it is a tissue block, slide or other material), the date that they were removed from storage, the reason they were removed and the date that they were returned to storage, including a record of their receipt.

Within the laboratory, a laboratory 'chain of evidence' form (LCOEF) is used. A LCOEF can be found on the Trust intranet in the following policy "Child Death – the management of when a child dies (SUDI/SUDC) Protocol" or in section 28 of this handbook

When to use a Chain of Evidence?
Samples requiring this procedure:

- All samples (from requests that includes patient identifiable information) where the request form indicates that a criminal act may have taken place (e.g. '? assault', 'alleged sexual assault', '? non-accidental injury', 'food poisoning outbreak').
- Samples that are accompanied by a 'chain of evidence' form instigated by the requestor.
- Samples that are brought to the laboratory by the police doctors who have taken them, police officers or other law enforcement agents (e.g. environmental health officers). These should be accompanied by a request form and a LCOEF. Many of these samples are normally dealt with at forensic laboratories, but are occasionally presented to clinical laboratories.

It is straightforward to recognise the need for a continuous chain of evidence when samples are collected as part of a criminal investigation. However, laboratory results of forensic importance sometimes arise unexpectedly. For example, the culture of sexually transmitted microorganisms (e.g. Neisseria gonorrhoeae) from children below the age of consent or the presence of spermatozoa on urine analysis from a female under the age of consent may be evidence of sexual assault or abuse, which would require formal investigation. However because the samples may have been taken as part of a routine diagnostic process, there would be no formal chain of evidence and the result might be inadmissible in Court. In such circumstances, for repeatable samples, a fresh sample may be taken and a chain of evidence established from that point.

16 Travel Abroad

All patients should be questioned about their travel history in the last 12 months. Any patient who has been hospitalised in an area with known high prevalence must be screened for Carbapenamase Producing Enterobacteriacae (CPE) by the taking of a rectal swab or stool sample. For more information on the detection and management of CPE, please click the following link - Carbapenemase-producing Enterobacteriacae: early detection, management and control toolkit for acute trusts

Suspected Viral Haemorrhagic Fever, Middle East Respiratory Syndrome or Avian flu – Contact the Consultant Microbiologist.

Blood cultures taken from patients who have a fever and have travelled outside northern Europe and North America within the last 6 months must be marked as 'Danger of Infection'. All travel history MUST be included in the clinical details

All returning travellers with fever who in the last 6-months have returned from malaria endemic regions (regardless whether prophylaxis was taken) should be screened for malaria **as a matter of urgency** – this test is NOT performed in microbiology, but is a haematology request via blood sciences. Please send 2.5-5 mL of whole blood in an EDTA (purple) tube, requesting 'malaria screen' plus adequate travel details. A positive malaria film should be discussed with the Consultant Microbiologist who will advise on further management.

16.1 Related documents:

Viral haemorrhagic fevers risk assessment algorithm

Viral haemorrhagic fever: sample testing advice for doctors

Investigation and management of possible human cases of avian influenza A(H7N9), in returning travellers

Risk Assessment of Middle East Respiratory Syndrome Coronavirus (MERS-CoV)

UK malaria treatment guidelines 2016

17 Needle stick Incidents

Contact occupational health for further advice. Send 7ml clotted blood sample clearly stating on the microbiology request form it is a needle stick incident. Also state if the sample is from the donor or recipient and request the following tests;

Donor – HIV, Hepatitis C and HBsAg

Recipient – Storage, plus Hepatitis B surface antibody if history of immunisation

Complete a risk assessment, which will help consider the need for hepatitis B rapid immunisation regimen, immunoglobulin or HIV post-exposure prophylaxis.

18 Specimen Collection

18.1 Patients guide to taking specimens.

18.1.1 Urine sample

Your GP or other healthcare professional may ask for a urine sample to aid diagnosis or to rule out certain health problems. Your GP should provide specific instructions on how to collect the sample and where to deliver it to.

Urine may be used to diagnose

- Urinary tract infection
- Sexually transmitted disease
- Pregnancy
- Various metabolic conditions such as diabetes

Collecting your urine sample

You should:
Collect your urine sample in the container provided by your GP
If you cannot hand it in straight away store in fridge in a sealed plastic bag.

What is a mid-stream urine sample (MSU)?

A mid-stream urine sample means that you don't collect the first part of the urine that comes out. This reduces the risk of the sample being contaminated from your hands or from the skin around the urethra (the tube that caries the urine out of the body).

- If not already done, label the container with your name and date of birth.
- Wash your hands
- Start to urinate but don't collect the first part of the urine that comes out.
- Collect a sample of urine (mid-stream) that comes out in the sterile container provided.
- Some types of containers need to be filled to have a minimum volume line.
- Screw the lid of the container shut.
- Wash your hands again thoroughly.

If you can't hand your sample in within an hour you should keep it in the fridge at around 4ºC in a sealed plastic bag for no longer than 24 hours. If the sample is not refrigerated, and kept at room temperature, bacteria in it may multiply and produce an incorrect result.

Different types of container for collecting urine samples. The red topped version contains a substance that stabilises bacterial growth if there is a delay in transport to the laboratory. The brown container is only used for detection of renal TB.

18.1.2 Stool (faeces) specimen.

Your GP or other healthcare professional may ask you for a faeces sample to aid diagnosis in various conditions affecting the bowel. The faeces may contain harmful bacteria or other

substances that may affect the digestive system that can be detected in the laboratory. Your GP should provide you with a plastic sealable container and explain how to collect the sample.

A stool sample can be tested to help diagnose.

- Gastroenteritis
- Inflammatory bowel disease such as Crohn's disease
- Food poisoning.
- Bowel parasites
- Stomach and duodenal ulcers
- Non-ulcer dyspepsia
- Gastric mucosa-associated lymphoid tissue lymphoma - a MALToma

Collecting a stool sample

- Label the faeces container with your name and date of birth.
- Place something in the toilet to catch the stool such as a clean potty or empty plastic food container. (Note you need to bin this after use).
- Make sure the sample does not touch the inside of the toilet.
- Use a disposable spoon or spatula inside to place the faeces inside the container to about one third full, replace the lid a screw securely shut.
- Put anything used to collect the sample inside a plastic bag, tie it up and place in the bin.
- Wash your hands thoroughly with soap and warm running water.

Try not to collect urine or toilet water during this process. Stool samples should be delivered to the GP practice or laboratory as soon as possible and should not be stored for any significant amount of time. If unable to get the sample to your GP on the same day, leave the sample at room temperature (away from heat sources); however ensure it is taken to your GP without further delay. If possible, delay collection of the sample, to a day when it is possible to take it to the GP on the same day

Performing a rectal screen:

- Explain the procedure to the patient to gain their consent. Ensure the patient's privacy & dignity while performing the procedure
- Decontaminate hands using liquid soap and water.
- Confirm patient details on the pathology request card with the patient, or against patient's ID band.
- Put on non-sterile examination gloves and plastic apron to collect specimen.
- Insert the dry charcoal swab into the rectum approximately 2.5 cm (for adults) beyond the anal sphincter
- Very gently rotate to obtain faecal flora.
- Ensure that the tip of the swab is well covered in faecal material.
- Remove apron and gloves.
- Decontaminate hands using liquid soap and water.
- Dispose of PPE / equipment into appropriate waste stream
- Label specimens correctly and organise transport to laboratory

18.1.3 Sputum collection

Sputum is the phlegm coughed up from your lungs. It is not spit or mucus from the mouth or back of the throat. Your GP or other health care professional may ask you to produce a sputum specimen to aid diagnosis of the bacteria that may be affecting your lungs in various respiratory diseases:

- Pneumonia
- COPD exacerbations
- Bronchiectasis.

Collecting a sputum sample.

An early morning sputum (i.e. as soon as you wake up) is best, but if not possible sputum can be collected at other times of the day. Your GP should provide a special container for this specimen collection.

- Rinse mouth out with water (not mouth wash) and remove dentures if present.
- Cough hard to bring up sputum from deep in your lungs (this may take a lot of coughing).
- From the mouth the sputum should go directly into the container provided then screw the top on securely.
- Label the container with your name and date of birth.
- Place container in sealed plastic bag.
- Deliver to GP or laboratory as soon as possible. If there is a delay, the sample can be kept in the fridge for up to 24hours.

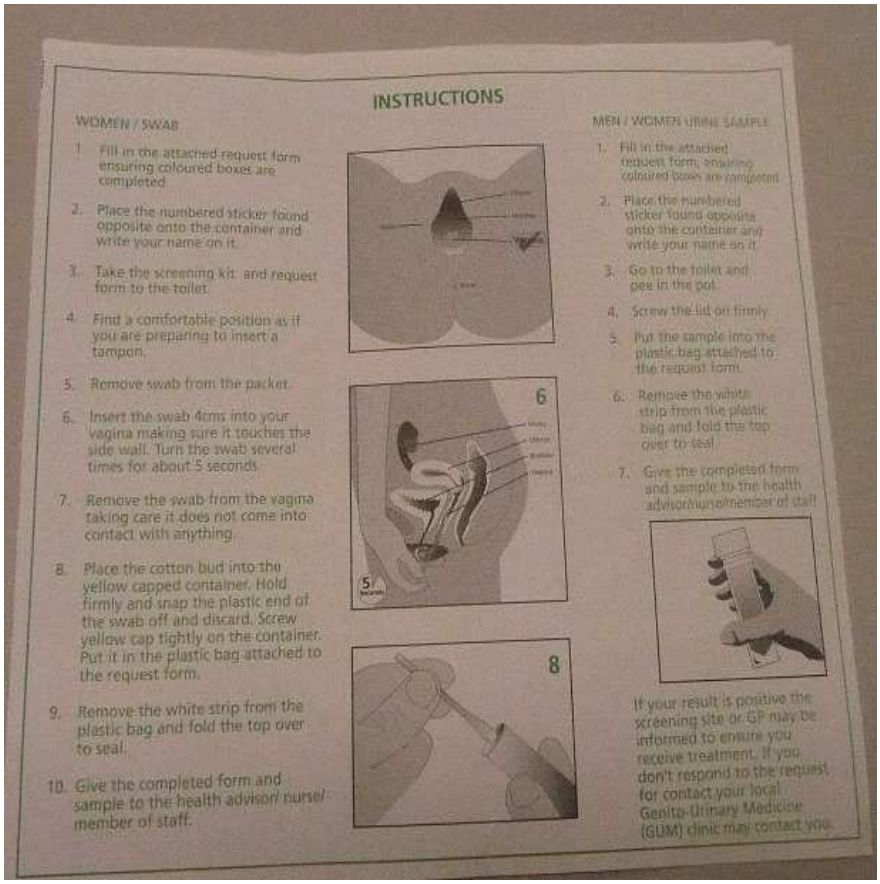
Note your GP may need to take several other specimens to diagnose your respiratory condition. E.g. throat swab, urine or blood.

18.1.4 Self-taken vaginal swabs and urine samples for detection Chlamydia/gonorrhoea

Self-collected vaginal swabs are only normally accepted for chlamydia and gonorrhoea screening through the Chlamydia Screening Programme.

The first voided urine should be collected, rather than the mid-stream

Instructions for self-collection of these tests are provided on the chlamydia testing request form supplied by sexual health department; this information is replicated below:



INSTRUCTIONS

WOMEN / SWAB

1. Fill in the attached request form ensuring coloured boxes are completed.
2. Place the numbered sticker found opposite onto the container and write your name on it.
3. Take the screening kit and request form to the toilet.
4. Find a comfortable position as if you are preparing to insert a tampon.
5. Remove swab from the packet.
6. Insert the swab 4cms into your vagina making sure it touches the side wall. Turn the swab several times for about 5 seconds.
7. Remove the swab from the vagina taking care it does not come into contact with anything.
8. Place the cotton bud into the yellow capped container. Hold firmly and snap the plastic end of the swab off and discard. Screw yellow cap tightly on the container. Put it in the plastic bag attached to the request form.
9. Remove the white strip from the plastic bag and fold the top over to seal.
10. Give the completed form and sample to the health advisor/ nurse/ member of staff.

MEN / WOMEN URINE SAMPLE

1. Fill in the attached request form, ensuring coloured boxes are completed.
2. Place the numbered sticker found opposite onto the container and write your name on it.
3. Go to the toilet and pee in the pot.
4. Screw the lid on firmly.
5. Put the sample into the plastic bag attached to the request form.
6. Remove the white strip from the plastic bag and fold the top over to seal.
7. Give the completed form and sample to the health advisor/nurse/member of staff.

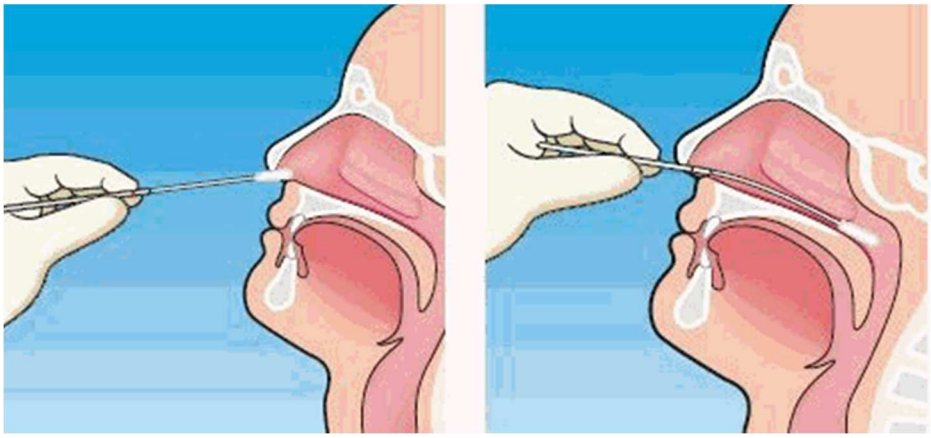
If your result is positive the screening site or GP may be informed to ensure you receive treatment. If you don't respond to the request for contact your local Genito-Urinary Medicine (GUM) clinic may contact you.

18.2 Pernasal swab collection

The pernasal swab consists of a very small bead of swab at the end of a long flexible wire. This is required to be passed the nasal cavity to sample the posterior naso-pharyngeal wall.

Pernasal swab kits can be obtained on request from WHT Microbiology department. After collecting the specimen using correct technique (see below) the swab tip can be snipped off, using a sturdy pair of scissors, into a vial of viral transport medium or sent in a dry cover. Do not send specimen in charcoal medium.

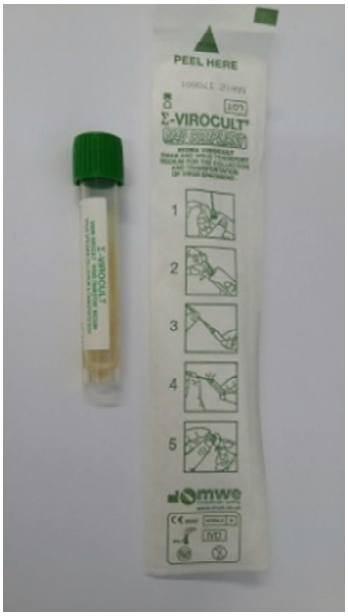
Correct technique for obtaining penasal swab specimen.



Gloves should be worn and, if the patient has an on-going cough, surgical mask and eye protection (wash hands before donning protective equipment). The pernasal swab needs to be passed backwards through the nasopharynx until it makes contact with posterior wall (see above). When in contact with the posterior wall the swab can be felt to meet resistance as it bends slightly downwards. At this point carefully rotate the swab back and forth for a few seconds to dislodge cells, and then gently remove the swab. The process is irritating and may induce a bout of coughing.

18.3 Testing for COVID-19

Using one swab take a throat swab, then a nose swab. The swab should then be broken off into a green top tube containing viral transport media (see picture below).. This should be accomplished using the appropriate PPE.



Yellow capped swabs are UNSUITABLE for this test. Other specimen types should be discussed with the Medical Microbiologist prior to collection.

19 Sample Requirement

Where possible use Order comm. to request samples using the printed sticker to label specimen. In addition, please handwrite DATE and TIME of collection on the specimen and the form. Where handwritten forms are used, please provide at least two patient identifying data on the sample label and three patient identifying markers on the form.

When un-dated samples are received, the date of the form will be used as the sample date. Please note that this may result in rejection of samples if the date on the form pre-dates the sample

Condition or specimen type	Clinical information required	Sample requirement	Sample container
Ear infection	Clinical presentation Recent antimicrobial therapy	Ear swab, middle ear effusion	Swab in charcoal transport media. Fluid in white top universal.
Conjunctivitis	Clinical presentation Recent antimicrobial therapy	Eye swab	Swab in charcoal transport media. Swab in viral transport media if virus suspected. If Chlamydia examination - Inoculate into a unisex swab collection kit Chlamydia testing kits available from the laboratory
Investigation of oral samples	Clinical presentation Recent antimicrobial therapy	Mouth swab	Swab in charcoal transport media
Investigations of nasal samples	Clinical presentation Recent antimicrobial therapy	Nose swab, antral washout, sinus aspirate and sinus washout	Swab in charcoal transport media. Fluid in white top universal.
Whooping cough * *suspected whooping cough is a notifiable infection – once notified to PHE for children aged 2-17y and a cough of >14d duration, an oral fluid kit will be posted to the patient for testing.	Vaccination history Date of onset Severity Recent antimicrobial therapy	Pernasal swab, nasopharyngeal aspirate – taken within 21 days of onset of cough.	Blue top Trans-swab placed in a plain universal Fluid in white top universal Do NOT use the charcoal media supplied. For more information on collection, please click here. NB Culture for Bordetella is being discontinued and replaced by PCR test.
		Serum sample – taken >14 days of onset of cough.	Serum
Throat infections, Epiglottitis	Clinical presentation Travel history Date of onset *N. meningitidis* case or contact Diabetic Recent antimicrobial therapy	Throat swab, posterior pharyngeal swab, nasopharyngeal swab, pharyngeal washings, pus aspirate, oropharyngeal swab	Swab in charcoal transport media.

Condition or specimen type	Clinical information required	Sample requirement	Sample container
Skin, Superficial and non-surgical wound infections	Clinical presentation Diabetic Animal bite Give specific description of anatomic site. Recent antimicrobial therapy. Travel history	Skin swab, swab from superficial wound, swab from non-surgical wound	Swab in charcoal transport media.
Fish tank granuloma	Clinical presentation Specific anatomic site Recent antimicrobial therapy	Biopsy, aspirate	Sample in a sterile leak-proof container
Abscess or deep seated infections	Clinical presentation Immunosuppressed Specific anatomic site Recent antimicrobial therapy. Recent travel history	Abscess pus, abscess swab, deep-seated pus swab, post-operative wound swab, wound exudates, tissue, biopsy	sample in sterile leak-proof container Swab in charcoal transport
Biliary infection	Clinical presentation Recent antimicrobial therapy	Bile	Sample in sterile, leak-proof container
Cannula-related infections	Clinical presentation Specific site and type of tip Recent antimicrobial therapy	Line tips e.g. CVP or Hickman lines, swabs of cannula insertion sites	Sample in sterile, leak-proof container Swab in charcoal transport media
Continuous ambulatory peritoneal dialysis (CAPD) peritonitis	Clinical presentation immunocompromised Recent antimicrobial therapy	CAPD fluid	Sample in sterile leak-proof container
Amnionitis	Clinical presentation immunocompromised Recent antimicrobial therapy Suspected congenital viral infection, e.g. parvovirus B19, CMV, etc. (An acute serum sample should be sent from the mother at the time of amniocentesis).	Amniotic fluid	Sample in sterile leak-proof container
Pericarditis	Clinical presentation immunocompromised Recent antimicrobial therapy Risk factors or clinical suspicion of TB Evidence of bacterial infection elsewhere,	Pericardial fluid	Sample in sterile leak-proof container
		Stool sample requesting “enterovirus PCR”	Sample in sterile leak-proof container
		Viral throat swab requesting “respiratory viral panel”	Swabs in viral transport media

Condition or specimen type	Clinical information required	Sample requirement	Sample container
	e.g. pneumonia, meningitis, etc.		
Peritonitis	Clinical presentation immunocompromised Recent antimicrobial therapy	Ascitic fluid, Peritoneal fluid	Sample in sterile leak-proof container
Pleurisy	Clinical presentation Recent antimicrobial therapy Evidence of bacterial pneumonia	Pleural fluid	Sample in sterile leak proof container
		Urine sample requesting "pneumococcal antigen" if evidence of lobar pneumonia	Urine in sterile leak-proof container
		Stool sample requesting "enterovirus PCR"	Sample in sterile leak-proof container
		Viral throat swab requesting "respiratory viral panel"	Swabs in viral transport media
Pneumonia	Clinical presentation Recent antimicrobial therapy	Sputum, bronchial washing, bronchial lavage, sample and/or urine sample if suspecting pneumococcal pneumonia	Sputum/fluid in sterile leak proof container Urine in sterile leak-proof container
Legionnaires' disease	Clinical presentation Recent antimicrobial therapy	Urine sample	Urine in sterile leak-proof container
Septic arthritis	Clinical presentation immunocompromised Recent antimicrobial therapy	synovial (joint) fluid	Sample in sterile leak proof container
Bursitis	Clinical presentation immunocompromised Recent antimicrobial therapy	Bursa fluid	Sample in sterile leak-proof container
Meningitis/encephalitis	Clinical presentation, Immunocompromised Details of recent travel,	CSF, Blood culture, EDTA blood for PCR, serum for HIV serology, bacterial throat swab for meningococcal culture.	Sample in sterile leak-proof container
Sub-arachnoid haemorrhage	Clinical presentation Recent antimicrobial therapy	CSF	Sample in 3 sterile leak-proof containers, labelled 1-3 in order of collection
Vaginal infection (other than STI's)	Clinical presentation Recent antimicrobial therapy	High vaginal swab (HVS), vaginal discharge, vulval swab, labial swab, cervical swab, endocervical swab, ,genital ulcer swab, aspirates from bartholin's gland, fallopian tube, tuboovarian abscess,	Swab in charcoal transport media.

Condition or specimen type	Clinical information required	Sample requirement	Sample container
		pouch of Douglas fluid, products of conception	
Intrauterine contraceptive devices associated infection	Clinical indications of PID or other inflammatory conditions	IUCD	Sample in a sterile leak-proof container
Infections (other than STIs) of the Male Genital Tract	Clinical presentation Recent antimicrobial therapy	urine sample, secretions of prostatic massage.	Swab in charcoal transport media Samples in a sterile leak-proof container
Herpes simplex	Clinical presentation Date of onset Sample site	Swab from lesion	Swabs in viral transport media
	In addition to lesion swab for pregnant women presenting with genital lesions in the third trimester.	Serum sample requesting "HSV-1 and -2 specific antibodies"	Serum
Chlamydia/gonorrhoea detection	Clinical presentation Date of onset Sample site	Urine (male and female accepted) Endocervical, urethral swab. Self-taken vaginal swabs (Chlamydia Screening Programme only)	Urine in Aptima Urine transport tube Endocervical, urethral, oral and eye swabs in Aptima collection swab (white and purple label Self-taken swabs in Aptima collection swab (orange label)
MRSA screening		Nose. Groin, axilla swab	Swab in charcoal transport media
Carbapenem resistant organism screening	Travel history Hospital transfer Contact	Rectal swab or stool sample	Swab in charcoal transport media or Sterile leak-proof container
Vancomycin resistant enterococci screening	Travel history Hospital transfer Contact	Rectal swab or stool sample	Swab in charcoal transport media Sterile leak-proof container
Gastroenteritis	Clinical presentation Date of onset Travel history Contacts Recent antimicrobial therapy	Stool sample. NB C.difficile and Norovirus will not be tested on formed stools	Sterile leak-proof container
Stomach and duodenal ulcers Non-ulcer dyspepsia Gastric mucosa-associated lymphoid tissue lymphoma - a MALToma	Clinical presentation Recent antimicrobial therapy	Stool sample	Sterile leak-proof container
Faecal parasite infections	Date of onset Travel history Contacts	Stool sample on 3 consecutive days	Sterile leak-proof container
Enterobius / threadworm	Symptoms	Moistened plain peri-	Sterile leak-proof

Condition or specimen type	Clinical information required	Sample requirement	Sample container
	contacts	anal swab broken off into a plain universal **or** sellotape slide taken on waking, before bathing.	container. Place slide in slide carrier which is available from pathology
Schistosomiasis	Symptoms Travel history	3x terminal samples of urine taken between noon and 3pm (preferably after light exercise) to provide the optimum number of ova. Also send 3x stool samples and 7ml clotted blood for EIA	Sterile leak-proof container Serum
Fungal infection – skin, nail and hair	Type of rash Specific anatomic site	Skin scrapings, nail clippings Hair – up to 2 cm hair strand with root attached	Skin scrapings in folded black paper, inside sterile leak-proof container Nail and hair in sterile leak-proof container
Mycobacterium investigation	Clinical presentation Contacts Travel history	Sputum, gastric washing, sterile site body fluids (CSF, pleural fluids etc.), urine, skin or tissue biopsies, bone marrow, broncho-alveolar washings, blood, bone. NB if sending a urine sample, 3 whole early morning urines should be sent	Sterile leak proof container Containers for early morning urine samples are available from pathology Blood should be received in light blue top tube
Urinary tract infection	Relevant clinical details Specimen type Recent antimicrobial therapy	Bag urine, pad urine, catheter urine, prostate massage/secretions, clean catch urine, suprapubic aspirate, cystoscopy urine, ureteric urine, ileal conduit urine, urostomy urine, mid-stream urine, nephrostomy urine	Sterile leak-proof container with/without boric acid
Osteomyletis		Intra-operative samples of bone, bone biopsies, soft tissue, aspirates	Sterile leak-proof container

Condition or specimen type	Clinical information required	Sample requirement	Sample container
Prosthetic joint revision	Relevant clinical details Specimen type Recent antimicrobial therapy	Tissue* Fluid Swab * a minimum of 5 tissue samples is required to adequately microbiologically diagnose the causative pathogen of PJI. These should be each obtained using a sterile forceps kit to avoid cross contamination.	Tissue - Sterile leak-proof container containing glass beads Fluid – Sterile leak-proof container Swab – Black topped trans-swab
Serology blood tests	Relevant clinical details	Clotted blood sample	Red topped blood sample (as a rough guide, allow one red-topped clotted blood specimen per 4 tests)
PCR/Viral load for HIV and Hepatitis viruses	Relevant clinical details	EDTA blood	Purple topped blood
Vesicular rashes	Relevant clinical details	Swab or fluid	Swab or fluid in viral transport medium
Coronavirus	Full clinical details	1 swab of nose and throat	Green topped VTM swab

20 Update on service during Covid-19 pandemic

The Covid-19 pandemic has placed unprecedented demands on the service provided by microbiology

In order to prioritise work, and maintain safety of microbiology laboratory staff, we have made the following changes to our test repertoire:

- Anaerobic culture for superficial wound swabs will **stop;**
- Swabs culturing yeasts will **not** be speciated, but reported as "Candida species isolated";
- Urine microscopy will **not** be performed, but we will continue to report quantitative culture results.
- Routine mycology testing will be stopped
- Catheter-associated urine samples will not be processed unless from critical care. If you require a CSU to be processed then please contact the microbiology laboratory. Remember CSUs are culture positive in 100% of patients after 1 month of catheterisation; therefore interpretation of infection should be based on signs + symptoms, rather than culture result

These changes will be under constant review and we will inform you when we return to business as usual or introduce further changes to practice

The changes to the service were made in conjunction with the RCPath guidance (prepared in association with NHSI&E and the professional bodies), see link below.

Guidance for pathology testing prioritisation

21 Diagnostic Tests Available

21.1 Referred Virology tests

- **Vesicular rashes** caused by Varicella zoster or herpes simplex virus: a swab in viral transport medium (available from the laboratory)
- **Respiratory infections**, viral pneumonia: NPA or a throat swab in viral transport medium. Please note that sputum is not an appropriate specimen.
- **Viral meningitis or encephalitis:** CSF sample. This will be tested for Enterovirus, Varicella Zoster virus, Herpes Simplex virus and Parechovirus. Cytomegalovirus, Epstein-Barr virus, human-herpes virus 6 and JC virus can be tested if specifically requested, but typically requires a history of immunosuppression.
- **Cytomegalovirus (CMV) infections:** If patient is <3 months old please send a urine sample – guidelines for the investigation of sensorineural hearing loss recommends 2 urine samples tested by PCR taken on separate occasions. If a positive PCR result is obtained >3 weeks after birth, it is unsafe to assume that infection was congenitally acquired and this must be confirmed / refuted by obtaining the Guthrie card for CMV PCR from Birmingham Childrens' Hospital. If patient is >3 months old an EDTA blood must be sent. A clotted blood sample for CMV IgM testing may be helpful. A useful resource is: Rawlinson WD, et al. Congenital cytomegalovirus infection in pregnancy and the neonate: consensus recommendations for prevention, diagnosis, and therapy. Lancet Infec Dis 2017; 17 (6): 177-88.
- **PCR/Viral load for HIV and Hepatitis viruses:** EDTA blood.

- **Eye infections:** adenovirus and herpes virus – eye swab in viral transport medium.
- **Post mortem and tissue samples:** please discuss this with the Consultant Microbiologist.

21.2 Referred Tests

The following tests are sent to reference laboratories:

Test	Samples/Notes
Adenovirus DNA PCR	EDTA Purple top blood
Alphavirus serology	Red top clotted blood
Amoebic/Hydatid Serology	Red top clotted blood
Antibiotic assay: Amikacin Colistin Flucytosine Ganciclovir in renal failure ItraconazoleLinezolid in renal failure Posaconazole syrup Streptomycin Tobramycin Rifambutin Rifampicin Voriconazole	Red top clotted blood
Aspergillus (Galactomanan) Antigen	Red top clotted blood
Aspergillus precipitins	Red top clotted blood
Avian Precipitins	Red top clotted blood
Bacterial PCR genital	Syphilis and *Haemophilus ducreyi* Swab in viral transport media required
Borrelia (Lyme's)	Red top clotted blood Do NOT send serum from suspected erythema migrans – this should be treated at the point of diagnosis. Testing should be in line with NICE guidance.
Bordetella Pertussis Ab	Red top clotted blood. Send only if patient has been coughing for >2 weeks
Bordetella Pertussis PCR	NPA or pernasal swab. Please click here for more information.
Brucella serology	Red top clotted blood
CMV PCR	EDTA Purple top blood (urine from children under three months old)
CMV viral load	EDTA Purple top blood
Coxsackie PCR	Faeces sample or throat swab in viral transport medium
Cryptococcal Antigen	Red top clotted blood or aliquot of CSF
CSF PCR	CSF in plain universal
Dengue virus	Red top clotted blood
Differential Cell Count	Bronchial washing
Diphtheria immunity	Red top clotted blood
Enterovirus PCR	Faeces or throat swab in viral transport medium
Filarial Antibodies	Red top clotted blood
Francisella tularensis serology	Red top clotted blood

Hantavirus serology	Red top clotted blood
Hepatitis A IgG	Immunity for travellers
Helicobacter stool Ag test	Stool samples should be sent in the appropriate containers: **Do not overfill.** Before testing faeces for helicobacter, it will be necessary to stop H2 receptor blockers for 24 hours, antibiotic therapy for 4 weeks and proton pump inhibitors (PPI's) for 2 weeks
HBsAg quantitation	Red top clotted blood
HBV e Markers	Red top clotted blood
Hepatitis B Virus DNA PCR Viral Load	EDTA Purple top blood
HBV sensitivity test	EDTA Purple top blood
HCV genotype & viral load	EDTA Purple top blood
HCV viral load	EDTA Purple top blood
Hepatitis D (Delta)	Red top clotted blood – appropriate for HBsAg positive patients only
Hepatitis E Ab	Red top clotted blood
Herpes simplex virus PCR	CSF in plain universal or swab or vesicular fluid in viral transport medium.
Herpes simplex type specific serology	Red top clotted blood.
HHV6 serology	Red top clotted blood
HHV8 viral load	EDTA Purple top blood
HIV neonatal screen	EDTA Purple top blood. Mother's blood to accompany first request
HIV Resistance (without Tropism)	Requests from GUMED post viral load result for resistance only
HIV Resistance and Tropism	Newly diagnosed GUMED patients
HTLV 1, 2 and 3	Red top clotted blood
Amoebic/Hydatid Disease	Red top clotted blood
Histoplasma Serology	Red top clotted blood
LGV (Chlamydia PCR)	Rectal swab tested positive for Chlamydia in house are sent for LGV PCR
Leptospirosis (Weil's)	If symptoms of <14d: Red top clotted blood + EDTA purple top + urine in sterile universal container. If symptoms of >14d: Red top clotted blood only.
Visceral leishmaniasis screen	Red top clotted blood (cutaneous / mucosal leishmaniasis requires biopsy for both in-house histology, and send-away PCR testing at reference laboratory – please discuss with the Consultant Microbiologist)
Lymes Disease	Red top clotted blood Do NOT send serum from suspected erythema migrans – this should be treated at the point of diagnosis. Testing should be in line with NICE guidance.
Listeria PCR	Typically sterile site samples, e.g. CSF
Measles IgM	If IgG done 'in house' write on form 'don't do IgG'
MERS - Coronavirus	Throat swabs and sputum if available. **Contact Consultant Microbiologist before submission.**
Meningococcal PCR	EDTA Purple top blood +/- CSF.
Microsporidia	Faeces

Mumps IgM	Red top clotted blood
Mumps - salivary Ab	PHE collection kit required
Mycobacteria tuberculosis complex PCR	Respiratory samples only
Mycoplasma Ab	Red top clotted blood
Mycoplasma/ Ureaplasma genitalium PCR	Urine. Clinical details must be supplied
Parvovirus IgM and IgG	Red top clotted blood
Parvovirus PCR	EDTA Purple top blood
PCP Pneumocystis	Bronchial Washings (or induced sputum sample if agreed with Consultant Microbiologist, due to risk of a false-negative).
Phlebovirus serology	Red top clotted blood
Pneumococcal PCR	EDTA Purple top blood +/- CSF
Polyomavirus (JC) PCR	EDTA Purple top blood +/- CSF
Psitacossis/Chlamydia Ab	Red top clotted blood
Q fever (Coxiella burnetii)	Red top clotted blood
Rabies Ab	Red top clotted blood
Respiratory PCR	Throat swab in viral transport media or NPA. Panel includes: Influenza A and B, Adenovirus, Enterovirus, Parainfluenza, RSV, Metapneumovirus. During flu season, specimens from Critical Care will be tested in-house for RSV and Flu A & B. Only negative samples will be sent for full panel.
Rickettsial group	Red top clotted blood
Functional antibodies: Pneumococcal Immunity Tetanus Immunity Haemophilus B Immunity	Red top clotted blood
Syphilis markers	Red top clotted blood
Taenia solium antibody	Red top clotted blood
Tetanus Immunity	Red top clotted blood (Part of functional antibody screen)
Toxocara	Red top clotted blood
TSpot TB interferon	2 x 8ml Green top blood for adults and 4-5ml for paediatric, collected on the morning of testing. Testing every Monday-Thursday. Samples must arrive in the lab by 12pm
TDM (from GUMED only)	Viral vesicle fluid/swab
Varicella zoster IgM	Red top clotted blood
Varicella zoster	
Verotoxin Serology	Red top clotted blood
Verotoxin *E coli*	Faeces
Yersinia Ab	Red top clotted blood
Zika virus	Red top clotted blood **Contact Consultant Microbiologist before submission.**

21.2.1 T-spot

This is an assay that measures the amount of gamma interferon released from the patient's live lymphocytes on stimulation with *Mycobacterium tuberculosis* specific antigens. It requires fresh blood and, because the test is performed off site, requires arrangement in advance.

21.2.1.1 Requirements for test

- Inform lab staff on the day before (or earlier) the test is to be performed.

On the day of test take 2 bottles of patient's blood in lithium heparin (green topped tubes) in the morning; at latest, to arrive at lab by 12pm (Monday – Thursday only).

Results will be communicated by telephone to requesting doctor if required. Ensure contact details are provided.

21.3 In-House Serology (including antigen detection)

In addition to relevant clinical details, it is important to state the date of onset of symptoms. When requesting via Order comms, the type and number of vials will be indicated by the printed sample stickers. For manual requests, as a rough guide, allow one red-topped clotted blood specimen per 4 tests. For PCR or viral loads a minimum of 10ml of EDTA blood is required for each test.

21.3.1 Bacterial

- Antistreptolysin O (ASO) titre (red top blood)
- **Legionella pneumophila* antigen (Urine sample)
- *Pneumococcal antigen (Urine sample)
- Syphilis antibody (red top blood)
- Helicobacter pylori stool Ag

***Please note - Unless clinical details indicate otherwise, any requests for pneumococcal and legionella urine antigen will be tested for pneumococcal antigen first. Legionella will then be tested on all pneumococcal antigen negative samples.**

Pneumococcal positive samples will not be tested for legionella and will be reported as "Not Tested. Please contact lab if test still required."

21.3.2 Viral

For the following tests, please provide a red top blood sample

- Hepatitis A IgM assay.
- HIV 1 and 2 antigen/antibody + P24 combined assay. Consent is required for this test
- HIV viral load
- Rubella IgG and IgM assay.
- Hepatitis B surface antibody assay (post vaccination and immune status).
- Hepatitis B surface antigen.
- Hepatitis B core total antibody.
- Hepatitis C antibody.
- Varicella Zoster IgG antibody (immunity status)*.
- Epstein Barr Virus (EBNA IgG)
- CMV IgM and IgG
- Toxoplasma IgM and IgG
- Measles IgG
- Mumps IgG

*Note: Chicken-pox immunity is an urgent test in specific patients groups (i.e. immunosuppressed patients and pregnant women with uncertain immunity) following significant exposure. It is essential these requests have a clear date and type of chicken pox exposure documented on the request form, plus a contact number for the healthcare worker who would be responsible for acting on a non-immune result which needs urgent action (i.e. provision of immunoglobulin, antivirals). Please see the following PHE guidance for further instruction: Updated restrictions on use of Varicella Zoster Immunoglobulin (VZIG) during supply shortage: advice to health professionals.

Equivocal and positive results for HIV, Hepatitis B surface antigen, Hepatitis C antibody, Syphilis antibody, CMV IgM, Rubella IgM and Toxoplasma IgM are sent to the Reference Laboratory for confirmation. Negative results for EBNA IgG are sent to the reference laboratory for EBV VCA IgM and EBV VCA IgG to determine whether there is an acute EBV infection.

21.3.2.1 Paired sera

If the first sample is negative and there is a clinical suspicion of infection then retesting may be useful after the following number of days. Please discuss with the Consultant Microbiologist if unsure.

Q Fever	7-10 days
Lyme Disease	2-4 weeks
Psittacosis/Ornithosis	2-4 weeks
Other tests	10-14 days

21.4 Blood Cultures

Clinical staff are responsible for collecting blood cultures.
Yellow ‘grab’ bags are available in West Wing Blood Bank. Each bag contains a set of adult culture bottles (one for aerobic organisms (grey/blue cap) and one for anaerobic organisms (purple/cerise cap), and all consumables required for the collection of blood cultures

Paediatric are available in West Wing Blood Bank

Clinical details: Please give details of:

- The antibiotics given.
- Indications for blood cultures
- Clinical evidence of sepsis
- Any possible source of sepsis
- Foreign travel within the last 6 months (see Section 10)

Label both bottles with patient details.

In the interests of patient safety, DO NOT COVER OR REMOVE THE BARCODE.

8-10 ml is required for each adult bottle, smaller volumes may be used if absolutely necessary but this may lead to false negative results. Addition of too much blood can lead to false positive results.

For paediatrics use paediatric (pink/silver cap) bottle only.

Blood cultures should be obtained before antimicrobial therapy if possible. If the patient is already taking antibiotics then take the blood cultures before administering the next dose.

Thorough skin disinfection is essential prior to sampling in order to minimise the risk of contamination with skin organisms. When blood is collected for a number of different tests, it is imperative that the blood culture bottle is inoculated first.

If collecting the blood culture via a line, discard the initial part of the aspirate, so that infusion fluid, antibiotic solution etc., does not contaminate the sample.

When investigating for bacterial endocarditis, 3-6 separate blood cultures should be taken before starting antibiotics if possible.

Blood cultures should remain at room temperature and transported to Pathology via the pneumatic tube system or may be delivered by hand via porter or other designated person.

Once the blood cultures are in the laboratory, they are incubated for 5 days unless bacterial endocarditis and Brucellosis is suspected, in which case incubation is extended. Thus it is important to indicate all relevant clinical information on the request form. Negative reports are issued at 48 hours for paediatrics. The Consultant Microbiologist will inform relevant clinician of any positive blood culture.

21.5 CSFs

Three consecutively taken if possible; samples labelled 1, 2 and 3 are required. If sub-arachnoid haemorrhage is suspected, the first and last sample will be counted. Please ensure the sample placed in a brown envelope for xanthochromia is NOT the first or last numbered sample. **Samples must be sent to the lab urgently as microscopy and culture should be carried out within 2 hours of collection**

- A 1-2ml sample should be collected in each sterile universal.
- Samples with raised lymphocyte counts will be referred for viral PCR.
- Any viral PCR requests received, where the lymphocyte count is not raised, will be reviewed by the Consultant Microbiologist
- Specify if TB culture is required

If meningococcal or pneumococcal meningitis is suspected, submit 2.5-5.0 ml of **blood** in EDTA, purple top tube, for PCR (NB this is performed at an external laboratory) plus a serum sample for HIV serology, and a nasopharyngeal or throat swab requesting “meningococcal culture”.

21.6 Antibiotic Assays

The Blood Science laboratory performs all gentamicin and vancomycin assays. Antibiotic assays are NOT routinely performed out of laboratory hours.

It is mandatory that serum concentrations of some antibiotics are monitored, both to ensure adequate dosing for efficacy and to avoid the risks associated with potentially toxic levels. It is essential that the following procedure be followed in order to obtain timely results for gentamicin assays:

- Specimens for gentamicin and vancomycin assay should be sent to microbiology, where it will be booked in. The sample will be then be taken to Blood Science for testing.

- Antibiotic assays must reach the laboratory before 16.00 hrs during the weekdays, for same day processing.
- On Saturday, Sunday and Bank Holiday antibiotic assays must reach the laboratory before 15.00 hrs.
- On Christmas day antibiotic assays must reach the laboratory before 10.30 hrs. You must contact the on-call Biomedical Scientist via switchboard that you are sending a specimen for an antibiotic assay

21.6.1 Gentamicin assays.

For once daily Gentamicin dosing regimens take a **trough level** only within the hour before the next dose is due.

Reference range

Trough level ≤ 1.0 mg /l

For BD dosing regimens take a pre-dose (just before the dose) and a 1 hour post-dose specimen in red topped tubes. (The BD or TDS Gentamicin dosing is used only in treatment of neonates, neutropenic sepsis and bacterial endocarditis)

Reference range:

- Pre-dose : ≤ 1.0 mg /l
- Post-dose : aim for 3 to 5 mg/l

It is important to state carefully on the request form the date and timing of specimens (or whether pre or post dose specimen) and the dosing regimen as this information is vital for interpretation of results.

21.6.2 Vancomycin assays

Only a pre dose is required - taken just before the dose is given (or due).

Reference range

- Greater than 10 mg/l
- And an upper limit of 15 mg/l
- In deep seated staphylococcal infections (e.g. bacteraemia, endocarditis, osteomyelitis) it is desirable to run trough levels higher, aiming to keep as close to 20mg/l as possible

General notes
Do not take specimens for antibiotic assays via venflons, long lines, or from the same site as the antibiotic infusion as this can lead to erroneous results.

Renal function tests should also be monitored whilst patient is on aminoglycosides or glycopeptide therapy.

Other antibiotic assays (such as amikacin, teicoplanin, streptomycin, rifampicin, colistin, voriconazole, itraconazole, posaconazole when administered as syrup, flucytosine, ganciclovir, linezolid in renal failure, etc.) require referral of specimens to other reference laboratories and therefore should be arranged in advance.

21.7 M.R.S.A. Screen swabs

The infection control team must be informed immediately if a patient is infected or suspected to be infected with Methicillin-resistant Staphylococcus aureus (M.R.S.A). They will advise on investigation and management of the patient. Special cultural techniques are used to detect M.R.S.A.; therefore it is important to indicate on the request form if M.R.S.A. is suspected.

A full MRSA screen requires a combined swab taken from the nose (both anterior nares) and groin (both sides). Axilla swab only to be included in screening prior to upper body surgery. Separate forms for each swab but may be delivered in the same bag. Ulcer or wound swabs for MRSA should be on a separate form. These will be cultured routinely for pathogens including MRSA.

A 24 hour turnaround time for MRSA swabs is available for pre-op patients who are booked in for surgery within 48 hours. These swabs must be hand delivered to the Microbiology Laboratory. This turnaround time cannot be achieved if urgent swabs are sent down within a routine batch, even if they are marked urgent.

21.8 Carbapenem resistant organism screening

Incoming patients must be questioned as part of initial clerking on their travel history especially any in-patient episodes in hospitals in the UK or abroad. Patients who have received healthcare abroad or have been an inpatient in UK other than Walsall Healthcare within the last 12 months must be **screened by rectal swab or stool specimen for CRE faecal carriage** and isolated awaiting results. Rectal swabs should be sent to the microbiology laboratory for culture on selective medium and should be labelled as **'rectal swab for CRE screening'**

21.8.1 Multi- resistant Acinetobacter baumannii (Contact Screening)

Contacts of positive patients may require screening and area will be directed by IPCT.
Predominantly patients with 8 or more hours contact duration who are still inpatients and those in current bay when patient confirmed.
Screening specimens must include:

- Urine
- Wound swabs from any open wounds
- Hairline
- Groin swab
- Sputum or throat swab if the patient is not expectorating.

Specimens should be indicated as MDR ACE contact screening.
Contacts screened should be isolated or co-horted until the screening results are known.

21.9 Vancomycin resistant Enterococci screening

Patients with a previous history of VRE should be isolated on admission and a resctal swab or stool specimen sent for VRE screening. Other clinical specimens such as urine, wound swabs, sputum should be sent as part of the basic admission screening however it should be made clear samples are also for VRE screening. The patient should remain in isolation until the result of the screening specimens is known.

21.10 Faeces MC&S

Stool samples should be sent in the appropriate containers: **Do not overfill.**

Routine investigation of faeces is designed to detect the presence of salmonella, shigella, campylobacter, *E.coli* 0157 and cryptosporidium. In addition, examination is performed for rotavirus, cholera, Yersinia enterocolitica, and ova cysts and parasites based on clinical information. It is therefore important that relevant clinical information is included on the request form, particularly regarding foreign travel. For the safety of laboratory staff, foreign travel MUST be included in the clinical details.

Testing for *Clostridium difficile* toxin can be performed, especially on patients who have diarrhoea (Bristol chart 6 or above) following antibiotic therapy i.e. elderly and surgical patients. For more information on the prevention and control of *Clostridium difficile* please click the following link

Norovirus testing is also performed in the laboratory. This should be prearranged with the infection control team before sending to the laboratory.

When an Enteropathogen is detected, the Clinician will be informed immediately followed by confirmation when available.

21.11 Mycology

Microscopy for fungal hyphae should be available within 3 days of receiving the sample. Dermatophyte culture may take up to four weeks before a result is issued.

21.12 Sputum & Other Respiratory Tract Specimens

Sputum samples obtained by physiotherapy are preferred. Specimens of saliva are of little value. When tuberculosis is suspected it is essential that this be indicated on the request form (routine samples are not examined for Mycobacterium tuberculosis). Bronchoalveolar lavage should be considered for any patient from whom satisfactory sputum samples cannot be obtained, and/or where sputum culture is negative. Culture for MTB takes up to 10 weeks.

All requests from bronchoalveolar lavage and bronchial washings are investigated for fungal pathogens. Samples which have had fungal investigation performed on, a preliminary report is issued after 48 hours from the receipt of the sample; a final report is then issued at day 7.

Microscopy for AAFB is performed 6 days per week. Results are available the same day or next working day, dependant on time of receipt.

21.13 Urine Examination

Urine culture is routinely performed on mid-stream and catheter specimens. Tests are carried out to isolate and identify pathogenic organisms. Antibiotic sensitivities are undertaken to facilitate treatment. 10-20 ml of urine is required. Urine microscopy is normally available on the day of receipt and the majority of culture results are available within 24 hours.

Examination for *Mycobacterium tuberculosis* is only made on request. Three complete early morning urine samples, taken on three consecutive days are required. EMU containers are obtainable from Specimen reception.

For examination of *Schistosoma haematobium* total urine collected between 10.00 and 14.00 hrs into sterile containers without boric acid preservative is required. Alternatively, a 24-h collection of terminal urine may be examined

For Chlamydia and gonorrhoea investigation please click here

21.14 Uro-Genital Swabs

Investigation includes Gram stain and wet prep for Bacterial vaginosis and Trichomonas vaginalis and routine culture. Some genito-urinary tract pathogens rapidly lose viability on swabs; therefore these specimens must be transported to the laboratory as soon as possible.

- **Cervical swabs:** Satisfactory endocervical swabs can only be obtained using a speculum. Clean the cervical os with sterile gauze before sampling. Insert the swab a few mm into the endocervical canal and rotate it several times. Withdraw the swab without touching the vaginal wall.
- **Vaginal swabs:** A high vaginal swab is obtained from the posterior fornix and upper lateral vaginal walls after visualisation using a speculum. Low vaginal swabs may be collected without the aid of a speculum.
- **Urethral swabs:** Insert the swab a few mm (females) or 1-4 cm (males) into the urethra, rotating the swab as it is withdrawn.

If Chlamydia/Gonorrhea is suspected please send an Aptima swab/urine for PCR (see below)

21.15 Chlamydia and gonorrhoea Molecular Testing

A Hologic Aptima molecular technique (transcription mediated amplification) for the detection of *Chlamydia trachomatis* and *Neisseria gonorrhoeae* is used for diagnosis of chlamydia and gonorrhoea infections. This test is suitable for examining urine, oral and uro-genital swabs. Ophthalmic samples are also accepted for this test however please note this test has not been validated for this sample type.

Specimen collection, handling, storage and transport instructions are printed on the Hologic Aptima collection kit packaging.

For quick reference

Yellow label	Urine Collection Kit
White/purple label	Unisex swab (endocervix/urethral/oral/ophthalmic)
Orange label	For self-taken vaginal swabs only, as part of Chlamydia Screening Programme. Full instructions given on Chlamydia/gonorrhoea Screening request form

Hologic Aptima collection kits are available from Pathology Stores. Only the Hologic Aptima collection system is compatible with the current laboratory equipment. Any other swabs received will be rejected.

21.16 Wound Swabs, Aspirates & Pus Specimens

Specimens are processed to isolate and identify pathogenic organisms responsible for the formation of abscesses and purulent discharges and infection. Antibiotic sensitivity tests are also carried out to ensure effective treatment. The specimen may be collected by inserting a swab deep into the wound or by collection pus into a sterile universal container. Aspirates (e.g. pleural, joint, peritoneal etc.) as well as surgical specimens requiring microbiological investigation are to be placed in sterile, screw-capped containers with no added fixatives or preservatives. Sterile fluids, e.g. ascitic, joint and pleural, may also be sent in blood culture bottles but an additional sample in a plain universal container must be sent for microscopy.

21.17 COVID – 19

For routine testing the Hologic Aptima molecular technique (transcription mediated amplification) is used for the detection of SARS CoV-2.

Specimens will be tested throughout normal working hours. Specimens arriving out of hours will be batch tested between 20:00 – 21:00pm. Specimens arriving later than this will be tested the following morning.

The laboratory is also able to offer a rapid test, which utilises the GeneXpert analyser. However there is a limited supply of cartridges and as a result the number of rapid tests is limited to a set number per day. Due to the limitation in the number the lab can test we have had to target areas where the rapid testing wil be most effective, as a result, rapid testing is available for the following groups

- Patients on ICU who have not tested positive for COVID19 previously.
- Selected patients coming through ED who look unlikely on clinical / radiological grounds to have COVID 19 but present with a respiratory infection. In these instances the test can be used to aid placement of these patient to non- COVID19 areas.
- Situations where the IPCT request a rapid diagnosis for inpatients for infection control priorities, patient isolation and management.

As with the routine samples, rapid samples will be tested throughout normal working hours, then batch tested between 20:00 – 21:00pm

22 Laboratory results

All positive blood cultures, CSFs, other sterile fluids and clinically important isolates are communicated promptly by the Consultant Microbiologist to the relevant clinical team, the ward sister, or the most senior person available who is dealing with the patient. Results from reference laboratories will be telephoned to the requesting wards, as deemed necessary by the consultant microbiologist. Provisional results may be obtained by telephone if available. Final results from all samples are available on Fusion or via GP links.

23 Reference ranges

The reference ranges of the following tests are given below.

- Aspergillus precipitins
- Avian precipitins

Test	Normal range	Units
Aspergillus precipitins	0-40	mg/L
Avian Precipitins	0-40	mg/L

Budgie feathers	0-40	mg/L
Budgie Droppings	0-40	mg/L
Pigeon serum	0-40	mg/L
Pigeon feathers	0-40	mg/L
Pigeon droppings	0-40	mg/L

For gentamicin and vancomycin reference ranges click here

24 Turnaround times

The turnaround time (TAT) for specific tests/specimen types is calculated from the date of receipt to the date of authorisation. Targets for each request type are set by the laboratory for the number of calendar days within which 90% of reports are issued. General bacteriology specimens are processed 7 days a week (including follow up work). Serology, parasitology and mycology requests are processed Monday to Friday. The turnaround times achieved for specific requests are shown in the table below.

Specimen/Request type	**TAT***	**Specimen/Request type**	**TAT***
MRSA	1	HIV serology	1
Urine Microscopy	0	Hepatitis serology (A,B,C)	2
Urine Culture	2	Syphilis	1
Swabs/Fluids	3	Rubella serology	3
Sputum	3	VZ/Measles/Mumps IgG	3
Faeces Culture	3	Toxoplasma serology	2
Norovirus	1	CMV serology	3
Rota/Adenovirus	1	EBV (EBNA)	3
CDT	1	ASO titre	1
OCP	4	Gent/Vanc Assay	1
Blood culture	6	Legionella/Pneumo Urine Ag	0
Chlamydia/GC (molecular)	3	HIV viral loads	4
GC culture (Sexual Health)	3	**Most common/vital referred tests**	
CSF culture	3	Pneumocystis PCR	5
Mycology	33	Meningo/Pneumococcal PCR	10
TB culture	69	Respiratory PCR	6
Resistant Org. Screen (pre-op)	3	Aspergillus precipitins	12
Antenatal infectious disease screen	0	Herpes PCR	7
COVID-19	1	Syphilis confirmation	12
		HCV viral load	11
		Functional antibodies	21

*Figures refer to turnaround times achieved April – Dec 2017.

25 Rejection of Specimens Submitted to the Laboratory.

Occasionally the laboratory has to reject specimens for the following reasons:

- Unlabelled labelled specimens. (*See below)
- Insufficiently labelled specimens (**See below)
- The request is not for Microbiology.

- Incomplete request form (no patient details)
- The details on the specimen and the request form do not match.
- Insufficient information on the request form to determine the examination required.
- The sample submitted is unsuitable for the investigation requested.
- The sample fails to comply with Health and Safety regulations.
- Leakage or loss of sample due to damaged container.
- Poor quality of specimen, e.g. sample not fresh, haemolysed
- Samples of saliva for respiratory culture
- Solid stool samples (except for ova cysts and parasites)

*__Unlabelled Specimens__ - These will not be processed. Unrepeatable specimens only will be processed following the completion of an “unlabelled specimen” form by a member of the ward staff.

__Insufficiently labelled specimens__ – Samples must be labelled with the first and surname, plus date of birth, NHS number or hospital number. Unrepeatable specimens only will be processed following the completion of an “unlabelled specimen” form by a member of the ward staff.

The laboratory will contact the ward/clinician to inform them of rejected specimens, at the discretion of the Laboratory Section Manager. A report will be issued giving the reason for the rejection of the specimen unless there are insufficient details provided to admit the patient onto the system or match with an existing patient.

26 Specimen quality

The reliability and value of test results depends of numerous factors. Improper collection, transport or processing of a specimen can affect test performance and the interpretation of results. For example

- Site of Collection, *e.g.* For pertussis infection, a properly taken pernasal swab is essential to ensure recovery of the organism
- Sample Container, *e.g.* a urine containing boric acid may not be used for TB culture.
- Transport Medium e.g. samples for PCR must be sent in viral transport media and not in charcoal-based transport medium
- Transport Time, *i.e.* specimens should be transported to the laboratory as soon as possible to increase likelihood of recovering pathogens. See table below for the maximum age of the specimen before it is rejected for being too old to process
- Transport Temperature - Specimens left at room temperature will become overgrown with normal bacterial flora. Bacteria can multiply at room temperature particularly in urine samples. Therefore it is very important to have the specimens sent to the laboratory straight away or refrigerated in the specimen collection points. (Exceptions include blood culture bottles and genitourinary samples for gonococcal culture - these should not be refrigerated be transported to the laboratory as soon as possible)
- Volume of specimen, *e.g.* blood cultures.
- Time of Collection, *e.g.* Samples for culture should, if possible, be taken before antibiotics are started.
- Poor quality specimens, *e.g.* blood cultures may be contaminated with skin flora if there is inadequate skin disinfection.
- Clinical details - in some cases we will only perform certain tests if indicated by the clinical details. Important clinical details include history of foreign travel, recent hospitalisation abroad, occupational factors such as abattoir worker or vet, and vaccination history.

If in any doubt, please contact the laboratory for advice

Specimen	Maximum age
Blood cultures	Blood cultures must be delivered to laboratory as soon as possible. No samples are rejected but bottles taking >48hours will be referred as a clinical incident.
Urine (in boric acid)	4 days
Urine (not in boric acid)	2 days
Urine TB investigations	3 days refrigerated
Wound swab	3 days
Genital swabs	3 days
Stools	3 days
Stool for Norovirus PCR	2 days
Stool for Clostridium	3 days
Clostridium difficile	3 days
Serum	N/A (depends on storage)
Nose and throat swab for Panther COVID-19	4 days if refrigerated
Nose and throat swab for Rapid COVID-19	8 hours if sample kept at room temperature or 7 days if sample refrigerated
Mycology • Nail	N/A

• Hair • Skin	
Sputum • Culture • TB investigation	 • 2 days • 3 days
Fluids including: • Ascitic • Pleural • Dialysis etc.	 • 3 days • 3 days • 3 days
Pus/Tissue	Refer to senior member of staff if >3days
Chlamydia/GC • Plain Urine specimen • Urine in Aptima transport tube and swab in Aptima transport tube	 5 days 4 weeks
HIV viral load • Whole blood	 Within 24 hours

27 Reference Laboratories

Below is a list of reference laboratories to which work is routinely referred.

Reference Laboratory	Test
Immunology Dept. Blood Sciences Pathology Department Sandwell and West Birmingham Hospital NHS Trust Sandwell Hospital Lyndon West Bromwich B17 4HJ Tel: 0121 507 4258	Specific antibodies: Haemophilus influenzae b immunity, Streptococcus pneumoniae immunity and Tetanus immunity
PHE, Birmingham Heartlands Hospital, Bordesley Green East, Birmingham B9 5SS Tel: 0121 424 2000 Switchboard 0121 424 3256- Laboratory Enquiries	Adenovirus PCR, Bordetella PCR, Coxsackie A & B Virus, CMV PCR, CMV serology, Cryptococcal antigen, Electron Microscopy for Viruses, CSF PCR, Hepatitis A IgG (immunity), HBsAg confirmation, Hepatitis B markers (HBeAg) and HBeAb), Hepatitis B DNA (HBV Viral load), Hepatitis C antibody, PCR & viral load, Herpes simplex PCR, HIV confirmation, HIV Resistance and Tropism, Legionella antibody, Mumps PCR, Mycobacteria culture and sensitivity, Rhinovirus, Respiratory Syncytial Virus (RSV), VZV IgM/PCR on CSF, E.coli 0157 (confirmation of isolate only), Pneumocystis PCP, MERS-Coronavirus Aspergillus (Galactomanan) antigen test (?infection) Measles IgM and Mumps IgM
Oxford Immunotec 143 Park Drive Milton Park Abingdon	TSpot

Oxfordshire OX14 4SE Tel 01235 442 780	
Antimicrobial Reference Laboratory Dept of Microbiology Lime Walk Building Southmead Hospital Westbury on Trym Bristol BS10 5NB **Tel:** 0117 323 5698/54	Antimicrobial Assay Service Itraconazole, Amikacin, Rifampicin, Streptomycin, Rifambutin, Teicoplanin, Tobramycin levels
Public Health England South West Laboratory Myrtle Road Kingsdown Bristol BS2 8EL **Tel:** 0117 342 5028	Identification service for yeasts and moulds, including dermatophytes. Reference antifungal susceptibility testing. Serology for dimorphic pathogens and other unusual infections. National Collection of Fungi. Voriconazole levels
Public Health Wales Microbiology Cardiff University Hospital of Wales Heath Park Cardiff CF14 4XW Tel: 029 20 742 171	Anaerobes (particularly *Clostridium difficile*), Actinomyces spp, metronidazole resistance in anaerobes
Brucella Special Diagnostic Unit Liverpool Clinical Laboratories Virology Department 8th floor Duncan Building Royal Liverpool & Broadgreen Hospital Prescott Street Liverpool L7 8XP Tel: 0151 529 4900	Brucella
Laboratories at PHE: Centre for Infections 61 Colindale Avenue London NW9 5EQ	
AMRHAI Reference Unit Antimicrobial Resistance & Healthcare Associated Infections Tel 020 8327 6511/7887	Exceptional aspects of antimicrobial resistance S.aureus vanc, teic,lin, tig. CNS vanc, lin tig. HIN 3rd generation carbapenem. Acinetobacter, colistin Coryne jeikeum, vanc, teic lin SPN mero vanc teic lin tige pen>4mg/l cefotaxime >2mg/l Ps aeruginosa colistin MBL +ve. BHS A,B,C,G pen vanc teic lin tige Enterococci lin teic Enterobacteriacae ery mero imi colistin
Virus reference Department (VRD) IDU Immunisation and diagnosis Unit Tel: 020 8327 6017	Polyoma virus (JC and BK), Polio, Coxsackie,
Virus reference Department (VRD) SSU Seromolecular services unit Tel 0203827 6971	HIV-1, HIV-2, Hepatitis D

GBRU Gastrointestinal Bacteria Reference Unit Tel: 020 8327 7887	Salmonella, Shigella, Vibrio, Yersinia, Campylobacter, Citrobacter, E.coli verotoxin (stool sample only) Bacillus, Clostridium perfringens, Clostridium botulilum, Listeria, Stahylococcal toxins.
AMRHAI Antimicrobial Resistance and Healthcare associated Infections Tel 020 8327 6511/7887	Staphylococci, MRSA, Enterococci, Klebsiella, Enterobacter, Serratia, Pseudomonas, Stenotrophomonas, Burkholderia, Acinetobacter, Achromobacter xylosoxidans Hospital Infection Advice
RVPBRU Respiratory and Vaccine Preventable Bacteria Reference Unit Tel: 0208327 7887	Streptococci (Groups A, B, C and G and all other streptococcal species, related genera), Streptococcus pneumoniae, potentially toxigenic corynebacteria (Corynebacterium diphtheriae, C. ulcerans, C. pseudotuberculosis), Diphtheria serology, Bartonella Spp. (cat scratch fever), Haemophilus influenzae, Bordetella spp, Legionella urine Ag confirmation
Virus reference Department (VRD) AVU Antiviral Unit Tel: 020 8327 6017	HTLV I and II, human papilloma virus, TSEs, Hepatitis D, Enterovirus PCR, HBsAg quantitation
STBRU Sexually Transmitted Bacteria Reference Unit **Tel:** 020 8327 7887	Bacterial sexually transmitted pathogens: Neisseria gonorrhoeae, Treponema palladium, Chlamydia trachomatis
Department of Clinical Parasitology, Hospital for Tropical Diseases 3rd floor Mortimer Market Centre Mortimer Market London WC1E 6JB **Tel:** 020 7927 2427	Parasites and amoeba -Taenia serology -Microsporidium (faeces) - Amoebic/hydatid serology -Filariasis serology -Toxocara antibodies
Meningococcal reference unit (Men RU) Manchester Clinical Sciences Building 2, Manchester Royal Infirmary Oxford Road Manchester M13 9WL Tel: 0161 276 6757	Meningococcal typing Meningococcal PCR Pneumococcal PCR
Manchester Medical Microbiology PO Box 209 Clinical Sciences Centre Manchester Royal Infirmary Oxford Road Manchester M13 9WL	Herpes simplex type specific serology See also Meningococcal Ref Unit above

Specialist Microbiology Services **Rare and imported pathogens laboratory (RIPL)** Public Health England Manor Farm Road Porton Down Wiltshire SP4 0JG Tel: + 44 (0) 1980 612 348 (9-5) Tel: + 44 (0) 1980 612100 (24 hour)	Arboviruses, Haemorrhagic Fever Viruses, Nipah and Hendra viruses, Rickettsiae and Coxiella burneti (Q Fever), Bacillus anthracis, Hantavirus, Lyme's disease (Borrelia) Rabies, Pox viruses including small pox, Lyme disease.
Cryptosporidium Reference Unit Public Health Wales Microbiology ABM Singleton Hospital Sgeti Swansea SA2 8QA Tel : 01792 285341	Cryptosporidia (faeces)
Protein Reference Unit & Immunology Department Laboratory Medicine Building North Lane Northern General Hospital Herries Road SHEFFIELD S5 7AU Tel : 0114 271 5552	Aspergillus precipitins Avian precipitins
Microbiology The Royal Wolverhampton Hospital NHS Trust New Cross Hospital Wednesfield Road Wolverhampton WV3 9QR Tel : 01902 307999 Speed dial *3147	Mycobacteria culture (all specimens except blood and bone marrow which are sent direct to Heartlands),
PHE Bristol Myrtle Road Bristol BS2 8EL Tel: 0117 342 5551	Mycoplasma Ab
Lab21 Ltd Park House Winship Road Milton Cambridge Cambridgeshire CB24 6BQ UK Tel : 01223 395450	HIV Therapeutic Drug Monitoring (TDM)
Leeds Teaching Hospitals NHS Trust Old Medical School Leeds General Infirmary Leeds Thoresby Place LS1 3EX Tel: 0113-3928766	Histoplasma serology
The National Creutzfeldt-Jakob Disease Research & Surveillance Unit	PrP CJD CSF maybe stored ready for collection at -70°C.

Western General Hospital Crewe Road Edinburgh EH4 2XU Main Office +44 (0)131 537 1980/2128/3103 Neuropathology Laboratory +44 (0)131 537 3084 CSF Referrals +44 (0)131 537 3075	Request/transport all done by clinician. Only lab involvement is storage of specimen prior to transport.
Biochemistry Walsall Manor Hospital Moat Road Walsall WS2 9PS Tel: 01922 721172 ext. 6473/6485	Gentamicin and Vancomycin assay
Histopathology Department Birmingham Heartlands Hospital, Bordesley Green East, Birmingham B9 5SS Tel: 0121 424 0838 Tel: 0121 424 0196	BAL Differential cell count

28 Appendix 1 LABORATORY CHAIN OF EVIDENCE FORM

Date and Time:		**Doctor's Name and Position:**	
Location:	**Contact No:**	**Doctor's Signature:**	
Patient's Name:		**D.O.B:**	**Hospital/NHS Number:**
Clinical Details:			

Specimen Type:	
Tests requested:	

ALL NAMES MUST BE ACCOMPANIED BY A SIGNATURE
(Add additional Names and Details as appropriate)

PROCEDURE	NAME	SIGNATURE	DATE	TIME
1. Specimen taken by:				
2. Specimen delivered by:				
3. Received by: On call (Y/N)				
4. Senior registered scientist check at receipt:				
5.				
6.				
7.				
8.				
9.				

Please Return Completed form to the Consultant Paediatrician on call at Walsall Manor Hospital