Saolta
Grúpa Ollscoile Cúram Sláinte
University Health Care Group

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

Letterkenny University Hospital

MICROBIOLOGY USER MANUAL

Rev 23 Change Description:

Section 1.8 '*Notification of critical results'* added
Section 2.2 '*Specimen containers'* updated.
Section 3.6 '*Urine Specimens'* updated (rejection of urine samples >48hrs).
Section 4 '*Urine Culture'* updated to include automated urine microscopy and criteria for culture.
Section 6.2 Adenosine deaminase for TB added

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GUIDE TO USING THIS MANUAL

This User Manual has been prepared in conjunction with The Pathology Department User Manual (MP-GEN-0064) to inform the users of the Saolta University Health Care Group, Letterkenny University Hospital, Pathology Department of which services are available within the Pathology Department and how to obtain the services required.

PLEASE REFER TO DOCUMENT MP-GEN-0064, THE PATHOLOGY DEPARTMENT GENERAL USER MANUAL FOR GUIDANCE ON USING THESE DOCUMENTS.

Documents are available on Q-Pulse and also on the HSE Website http://www.hse.ie/luhPathology

Contents

1 INTRODUCTION

This manual is designed to give an overall view of the services available in the Microbiology Laboratory at Letterkenny University Hospital. It is intended as a quick reference guide for all users of the Saolta University Health Care Group, Letterkenny University Hospital, Microbiology Department. This includes both GP and Hospital Clinicians.

Please note this manual is intended for use as a guide only.

1.1 Service Description

The department offers a comprehensive range of diagnostic services in routine Bacteriology, Parasitology, Serology and Virology. All Mycobacteriology is referred to Galway University Hospital. Mycology work (other than microscopy) on fungal isolates, with the exception of Candida species, is provided by external referral laboratories. The department also offers consultation in microbiology, infectious diseases and antibiotic utilisation and provision of statistical and cumulative data for infectious disease monitoring.

The proper selection, collection and transport of specimens to the laboratory is, an essential part of the quality assurance of the microbiology laboratory. Results are reported rapidly and phoned if necessary to ensure timely intervention for optimum patient care. As part of the quality assurance process within the laboratory, turnaround times are routinely audited.

The department was accredited by the Irish National Accreditation Board (INAB) in September 2010.

Please note: samples requested from Web Doctor will not be processed in the Pathology Department at LUH.

1.2 Scope of Service

• Diagnostic bacteriology including antimicrobial susceptibility testing.
• Diagnostic microbial serology and virology.
• Guidance on antimicrobial chemotherapy.
• Guidance on infection prevention and control and outbreak management.
• Semen analysis (Andrology)

1.2.1 Clinical Advisory Services

Microbiology
Dr. M. Mulhern, Dr M. Kayalova and Dr J. Sarma, Consultant Microbiologists are available to provide Microbiology clinical advice and are contactable via switch.

Andrology
Dr M McKernan, Consultant Gynaecologist and Dr M. Kayalova, Consultant Microbiologist are available to provide Andrology clinical advice and are contactable via switch.

1.3 Contact Details

Title	Name	Phone*	Email
Microbiology lab for general enquiries		074912 **3557**	
Consultant Microbiologist	Dr. Michael Mulhern	Ext **4090**	michaelf.mulhern@hse.ie
Consultant Microbiologist	Dr. Muna Kayalova	Ext **2255**	muna.kayalova@hse.ie
Consultant Microbiologist	Dr. Jayanta Sarma	Ext **5202**	Jayanta.sarma@hse.ie
Consultant Microbiologist secretary	Katriona Maguire	074910 **4479**	
Chief Medical Scientist (Microbiology)	Judith Rodgers	074910 **4618**	judith.rodgers@hse.ie
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Senior Medical Scientists	Des Sweeney Laura Wilson Deirdre Cunningham Julie McGee	074 912 **3610**	des.sweeney@hse.ie laura.wilson3@hse.ie deirdre.cunningham3@hse.ie julie.mcgee@hse.ie
Infection Control Nurse Manager	Virginia Murray	074910 **4203**	virginia.murray@hse.ie
Infection Prevention & Control Team	Martina Grealish Mary Gibbons Maureen Carlin Ginji Bijo	**4413** **4621** **2550** **4099**	martina.grealish@hse.ie mary.gibbons3@hse.ie maureen.carlin@hse.ie gingi.bijo@hse.ie
Consultant Gynaecologist (Andrology)	Dr. Matthew Mc Kernan	074910 **4644**	matthew.mckernan@hse.ie

1.4 Turnaround Times

Expected turnaround times for common requests are identified in Sections 4 and 6. Turnaround time is defined as the time from specimen receipt in the Pathology Department to the time results are available. Turnaround times may be increased by to 48-72 hours to allow for weekends and bank holiday weekends. If a specimen requires further work, the turnaround times may be extended by one or more days.
The times stated are deliverable in 90% of instances in normal circumstances. There are times, due to factors outside the laboratory's control, that the stated turnaround times may be exceeded. These events are infrequent and will be explained to users at the time.
If the laboratory fails to meet expected turnaround times please contact Chief Medical Scientist or Pathology Manager (see contact list in the Pathology Department User Manual (MP-GEN-0064)).

1.5 Laboratory Accreditation

The Microbiology Laboratory is currently accredited by the Irish National Accreditation Board (INAB) in compliance with the International Standard ISO/IEC 15189 (Registration number 210MT). The scope of accreditation for the Microbiology Laboratory is controlled by INAB and available on their website: http://www.inab.ie

1.6 Uncertainty of Measurement

Uncertainty of Measurement data is available to users on request for cell counts, andrology and molecular tests.

1.7 Notification of Infectious Diseases

All medical practitioners, including clinical directors of diagnostic laboratories, are required by law to notify the Medical Officer of Health (MOH)/Director of Public Health (DPH) of certain diseases. This information is used to investigate cases thus preventing spread of infection and further cases. The information will also facilitate the early identification of outbreaks. It is also used to monitor the burden and changing levels of diseases, which can provide evidence for public health interventions such as immunisation. The list of diseases (and their respective causative pathogens) that are notifiable is contained in the Infectious Diseases Regulations 1981 and subsequent amendments.

The list of notifiable diseases is available at
https://www.hpsc.ie/notifiablediseases/listofnotifiablediseases/

1.8 Notification of Critical Results

Positive blood culture, CSF, bacterial and viral enteric pathogens (faeces samples) and legionella and pneumococcal urinary antigens will be telephoned to the requesting ward/GP. **Please note: this list is not exhaustive.**

2 GENERAL GUIDELINES

2.1 Collection of specimens

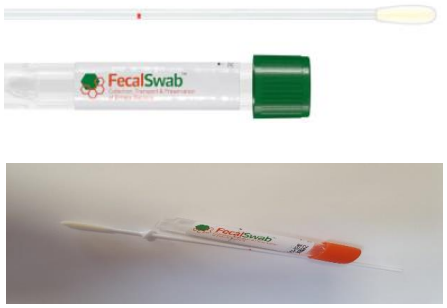
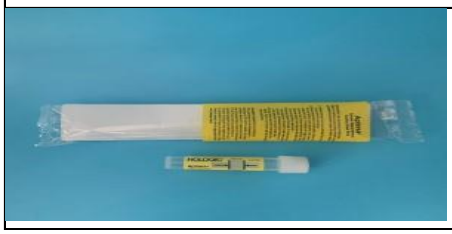
Collect specimens before commencement of antimicrobial therapy. This is usually possible for most mild infections. For more serious infections, antimicrobial therapy should not be withheld pending collection of a specific specimen. For example, antimicrobial therapy should not be withheld pending collection of CSF from an individual with suspected meningitis or collection of sputum from an individual with severe pneumonia. However, blood cultures can be obtained in nearly all cases prior to antimicrobial treatment of serious infection.

If in any doubt as to the appropriate container, please contact the laboratory for advice.

Please send an adequate amount of specimen. As a general rule – 'the more specimen the better'. If pus is present, send pus rather than a swab and remember to send enough specimen if a series of tests are required. This applies to CSF and serology specimens in particular.

2.2 Specimen containers

Microbiology containers		Use	Additional Information
	Blood Culture Aerobic (Adult)	Blood Culture	
	Blood Culture Anaerobic (Adult)	Blood Culture	
	Paediatric Blood Culture (Paediatric)	Blood Culture	
	Urine Tube 6.0ml (Yellow Cap)	Urine	
	Urine Beaker 100ml with Integrated Transfer Device	Urine	**Collection device for URINE COLLECTION ONLY – Do not send to Laboratory. Do not use for other sample types.**
	Sarstead Semen Analysis Containers	Semen Analysis	Not to be used for any other sample types
	20ml Universal Container	Used for CSF, faeces, sputum, pus, sterile fluids, tissue, skin scrapings, nail clippings	

Microbiology containers		Use	Additional Information
	Copan Fecal Swabs. Green/orange top Liquid media	CPE & VRE	
	Amies Charcoal Swab Black Top	Culture	
	Copan Fine tip wire swab, Orange top	Ear, pernasal, urethra for culture	Pernasal swab for B. pertussis should be sent to lab as soon as possible to preserve organism viability.
	Adult Serum gel tube 5ml (Gold Cap)	Occupational exposure samples, antibody detection, serology	
	Adult EDTA tube 3ml (Pink/Purple Cap)	PCR, Fluid Differential Count	
	Paediatric1ml EDTA tube (Lavender Cap)	PCR, Fluid Differential Count	
	Unisex Chlamydia Urine Specimen Collection Kit	Chlamydia/Gonorrhoea PCR	

Microbiology containers		Use	Additional Information
	Purple Unisex Chlamydia Swab Specimen Collection Kit. Endocervical and Male Urethral (Nurse/Dr collect)	Chlamydia/Gonorrhoea PCR	
	Orange: Multitest Chlamydia Swab Specimen Collection Kit (Self collection)	Chlamydia/Gonorrhoea PCR	
	Primestore MTM Nasopharyngeal/oropharyn-geal molecular transport swab Orange Cap	Respiratory viruses including Influenza, RSV and SARS-CoV-2	**Please DO NOT confuse this swab with fecal swab for CPE and VRE as illustrated above.**
	Copan UTM VIROLOGY Liquid swab (**Red Top**) referrals to NVRL only	MPOX, viral PCR,	
	Oracol Saliva Collection System	Measles, Mumps	
	QuantiFERON-TB Gold®	Quantiferon gold assay	Please adhere to specific collection instructions provided and return fully completed Mater Hospital request form with samples.

2.3 Completion of request forms and specimen identification

Please refer to the **General Information User Guide, MP-GEN-0064, Section 8 for sample** and request form labeling requirements. This manual is available on Q-Pulse and the HSE website **http://www.hse.ie/luhPathology**

2.4 Storage and Transport of specimens to the laboratory

Storage

Specimens should be transported as soon as possible. If processing is delayed, refrigeration is preferable to storage at ambient temperature, with the exception of Blood cultures and Cerebrospinal fluid which should be held at room temperature. It is recommended that inoculated blood culture bottles be placed onto the blood culture analyser as soon as possible after collection, ideally within 4 hours. If there is an unavoidable delay, inoculated bottles may be maintained at room temperature up to 24 hours before loading onto the instrument. Blood cultures **MUST NOT** be refrigerated.

Transport

Specimens should be transported to the laboratory without delay to ensure optimal results. Please see Policy on Transport of Specimens to the Laboratory MP-GEN-0060
All specimen containers must be tightly closed and placed in a transparent hazard bag for transport to the laboratory.
It is the responsibility of the person dispatching the specimen to the laboratory to ensure that it is packaged correctly, and does not pose a risk to anyone coming in contact with it during transport or on receipt in the laboratory.

All CSF specimens are treated with priority in the Microbiology Laboratory.

Outside normal hours the requesting clinician must ensure that the on call medical scientist in Microbiology is aware that a CSF is expected.
CSF specimens should not be transported via the pneumatic tube system

Please contact the Consultant Microbiologist and the laboratory prior to sending any samples for **Mpox**.

2.5 Storage of specimens in the laboratory

Please note:

Samples received in the Microbiology Laboratory are stored at 2-8^{o}C

Samples are retained for 48hr at 2-8^{o}C after the final result has been issued.

Subject to approval by the Consultant Microbiologist, additional examinations may be requested within 48hrs.

If an analytical or quality control failure occurs there may be a delay in reporting test results. In this event all attempts will be made for repeat testing of the primary sample however on occasion it may be necessary to request a repeat sample.

3 RECOMMENDED SAMPLES TO BE SENT FROM PATIENTS WITH PARTICULAR CLINICAL SYNDROMES

3.1 Suspected bacteraemia, Systemic Inflammatory Response Syndrome (SIRS), Sepsis, Septic Shock

Blood cultures - For optimum sensitivity, two sets of blood cultures should be collected from separate sites within a 24 hour period. These should be taken at least 20 min apart. For patients with suspected endocarditis, three sets should be collected.

Method: When taking a blood culture observe standard precautions, wash hands, carefully disinfect the skin with alcohol, allow to dry, insert needle (winged set) into vein, collect 10 ml of blood into an aerobic and 10 ml into an anaerobic blood culture bottle (ensuring that the tops of each bottle are disinfected with an alcohol wipe prior to inoculation). The order of inoculation is dependent on the collection method. When using a winged set the aerobic bottle is inoculated first followed by the anaerobic bottle. If using a needle and syringe, inoculate anaerobic bottle first followed by aerobic bottle. Yeasts and fungi may be detected using the normal blood culture system.

Refer to the “fill line” on each bottle to ensure the correct amount of blood is collected.

Specific aerobic bottles are available for paediatric patients. Fill volume is dependent on patient weight.

Refer to section 10 below for further information on the collection of blood cultures.

Look for a focus of infection and culture those sites appropriate to a suspected focus.

3.2 CNS infections

Blood cultures
Blood cultures should be collected from all patients with suspected meningitis.

CSF
CSF should be collected from all adult patients with suspected meningitis except when a clear contraindication exists (e.g. signs of raised intra-cranial pressure, focal neurological signs,

severe shock, severely depressed or fluctuating conscious level, coagulation disorder). Note antimicrobials should NOT be withheld pending a lumbar puncture.

Plasma
Send 5 ml EDTA blood for bacterial PCR.

Stool
Stool specimen should also be sent for enterovirus if viral meningitis suspected.

3.3 Respiratory tract infection

Tonsillopharyngitis
Send a throat swab. Please contact the laboratory if diphtheria is suspected.

Sinusitis:
Using a syringe aspiration technique, a specially trained physician or an ENT surgeon can obtain material from maxillary, frontal, or other sinuses. Place the contents of the syringe into a sterile universal container.

Otitis media:
Send ear swab to the laboratory.

Diagnosis of Whooping cough (*B. pertussis*)
Send charcoal pernasal swab to the laboratory without delay. *B. pertussis* investigations are referred to CHI Crumlin for PCR and culture.

Bronchitis:
A good quality purulent or mucopurulent sputum specimen should be obtained, preferably before antimicrobial therapy.

Pneumonia:
It is not necessary to perform a full range of microbiological investigations on all patients with community-acquired pneumonia. The extent of investigation should be determined by the severity and clinical course. Specimens that should/may be sent include:

- Blood cultures should be obtained from all patients with moderate to severe CAP.
- Sputum: A good quality purulent or mucopurulent sputum specimen should be obtained from patients ill enough to require hospital admission or those being treated in the community and not responding to initial antibiotic therapy. Collect specimens before starting antimicrobial therapy where possible. BAL and sputum should be processed promptly to give the best opportunity to culture pathogenic organisms and reduce the risk of overgrowth with contaminants. If processing has to be delayed up to 24 hours, refrigeration is preferable to storage at ambient temperature.

- *Legionella* sputum culture should be specifically requested from patients with severe community acquired pneumonia, or where *Legionella* infection is suspected on epidemiological grounds.
- Urine for *Legionella* antigen and *Streptococcus pneumoniae* antigen should be obtained from all patients with severe CAP and particular patients with specific risk factors.

- Pleural fluid: If a pleural effusion is present, consider aspiration into a sterile universal container at an early stage.

- Bronchoscopic samples may also be required, especially among immunocompromised patients.

- *Pneumocystis jiroveci*: diagnosis of Pneumocystis is carried out on bronchoscopic or induced sputum samples.

3.4 Gastrointestinal tract infection

Gastroenteritis

Please note that this laboratory employs a cost-effective approach to the diagnosis of infectious diarrhoea. Not all specimens are examined for every pathogen. It is therefore important that clinical details or suspected diagnoses are included on the request form. Information that is of use when processing specimens includes: travel history, relationship to a particular food, prolonged diarrhoea, antibiotic use, suspected outbreak.

The laboratory examines all stool samples from patients who have been in hospital for 3 days or less for:

Salmonella
Shigella
Verotoxin producing *E. coli*
Campylobacter
Cryptosporidia
Giardia species

Clostridoides difficile antigen and toxin detection is performed on all diarrhoeal specimens from patients >2years. (Sample must take the shape of the container).

Faecal specimens are examined for rotavirus and adenovirus from all patients up to 5 years of age.

Other pathogens e.g. *Yersinia, Vibrio, Aeromonas*, ova and parasites etc. are only examined if the clinical details suggest that possibility.

Please note the possibility of Norovirus infection and state whether vomiting is a feature or whether an outbreak is suspected. Norovirus requests **must** be discussed with the Infection Prevention and Control team (hospital or community) prior to sending samples.

Please send a blood culture if typhoid fever is suspected.

When to send a stool specimen: Send a stool specimen to the laboratory when there are ≥3 liquid or very loose stools per day. There may be other symptoms suggestive of infectious diarrhoea e.g. abdominal pain or discomfort, nausea, faecal urgency, tenesmus, fever, blood or mucus in stools. Within the hospital, specimens must be sent to the laboratory immediately. In General Practice, please refrigerate if there is to be a delay in transporting the specimen.

How many samples to send: One stool specimen is normally all that is required for culture.

As microscopy for parasites is less sensitive, please send 3 specimens (but no more than 3) on different days as some parasites are excreted intermittently. If a worm is excreted, please send the worm and faeces sample.
Sellotape slide for **Enterobius vermicularis (Thread/Pinworm**). Samples should be taken between 10pm and midnight, or early in the morning, before defecation or bathing.
Method: Apply clear Sellotape to the perianal region, pressing the adhesive side of the tape firmly against the left and right perianal folds several times; the tape can be wrapped around a tongue depressor to aid specimen collection. Carefully smooth the tape back on the glass microscope slide, adhesive side down. Sellotape samples NOT affixed to a slide will NOT be examined. A swab of the area also cannot be examined
Parasitology requests (including threadworms) are referred to an external laboratory (see section 6.2).

How much to send: Please fill a universal specimen container to between ¼ and ½ full. Please do not fill to the brim. Formed stools are not routinely tested.

Rectal swabs
Rectal swabs are collected primarily for the detection of carriage of Vancomycin-Resistant *Enterococci* (VRE), Carbapenamase producing enterobacterales (CPE), or for culture for *Neisseria gonorrhoeae*. Insert swab about 2 cm into anal cavity, rotate and send specimen to laboratory. Please specify required test on request form.

3.5 Bone and joint infection

Osteomyelitis
Blood culture: Blood cultures should be performed an all patients with suspected osteomyelitis, preferably before antibiotics are started.
Bone biopsy: A biopsy of bone is the preferred specimen for the establishment of a diagnosis of osteomyelitis and the causative agent. The biopsy should be placed in a sterile universal container with saline and transported to the laboratory as quickly as possible. It is also preferable to send multiple specimens (3 or 4) especially in cases of infection associated with a prosthetic device as this makes interpretation easier if a skin organism is recovered. Consider requesting mycobacterial culture from high-risk groups.

Septic arthritis
Blood cultures: Blood cultures should be performed on all patients with septic arthritis, preferably before antibiotics are started.
Joint aspirate: A joint aspirate obtained using an aseptic technique should be submitted in a sterile universal container from all patients with septic arthritis.

Polyarticular arthritis
Send blood cultures and joint aspirate. Consider sending serum for Lyme disease antibodies. Viral causes also include Parvovirus and Rubella. See Section 4 for appropriate specimens to take.

Chronic septic arthritis
Consider requesting serum for antibodies to Brucella, culture of joint aspirate for mycobacteria and fungi.

Reactive arthritis
Faeces culture may be requested for *Salmonella, Shigella, Campylobacter* and *Yersinia*.
Send a serum specimen and request antibodies to *Campylobacter* and *Yersinia*. In rheumatic fever, send a throat swab and serum for ASO titre.
If a sexually transmitted aetiology is suspected then urethral, cervical or rectal swabs may be taken for gonococcal or chlamydial detection.

3.6 Urine specimens

When should you send a sample of urine:
It is probably reasonable to treat a young sexually active female with symptoms of simple cystitis empirically but a urine specimen should be sent for microbiological examination from all other cases. In severe or complicated UTI, a follow-up specimen should be taken 5 days post completion of antibiotic therapy. Persistence of bacteriuria implies a structural abnormality.
A specimen should be sent from patients with symptoms as asymptomatic bacteriuria is generally not a cause for concern except in pregnant women and patients undergoing surgery on the genito-urinary tract. The role of asymptomatic bacteriuria in children is controversial.
The same applies to patients with in-dwelling urinary catheters. Bacteriuria occurs in the vast majority of patients who are catheterised for more than 5 days, a urine specimen should only be sent if there are symptoms or signs suggestive of a urine or a systemic infection.

What type of specimen should you send?
Send a mid-stream specimen of urine (MSU) where possible. Patients should be instructed to pass a little urine into the toilet first, then pass urine into the urine collection container (yellow cap) and finish urinating into the toilet. The nurse or doctor should fill a urine vacuum tube via the yellow capped collection container and transport it to the laboratory without delay. Ideally, specimens should be transported and processed within 4hrs. If this is not possible, specimens should be stored at 4°C until processing.

Urine samples received in the laboratory more than 48 hours after collection will be rejected. For accuracy of results, urine samples should be transported to the laboratory as soon as possible (ideally within 4 hours). If transport is delayed samples should be kept refrigerated.

Rapid transport, culture or measures to preserve the sample, aid reliable laboratory diagnosis. Delays and storage at room temperature allow organisms to multiply, which generate results that do not reflect the true clinical situation.

Never obtain urine from a bedpan or commode.

A clean catch urine may also be obtained if the patient cannot co-operate.

A catheter specimen of urine (CSU) may also be sent to the laboratory. Urine should be obtained from an already catheterised patient by a syringe and needle from the catheter before it enters the collection bag. Clean the access point with a swab saturated with 70% isopropyl alcohol and allow time to dry. Using a sterile syringe and needle (if necessary), aspirate the required amount of urine from the access point and fill a urine vacuum tube. Re-clean access point with a swab saturated with 70% isopropyl alcohol.

3.7 Skin and superficial wound swabs

Note that routine sampling of skin lesions that do not appear clinically infected should generally not be performed. If there is a clinically infected lesion, please send a sample of pus in a universal container wherever possible. Pus is always preferable to a swab. If there is insufficient specimen, then use a swab, sample the infected area and send to the laboratory.

3.8 Deep-seated wounds/abscesses/ post-operative wound infection

Please send a sample of pus in a universal container wherever possible. Pus is always preferable to a swab. If there is insufficient specimen, then use a swab, sample the infected area and send to the laboratory. Clean the surface of the wound with sterile saline or water before taking the swab.

3.9 Mycobacterial Infection

Active Tuberculosis infection
The diagnosis of mycobacterial infection requires special staining and culture techniques. These investigations are currently performed in the microbiology laboratory at Galway University Hospitals. Please ensure that you request TB culture on the request form and attach a danger of infection label.

If standard bacteriological culture and sensitivities are required in addition to mycobacterial investigation, a separate specimen is necessary.

Suitable specimens:

The following is a list of suitable specimens to submit:

- Good quality early morning Sputum x3
- Specimens obtained at Bronchoscopy
- Pus
- CSF, Pleural, Peritoneal, Joint and other Sterile Fluids
- Tissue
- Lymph node biopsy
- Pus aspirated from lymph nodes
- Pleural biopsy
- Surgical sample for routine culture
- Radiological sample for routine culture
- Histology sample where non-respiratory TB is a possibility
- Aspiration sample where non-respiratoryTB is a possibility
- Bone
- Gastric aspiration
- Blood
- Bone marrow
- Urine in certain circumstances (must be discussed with Consultant Microbiologist)

Unsuitable specimens:

The following is a list of unsuitable specimens that will usually be rejected by the laboratory:

Poor quality sputum specimens e.g. salivary specimens or specimens of minute quantities

Swabs

Faeces

Urine, except when: A diagnosis of renal tuberculosis is suspected or the patient is immunocompromised. Please discuss with Consultant Microbiologist prior to sending sample.

Sputum specimens: Three consecutive early morning specimens should be submitted before the commencement of therapy. The specimen should be coughed from deep within the lungs.
Specimens obtained at bronchoscopy: Specimens should be placed in a sterile universal container and transported to the laboratory without delay.

Tissue: Tissue is preferable to necrotic material. Do not place any fixatives in the sterile universal container. If there is a possibility that the specimen may dry out before it reaches the laboratory, then sterile saline may be added to the container.

Blood: Blood may be useful for the diagnosis of non-tuberculous mycobacterial infection in profoundly immunosuppressed individuals. Please contact the laboratory for advice.

Bone marrow: Please contact the laboratory to discuss prior to collection.

CSF/sterile bodily fluids: The yield from examination of CSF specimens is dependant on the volume obtained. Ideally 10 ml should be obtained. Similarly, about 10 ml should be submitted for mycobacterial culture from other normally sterile bodily fluids e.g. pleural, ascitic, joint.

Latent Tuberculosis infection
In-vitro immunological assays called Interferon-Gamma Release Assays (IGRA) have been developed to diagnose latent TB infection. Samples for QuantiFERON-TB Gold® are referred to external laboratories (see section 6.). IGRA can be used as an adjunct to screening certain patient populations in addition to a medical history, chest X-ray and TST.

3.10 Fungal nail and skin infections

Affected areas should be scraped with a blunt scalpel to harvest affected hairs, broken-off hair stubs and scalp scale. This is preferable to plucking, which may remove uninvolved hairs. Scrapings should be transported in a folded square of paper preferably fastened with a paper clip, but commercial packs are also available (e.g. 'Mycotrans'). It is easier to see affected hairs on white paper rather than black.

Please note: A negative Microbiology result does not exclude the presence of infection.

4 SAMPLE REQUIREMENTS FOR ROUTINE MICROBIOLOGY CULTURE TESTS

Sample	Specimen and container	Frequency of analysis	Turnaround time	Notes
Abscess culture	Pus in sterile universal container or charcoal swab	Routine Monday-Friday	Microscopy: same day Aerobic culture: 2-3 days Anaerobic culture: 5 days	Clean the surface of the wound with sterile saline or water before sampling the deepest part of the wound trying to avoid the superficial microflora. Where possible specimen collection should occur before antimicrobial therapy has been initiated. Ideally all samples are processed as soon as possible as the recovery rate of anaerobes is compromised if the transport time exceeds 3 hours due to their susceptibility to air. The volume of specimen influences the transport time that is acceptable. Large volumes of purulent material maintain the viability of anaerobes for longer. Recurrent staphylococcal furunculosis is highly infectious and may be the first sign of an underlying disease such as diabetes mellitus. Aspiration of dental abscesses is necessary to obtain samples containing the likely causative organisms. Swabs are likely to be contaminated with superficial commensal flora.
Ascitic fluid	5ml in sterile universal container* EDTA sample required for cell counts	7 days	Microscopy: Same day Culture: 2-3 days Inoculated into blood culture bottles: 5 days	* May also be directly inoculated into Blood culture bottles. However further tests such as gram stain, cell count and protein cannot be performed unless an additional sample is supplied.

Sample	Specimen and container	Frequency of analysis	Turnaround time	Notes
Bile fluid	5-10ml in sterile universal container	Routine Monday-Friday	Microscopy: Same day Culture: 2-3 days	Bile is normally sterile but colonisation may occur, frequently with a mixture of aerobes and anaerobes originating from the gut. Occasionally instrumentation or stenting may lead to colonisation or infection, which lead on to bacteraemia. Fever, previous endoscopic or percutaneous biliary instrumentation, and bilioenteric anastomosis are significant predictors of a positive bile culture. Bile may be collected in theatre or from a closed drainage system by aspiration with a syringe and needle.
Biopsy	Sterile universal container. Immerse in sterile saline if likely to dry out.	Routine Monday-Friday	Microscopy: Same day Culture: 2-3 days	
Blood culture	Adult patients: 10 ml of blood in an aerobic (green) and 10ml in an anaerobic (purple) blood culture bottle. Paediatric patients: 1-2 mL from neonates, 2-3 mL from	24/7	Negative report in 5 days. Gram stain and Biofire PCR results reported electronically and phoned to ward within 3 hours of flagging positive. Identification and susceptibility results 24-48 hours from availability of isolate.	For optimum sensitivity, two sets of blood cultures should be collected from separate sites. These should be taken at least 20 min apart. For patients with suspected endocarditis, three sets should be collected. When taking a blood culture observe standard precautions, wash hands, carefully disinfect the skin with alcohol, allow to dry, insert needle (winged set) into vein, collect 10 ml of blood into an aerobic and 10 ml into an anaerobic blood culture bottle (ensuring that the tops of each bottle are disinfected with an alcohol wipe prior to inoculation). The order of

Sample	Specimen and container	Frequency of analysis	Turnaround time	Notes
	infants and 3-5 mL from pre-teen children in a paediatric (yellow) blood culture bottle.			inoculation is dependent on the collection method. When using a winged set the aerobic bottle is inoculated first followed by the anaerobic bottle. If using a needle and syringe, inoculate anaerobic bottle first followed by aerobic bottle. Yeasts and fungi may be detected using the normal blood culture system. Refer to the "fill line" on each bottle to ensure the correct amount of blood is collected. Specific aerobic bottles are available for paediatric patients. Fill volume is dependent on patient weight. It is recommended that inoculated blood culture bottles be placed on to the blood culture analyser as soon as possible after collection ideally within 4 hours. If there is an unavoidable delay, inoculated bottles may be maintained at room temperature up to 24 hours before loading onto the instrument. Blood cultures **MUST NOT** be refrigerated. All gram stain, PCR, identification and culture results are communicated to the Consultant Microbiologist who are available to provide clinical advice to clinicians. See **Section 10** for further information on blood culture collection.

Sample	Specimen and container	Frequency of analysis	Turnaround time	Notes
Bone Marrow	Bone marrow biopsy/aspirate in sterile universal container. Special bottle required for Mycobacterial culture. Please contact the laboratory for advice prior to taking sample.	7 days	Culture: 2 - 3 working days, Mycobacterial culture: up to 7 weeks, Fungal culture: 14 working days	
Bordetella pertussis culture	Pernasal charcoal swab	7 days	7-8 days	No longer cultured in LUH. Referred to CHI Crumlin for PCR and culture. See section 6.2 below.
Bronchoaleolar lavage/washings	Sterile universal container	Routine Monday-Friday	Microscopy: 1 day, Culture: 2 - 3 working days, Mycobacterial culture: up to 7 weeks.	Recovery and recognition of organisms responsible for pneumonia depends on: The adequacy of the lower respiratory tract specimen Avoidance of contamination by upper respiratory tract flora The fastidiousness of organisms involved The use of suitable microscopical techniques and culture methodology

Sample	Specimen and container	Frequency of analysis	Turnaround time	Notes
				Gram staining may be useful to predict results of quantitative culture. In some cases antimicrobial chemotherapy may be initiated on the results of the Gram stain before culture results are available. Specimens should be collected before antimicrobial therapy has been initiated where possible. Culture for Legionella species may still be successful after antimicrobial therapy has been started.
Carbapenemase Producing Enterobacterales (CPE)	Rectal swab taken using Copan fecal swab	Routine Monday-Friday	2-3 working days	Insert swab about 2 cm into anal cavity, rotate and send specimen to laboratory. Screening for CPE includes: The following people must be offered screening for CPE in acute hospitals. a. All people who were transferred from any other hospital in Ireland or elsewhere. b. All people who have been inpatients in any hospital in Ireland or elsewhere any time in the previous twelve months. Any hospital includes previous admissions to the hospital to which they are now being admitted. c. All people who normally reside in a long term care facility for older people.

Sample	Specimen and container	Frequency of analysis	Turnaround time	Notes
				d. All admissions to and all transfers to Intensive Care Units and High Dependency Units on admission and weekly thereafter. e. All admissions to and all transfers to haematology, oncology and transplant wards on admission and weekly thereafter. f. People undergoing renal dialysis for the first time in a dialysis unit, periodically during dialysis treatment (preferably every three months but not less than every six months), and on return from dialysis elsewhere. g. All people who were formerly colonised with CPE but who have subsequently met the criteria for removal of that designation. h. Other people where CPE screening is requested by the IPC team. **Contact screening:** Samples should be taken at intervals of at least one week apart. The last sample should be taken at least four weeks after the latest date of exposure. **Screening of staff:** this is not routinely recommended.

Sample	Specimen and container	Frequency of analysis	Turnaround time	Notes
Cerebrospinal Fluid (CSF) – should be collected from all patients with suspected meningitis	THREE sequentially labelled **sterile universal containers** (routine culture and biochemistry). For other tests eg. Viral or bacterial PCR, TB, Xanthochromia: an extra specimen should be collected for each test. Samples for Xanthochromia should be protected from light.	24/7	Microscopy: 2 hrs. Positive results telephoned to ward. All results (positive and negative) available on LIS. Culture: 2 - 3 days.	CSF should be collected from all adult patients with suspected meningitis except when a clear contraindication exists (e.g. signs of raised intra-cranial pressure, focal neurological signs, severe shock, severely depressed or fluctuating conscious level, coagulation disorder) or if there is a confident clinical diagnosis of meningococcal infection with a typical rash. Note: Antimicrobials should **NOT** be withheld pending a lumbar puncture. Healthcare workers should wear a surgical mask when performing a lumbar puncture to prevent a potential healthcare associated infection.
Cervical swab culture	Charcoal swab (unsuitable for Chlamydia PCR)	Routine Monday-Friday	Microscopy: 1-2 working days Culture : 2 - 3 working days	Appropriate specimens are often difficult to obtain and incorrect or sub-optimal specimens are often received. It is important to avoid contamination with vulva faecal flora during collection of specimens. Use a speculum without lubricant. Wipe the cervix clean of vaginal secretions and mucus. Gently insert a swab into the endocervical canal and rotate inside the endocervix to obtain any exudate. Place the swab in transport medium. Cervical, endocervical, and female urethral specimens have a gram stains performed.

Sample	Specimen and container	Frequency of analysis	Turnaround time	Notes
Ear	Pus or exudates are always preferable to a swab. If insufficient for collection, swab any pus or exudate. Sterile universal container or charcoal swab.	Routine Monday-Friday	2 - 3 working days	Where possible specimen collection should occur before antimicrobial therapy and always when pus or exudate is present. Respiratory syncytial virus and parainfluenza viruses have been isolated from middle ear effusions and may have a role in the aetiology of otitis media especially in children. Use a 'pink' top viral culture swab if indicated. Mycotic infection of the ear is a superficial, chronic or subacute infection of the external auditory canal. Fungal infection accounts for two to ten percent of cases of otitis externa, and most frequently occurs after treatment of bacterial infection. Superficial infection with candida occurs more commonly in patients who use hearing aids. For investigation of fungal infection, scrapings of material from the ear canal are preferred although swabs can also be used.
Eye	Sterile universal or charcoal swab. Any available pus is sampled as well as the lesion of interest	Routine Monday-Friday	2 - 3 working days	Separate swabs in appropriate transport media are needed for the diagnosis of viral and chlamydial infections.

Sample	Specimen and container	Frequency of analysis	Turnaround time	Notes
Faeces analysis	Faeces in sterile universal container	Routine Monday-Friday	2-3 working days	*Salmonella, Shigella, Campylobacter*, VTEC, *Cryptosporidium* and *Giardia* are examined routinely by molecular methods (refer to section 6.1). Other enteric pathogens e.g. *Yersinia, Vibrio, Aeromonas*, ova and parasites etc. are only examined if the clinical details suggest that possibility. Please send a blood culture if typhoid fever is suspected. Rotavirus and Adenovirus testing is performed on all children <5 years old (refer to section 6.1). Refer to section 6.1 for C. difficile testing.
Fungal culture - systemic	Pus/aspirate, Tissue/biopsy, BAL/sputum, CSF, Blood culture, Bone marrow, Ear swab or other in sterile universal container, charcoal swab or blood culture bottles	Routine Monday-Friday	Microscopy: 24 hours, Culture: 3-4 weeks	Specimens are collected at onset of symptoms, and before antifungal therapy, where possible. Sufficient volume of pus/tissue/biopsy/other in sterile container transported directly to the laboratory. Specimens for subcutaneous mycological investigation are processed as soon as possible after collection. All specimens submitted for fungal culture should have microscopy performed. Fungal isolates may be referred to an external reference laboratory for identification and susceptibility testing.

Sample	Specimen and container	Frequency of analysis	Turnaround time	Notes
Gentamicin assay	Serum	7 days 8am-8pm	24 hours	Refer to "LUH Empiric Antibiotic Guidelines". Contact Consultant Microbiologist for clinical advice. Test performed in Biochemistry Department. Consult Biochemistry User Manual for current reference ranges.
High vaginal swab – culture	Charcoal swab	Routine Monday-Friday	Microscopy for Bacterial vaginosis/Trichomonas vaginalis: 1-2 working days Culture: 2-3 working days	Appropriate specimens are often difficult to obtain and incorrect or sub-optimal specimens are often received. It is important to avoid contamination with vulva faecal flora during collection of specimens. After the introduction of the speculum, roll the swab firmly over the surface of the vaginal vault. Then place the swab in transport medium with charcoal. To detect *Trichomonas vaginalis,* the posterior fornix, including any obvious candidal plaques are swabbed. A range of sexually transmissible organisms cause infections responsible for a large number of clinical syndromes. When a specific STI is diagnosed, it is recommended to screen for other infections. Screening has a role in helping to control gonorrhoea, syphilis, chlamydial infection, and human immunodeficiency virus (HIV) infection Bacterial Vaginosis (BV) is now considered to be associated with a variety of genital tract infections and complications. BV may be diagnosed clinically if three of the following four criteria are fulfilled: • Grey-white, thin homogenous discharge

Sample	Specimen and container	Frequency of analysis	Turnaround time	Notes
				• Vaginal secretions pH > 4.5 • Positive amine odour test (release of fishy amine odour when vaginal secretion is mixed with 5-10% potassium hydroxide) • Presence of clue cells on microscopic examination
Joint fluid – culture	5-10ml in sterile universal container. EDTA sample required for cell count.	7 days	Microscopy:Same day. Culture: 10 days	Blood cultures should also be collected on all patients with septic arthritis, preferably before antibiotics are started. Urgent requests must be phoned to the laboratory.
MRSA screen	Charcoal swabs: nose and groin. Other sites as appropriate.	Routine Monday-Friday	2-3 working days	Screening for MRSA includes: Those patients previously positive. 1. Patients admitted to LUH from another hospital or healthcare facility or those known or suspected to have MRSA. 2. Patients during an outbreak. 3. ITU and other high-risk areas. **Discharge Screening:** there is no indication for routine discharge screening. **Screening of staff:** this is not routinely recommended. **Screening of MRSA carriers**: three negative swabs

Sample	Specimen and container	Frequency of analysis	Turnaround time	Notes
				from previously positive sites, preferably at weekly intervals, are required for clearance. Swabs should only be sent once antimicrobials with activity against MRSA have been discontinued for 48 hours.
Pericardial fluid/aspirate	Sterile universal container. EDTA sample required for cell count.	7 days	Microscopy: Same day Culture: 2-3 days.	
Peritoneal/Ascitic fluid	Sterile universal container. EDTA sample required for cell count.	7 days	Microscopy: Same day Culture: 2-3 days.	
Throat swab	Charcoal swab	Routine Monday-Friday	2-3 working days.	Throat swab taken from the tonsillar area and/or posterior pharynx avoiding the tongue and uvula. Hold samples at room temperature. The most common cause of bacterial pharyngitis is Lancefield group A streptococcus. Most laboratory procedures concentrate primarily on this organism. However a proportion of healthy individuals are carriers of Lancefield group A streptococcus and its isolation does not necessarily imply a role in infection. Lancefield group A streptococcal pharyngitis may be associated with extrapharyngeal manifestations such as rheumatic fever, toxic-shock-like syndrome and glomerulonephritis.
Tip culture	Distal 3cm of line cut with sterile scissors	Routine Monday-Friday	Culture: 2-3 working days.	Only send tips from lines that are suspected to be infected. Specimens received without appropriate

Sample	Specimen and container	Frequency of analysis	Turnaround time	Notes
	in sterile universal container			clinical information will be rejected.
Urine culture	5ml urine in urine tube	Routine Monday-Friday	1-4 days working days	It is probably reasonable to treat a young sexually active female with symptoms of simple cystitis empirically but a urine specimen should be sent for microbiological examination from all other cases. In severe or complicated UTI, a follow-up specimen should be taken 5 days post completion of antibiotic therapy. Persistence of bacteriuria implies a structural abnormality. Send a mid-stream specimen of urine (MSU) where possible. Specimens should be processed within 4 hours. In General Practice if transport to the laboratory has to be delayed, the specimen can be stored at 4° C for up to 48 hours. A catheter specimen of urine (CSU) may also be sent to the laboratory although as bacteriuria occurs in the vast majority of patients who are catheterised for more than 5 days, a urine specimen should only be sent if there are symptoms or signs suggestive of a urine or a systemic infection. Automated urine cell count is performed on all urine specimens requesting culture and susceptibility testing. Further culture investigations will be performed on urine specimens that meet the required criteria as outlined below: • All specimens with WBC count of >30 cells/µl from

Sample	Specimen and container	Frequency of analysis	Turnaround time	Notes
				automated cell count • All children under the age of 16 • All specimens from ICU/HONC/RDU • Specimens with clinical details of pyelonephritis, urosepsis, hx of renal transplant, immunocompromised. • Specimens from antenatal/pregnant ladies – these specimens will be **cultured only** as they are not suitable for cell count using the automated cell count analyser. • Nephrostomy, urostomy, suprapubic aspirate specimens. It is very important that all relevant clinical details are added to the laboratory request form. Specimens that do not meet the criteria above will receive a cell count only, culture will not be performed unless by prior arrangement.
Vancomycin assay	Serum	7 days 8am-8pm	24 hours	Refer to "LUH Empiric Antibiotic Guidelines". Contact Consultant Microbiologist for clinical advice. Test performed in Biochemistry Department. Consult Biochemistry User Manual for current reference ranges.
Vancomycin	Rectal swab	Routine	2-3 working days	Insert swab about 2 cm into anal cavity, rotate and send

Sample	Specimen and container	Frequency of analysis	Turnaround time	Notes
resistant Enterococci (VRE)	taken using Copan fecal swab or amies charcoal swab	Monday-Friday		specimen to laboratory. Screening for VRE includes: • On admission, those patients known to be previously positive. • Patients during an outbreak. • Renal Dialysis Unit patients. **Discharge Screening:** there is no indication for routine discharge screening. **Screening of staff:** this is not routinely recommended. **Screening of VRE carriers**: There is presently no evidence to recommend obtaining swabs to determine clearance of VRE.
Wound swab	Samples of pus, if present, are preferable to swabs. If insufficient pus or exudate is available, swab a representative part of the lesion. Sterile universal	Routine Monday-Friday	2-3 working days	Routine processing of superficial swabs of ulcers must be discouraged. Swabbing dry crusted areas are unlikely to be helpful. If specimens are taken from ulcers the debris on the ulcer must be removed, the ulcer cleaned with saline, and either a biopsy, or preferably a needle aspiration of the edge of the wound taken. A less invasive irrigation-aspiration method may be preferred. Ulcers are often colonised by mixtures of aerobic and anaerobic organisms. Some of these organisms may be clinically significant if associated with cellulitis or systemic symptoms. The significance of the microbiological flora detected must be interpreted with

Sample	Specimen and container	Frequency of analysis	Turnaround time	Notes
	container or charcoal swab			care. When infections are complicated by the involvement of soft tissue and bone, isolates from superficial swabs taken from ulcers may correlate poorly with cultures of specimens taken by other means. Such specimens are biopsies and excised tissues, surgically obtained curettage, and aspirates from abscesses. Sampling by irrigation aspiration rather than biopsy has been recommended, and results correlate well with responses to clinical measures.

5 APPROPRIATE REQUESTING OF SEROLOGY / VIROLOGY TESTS

Virus specific IgM tests may be done on a single specimen of serum for the diagnosis of acute infections for example Hepatitis A. IgM is usually positive 5 days post onset.
N.B. A general request for "Viral screen" will not be accepted unless sufficient clinical details are provided.
The following tables provide information relating to organisms that may be associated with various clinical presentations / situations. Further details on available tests for these organisms are presented in Section 6 and 7.

5.1 Acute Febrile Illness

Clinical Manifestation	Common organism	Less common
Acute Febrile Illness (dependant on travel and contact history)	Flaviviruses Arboviruses Hemorrhagic fever viruses	

5.2 Gastrointestinal disease

Clinical Manifestation	Common organism	Less common
Viral Gasteroenteritis	Rotavirus and Norovirus	Astrovirus (children) Adenoviruses (types 40 & 41) – endemic diarrhoea and outbreaks Human calicviruses (Sapporo-like viruses), particularly in adults.

Clinical Manifestation	Common organism	Less common
Hepatitis	Hepatitis viruses: Hepatitis A virus Hepatitis B virus Hepatitis C virus Cytomegalovirus Epstein-Barr (infectious mono-nucleosis)	Hepatitis E virus (rare in Republic of Ireland without travel history) Hepatitis D virus Toxoplasma gondii(if immunosupressed) Arboviruses Flaviviruses Parvovirus B19
Acute pancreatitis		Mumps virus (rare)
Parotitis	Mumps	Mumps Coxsackie A Parainfluenza 3 (rare)
Gingivostomatitis Mouth ulcers	Herpes simplex virus	

5.3 Cardiac disease

Clinical Manifestation	Common organism	Less common
Endocarditis		*Coxietta burnetii* (Q fever) Typhus (louse borne) Chlamydia species

Clinical Manifestation	Common organism	Less common
Myocarditis Pericarditis	Influenza Enteroviruses Coxsackie B	Very rarely; parainfluenza viruses, adenovirus, cytomegalovirus, parvovirus B19, *Mycoplasma pneumonia*, Coxsackie A ECHO, Mumps, Measles, Varicella zoster virus, Influenza
Myositis Myalgia	Coxsackie B (pleurodynia) Influenza Arboviruses Flaviviruses Enterovirus	Coxsackie A Echovirus Arbovirus

5.4 Newborn

Clinical Manifestation	Common organism	Less common
Congenital infection Small for date babies	Testing of new-borns with non-specific clinical features is unhelpful. If the baby has features of a specific congenital infection please, contact NRVL to discuss.	

5.5 Genitourinary disease

Clinical Manifestation	Common organism	Less common
Genital Chlamydia Vaginal discharge	*Chlamydia trachomatis.*	Numerous bacteria.
Haemorrhagic cystitis		Adenovirus (children and immunocompromised adults). BK virus (immunocompromised).
Ulcers and / or vesicles	Herpes simplex virus 1& 2.	Varicella zoster virus in cases of zoster – not usually chickenpox Coxsackie A Wart
Orchitis Epididymitis Ovaritis	Mumps	Mumps Coxsackie B Varicella
Wart like lesion	HPV Molluscum contagiosum	

Clinical Manifestation	Common organism	Less common
Acute renal failure (including haemorrhagic fever with renal syndrome)		Hantaviruses
Haemolytic uraemic syndrome		No clear aetiology

5.6 Haematology disorders

Clinical Manifestation	Common organism	Less common
Thrombocytopenia and ITP	Epstein-Barr virus	Rubella virus (rare) Dengue Varicella zoster virus
Atypical lymphocytes	Epstein-Barr virus	Cytomegalovirus *Toxoplasma gondii* HIV
Henoch-Schonlein purpura		*Chlamydia pneumoniae* *Mycoplasma pneumoniae*

5.7 HIV/AIDS

Clinical Manifestation	Common organism	Less common
Making the initial diagnosis	HIV-1 HIV-2	HIV (N and O groups)
Baseline and Monitoring HIV viral load		
Monitoring drug resistance by genotypic methods		

5.8 Joint disease

Clinical Manifestation	Common organism	Less common
Arthritis Arthralgia	Parovirus B19	Rubella virus *Chlamydia trachomatis* Mumps virus Alphavirus and flaviviruses

5.9 Neurological disease

Clinical Manifestation	Common organism	Less common
Aseptic meningitis Encephalitis Cerebellar signs	Enterovirus Mumps Herpes simplex 2 Herpes simplex virus Varicella zoster virus	*Mycoplasma pneumonia,* Epstein-barr virus, Cytomegalovirus Arboviruses, Flavivirus, Influenza, Toxoplasma, HIV *Borrelia burgdorferi* (Lyme disease), Adenovirus, JC (in HIV infected patients), Rabies

Clinical Manifestation	Common organism	Less common
Febrile convulsions	Any viral infection that causes fever. HHV-6 is common cause in children	
Gullain Barre Syndrome Acute transverse myelitis	Cytomegalovirus	Epstein-Barr virus Varicella zoster virus *Borrelia burgdorferi* (Lyme disease)
Facial numbness/tingling	Varicella zoster virus	
Paraesthesia demyelination Peripheral neuropathy Multiple sclerosis	There is no clear diagnosable viral aetiology	Varicella zoster virus Measles Enterovirus Arbovirus Flavivirus HTLV I and II

5.10 Ocular disease

Clinical Manifestation	Common organism	Less common
Conjunctivitis, keratitis	Herpes simplex virus Varicella zoster virus Adenovirus Chlamydia trachomatis Measles (prodrome) Rubella (prodrome)	Enterovirus 70 and Coxsackie Z24 (haemorrhagic conjunctivitis) Influenza Newcastle disease

Clinical Manifestation	Common organism	Less common
Corneal Infection	Herpes simplex virus Varicella zoster virus	Respiratory syncytial virus Rhinovirus Influenza A & B viruses (tracheobronchitis)
Retinitis	Cytomegalovirus (AIDS)	*Toxoplasma gondii* (immunosupressed)
Blepharitis	Herpes simplex Wart (papilloma) Molluscum	
Sensorineural hearing loss	Mumps Measles Varicella-zoster Influenza Enterovirus Herpes simplex	Adenovirus Rubella (congenital) Cytomegalovirus (congenital)

5.11 Pregnancy

Clinical Manifestation	Common organism	Less common
Maculopapular Rash	Measles Parvovirus B19 HHV-6 in young children Rubella	
Vesicular Rash	Varicella-zoster virus (Chickenpox or zoster) Herpes simplex virus	Enteroviruses (hand and foot and mouth disease)

Clinical Manifestation	Common organism	Less common
Foetal hydrops	Parvovirus B19	
Abortions, still births, intra-uterine growth retardation	Please contact NVRL if you wish to discuss a specific case	

5.12 Rash

Clinical Manifestation	Common organism	Less common
Maculopapular (Rubelligorm) rash	Measles Rubella ECHO Coxsackie	Epstein-Barr (infectious mono-nucleosis) Arboviruses Adenoviruses
Vesicular rash	Herpes simplex virus Varicella zoster virus Wart (papilloma virus) Molluscum contagiosum	
Haemorrhagic rash	Arboviruses	

Clinical Manifestation	Common organism	Less common
Localised lesion	Herpes simplex virus Varicella zoster virus Wart (papilloma virus) Molluscum contagiosum	

5.13 Respiratory tract infections

Clinical Manifestation	Common organism	Less common
Pneumonia	Mycoplasma pneumoniae Chlamydia pneumoniae Influenza virus	Legionella pneumophila Chlamydia psittaci Coxiella burnetii (Q-fever) Varicella zoster virus Respiratory syncytial virus (infants and the elderly) Chlamydia trachomatis (neonates) Cytomegalovirus and pneumocystis carini (in immunocompromised) Human metapneumovirus Measles virus SARS CoV, SARS-CoV-2
Laryngotracheobronchitis (croup)	Parainfluenza virus	Respiratory syncytial virus Rhinovirus Influenza A & B viruses (tracheobronchitis)

Clinical Manifestation	Common organism	Less common
Bronchiolitis (infants)	Respiratory syncytial virus Human Metapneumovirus	Parainfluenza 1, 2 & 3 Adenovirus Rhinovirus
Coryza (common cold)	Parainfluenza virus Coronovirus Rhinovirus	
Acute exacerbation of COPD/COAD and athsma	Any of the above	
Pharyngitis	Epstein-Barr virus	Andenovirus Influenza virus Chlamydia pnemoniae Enteroviruses (hand, foot & mouth disease)

5.14 Systemic illness

Clinical Manifestation	Common organism	Less common
Lymphadenopathy	Epstein-Barr virus Cytomegalovirus	*Toxoplasma gondii* HIV
Pyrexia	Influenza Epstein-Barr virus Cytomegalovirus Parvovirus B19 HHV6	*Coxietta burnetii* Arbovirus Flaviviruses

Clinical Manifestation	Common organism	Less common
Non-specific symptoms (malaise, fatigue, lethargy, tiredness, generalised aches, weight loss, night sweats, myalgia/myositis)	Influenza but only if preceded by "flu-like illness" Epstein-Barr virus Cytomegalovirus *Toxoplasma gondii* HIV	Parainfluenza 1,2 & 3 Adenovirus Rhinovirus

6 SAMPLE REQUIREMENTS FOR MOLECULAR / SEROLOGY / VIROLOGY TESTS

Virus specific IgM tests may be performed on serum for the diagnosis of acute infections. IgM is usually positive 5 days post onset.

6.1 Infectious serology, immunoassay and molecular testing performed in LUH

TEST	SAMPLE	TURNAROUND TIME	FREQUENCY OF TESTING	TESTING LABORATORY	NOTES
Adenovirus antigen test	Faeces	2-3 working days	7 days	Microbiology	Performed on children aged <5 years old.
Biofire Blood Culture Identification Panel (molecular)	Positive blood culture	4 hours from flagged positive blood culture	24/7	Microbiology	
Biofire Meningitis/ Encephalitis Panel (molecular)	CSF	4 hours	24/7	Microbiology	Performed on CSF samples with raised WCC (see section 8) and on samples from neo-nates. *E. coli* K1, *H. influenzae, L. monocytogenes, N. meningitidis, S. agalactiae, S. pneumoniae*, CMV, Enterovirus, HSV1/2, HHV-6, Parechovirus, VZV, *Cryptococcus neoformans/gattii*

TEST	SAMPLE	TURNAROUND TIME	FREQUENCY OF TESTING	TESTING LABORATORY	NOTES
Biofire Respiratory Panel	Naso/Oro-pharyngeal Primestore MTM swab/UTM	24 hours	Routine Monday-Friday	Microbiology	Adenovirus, Coronavirus 229E,HKU1, NL63 and OC43, MERS-CoV, Human Metapneumo virus, Rhino/Enterovirus, Influenza A/B, Parainfluenza 1,2,3,4, RSV, *B. parapertussis, B. pertussis, Chlamydia pneumoniae, Mycoplasma pneumoniae*. Please note SARS-CoV-2 are not reported from this assay. Please send separate form and sample if required. **Only carried out upon Consultant request.**
Clostridoides difficile antigen test	Faeces	24-48 hours	Routine Monday-Friday	Microbiology	The Clinical Microbiology laboratory currently tests for GDH to detect *C difficile* in stool samples. Positive GDH specimens are tested for *Clostridium difficile* toxin A and B. GDH positive and *C diff* toxin negative specimens are further tested by a molecular assay. Test may be repeated once if the initial test is negative and C. difficile is strongly suspected. Only diarrhoeal samples will be tested. Positive patients should not be rescreened within 14 days of a positive result. Test may only be carried out on those 2 years of age and over. Infection control will be notified of a positive result.

TEST	SAMPLE	TURNAROUND TIME	FREQUENCY OF TESTING	TESTING LABORATORY	NOTES
Clostridoides difficile (Confimatory PCR)	Faeces	24-48 hours	Routine Monday-Friday	Microbiology	Only performed when GDH antigen positive and Toxin antigen negative.
Carbapenemase Producing Enterobacterales (CPE) PCR	Rectal swab (Copan Fecal Swab)	24-48 hours	Routine Monday-Friday	Microbiology	See section 4 above for CPE testing criteria and guidelines.
Gastrointestinal pathogen PCR	Faeces	24-48 hours	Routine Monday-Friday	Microbiology	All samples are tested for *Salmonella sp, Shigella sp, Campylobacter sp, VTEC, Cryptoporidium sp and Giardia sp.* Formed stools will not be tested. Positive *Salmonella sp* and *Shigella sp* are confirmed by culture and the isolate is referred to GUH for whole genome sequencing. Positive VTEC samples are referred to the Public Health Laboratory in Cherry Orchard Hospital for confirmatory testing.
Helicobacter pylori antigen test	Faeces	24-48 hours	Routine Monday-Friday	Immunology	

TEST	SAMPLE	TURNAROUND TIME	FREQUENCY OF TESTING	TESTING LABORATORY	NOTES
Hepatitis serology Hep A IgM, HBsAg, Anti-HCV), Hep B antibody (AHB)	Serum	24 hours	Routine Monday-Friday	Biochemistry	Confirmatory testing and further investigations performed at NVRL
HIV serology	Serum	24 hours	Routine Monday-Friday	Biochemistry	Confirmatory testing and further investigations performed at NVRL
Legionella Urinary Antigen	Urine	24 hours	7 days	Microbiology	
Norovirus PCR	Faeces	24-48 hours	Routine Monday-Friday	Microbiology	All suspected cases of Norovirus must be discussed with the Infection Prevention and Control team prior to sending samples.
Pneumococcal Urinary Antigen	Urine	24 hours	7 days	Microbiology	
Rotavirus antigen test	Faeces	2-3 working days	7 days	Microbiology	Performed on children aged <5 years old.

TEST	SAMPLE	TURNAROUND TIME	FREQUENCY OF TESTING	TESTING LABORATORY	NOTES
SARS-CoV-2 PCR	Naso/Oropharyngeal Primestore MTM swab	Rapid test: 4 hours Batch test: 24-48 hours	Rapid test: 24/7 Batch test: Routine Monday-Friday	Microbiology	Only admitted patients will be tested. Request form must state relevant clinical details and admission information.
SARS-CoV-2, Influenza A/B, RSV rapid PCR	Naso/Oropharyngeal Primestore MTM swab	4 hours	24/7	Microbiology	Only admitted patients will be tested. Request form must state relevant clinical details and admission information.
Syphilis serology (T. pallidum)	Serum	24 hours	Routine Monday-Friday	Biochemistry, LUH	Confirmatory testing and further investigations performed at NVRL

6.2 MICROBIOLOGY TESTS REFERRED TO EXTERNAL LABORATORIES

Turnaround times are based on those stated by each referral laboratory and do not take into consideration sample transport times or time taken to receive hard copy reports. This list is not exhaustive. Additional tests may be referred by request.

TEST	SAMPLE	TURNAROUND TIME	TESTING LABORATORY	NOTES
Adenosine deaminase for TB	CSF/pleural fluid/Ascitic fluid	1 week	Purine Research Lab, St Thomas's Hospital, London	https://www.synnovis.co.uk/our-tests/ada-for-tb-adenosine-deaminase
Therapeutic drug monitoring: Antibiotic and antifungal levels	Refer to: https://www.nbt.nhs.uk/severn-pathology/pathology-services/antimicrobial-reference-laboratory	Refer to: https://www.nbt.nhs.uk/severn-pathology/pathology-services/antimicrobial-reference-laboratory	Antimicrobial Reference Laboratory, Bristol	Please discuss with Consultant Microbiologist/Antimicrobial pharmacist in advance of taking sample. For full details on all available analytes, sample requirements including timing of collection and turnaround times please refer to: https://www.nbt.nhs.uk/severn-pathology/pathology-services/antimicrobial-reference-laboratory
Faecal ova, cysts & parasites (including threadworms)	Faeces	5 days	Eurofins Biomnis	https://www.eurofins.ie/biomnis/test-information/test-guide/ Sellotape slide for Enterobius vermicularis (Thread/ Pin worm). Samples should be taken between 10pm and midnight, or early in the morning, before defecation or bathing. Method: Apply clear Sellotape to the perianal region, pressing the adhesive side of the tape firmly against the left and right perianal folds several times; the tape can be wrapped around a tongue depressor to

TEST	SAMPLE	TURNAROUND TIME	TESTING LABORATORY	NOTES
				aid specimen collection . Carefully smooth the tape back on the glass microscope slide, adhesive side down. Sellotape samples NOT affixed to a slide will NOT be examined. A swab of the area also cannot be examined
Fungal culture and microscopy	Nail clippings, skin scrapings in sterile universal container or Mycotrans device	3-4 weeks	Microbiology, St James's Hospital, Dublin	http://search.stjames.ie/Labmed/
Joint fluid crystal analysis	Joint fluid in sterile universal	5 days	Cytology Dept, Beaumont Hospital, Dublin	
Tuberculosis (TB) culture	Respiratory specimens	Microscopy: 1 day. Culture:6-7 weeks.	Microbiology Dept, Galway University Hospital	Urines are not suitable for TB culture https://www.saolta.ie/documents/guh-laboratory-medicine-user-guide-version-312
Quantiferon Gold TB (latent TB)	Specialised blood tubes.	Mater: 3 weeks Biomnis: 3 days	Mater Hospital Dublin Eurofins Biomnis (OH samples only)	Contact laboratory reception to obtain correct tubes and request form. https://www.eurofins.ie/biomnis/test-information/test-guide/
Bacterial PCR (*S. pneumoniae, H. influenzae, E. coli K1, N. meningitidis*)	0.5ml CSF, 0.5-1ml EDTA blood	1-2 days	IMSRL, Temple St Children's Hospital, Dublin	https://www.cuh.ie/healthcare-professionals/departments/laboratory/ Samples should be collected as close to onset as possible and prior to administration of antibiotics. Store samples at 4ºC if delay in transportation
Strongyloides serology	Serum	8 days	Hospital for Tropical Diseases, London	http://www.thehtd.org/parasitology.aspx

TEST	SAMPLE	TURNAROUND TIME	TESTING LABORATORY	NOTES
Toxocara serology	Serum	8 days	Hospital for Tropical Diseases, London	http://www.thehtd.org/parasitology.aspx
Filaria serology	Serum	8 days	Hospital for Tropical Diseases, London	http://www.thehtd.org/parasitology.aspx
Schistosoma serology	Serum	8 days	Hospital for Tropical Diseases, London	http://www.thehtd.org/parasitology.aspx
Hydatid serology	Serum	8 days	Hospital for Tropical Diseases, London	http://www.thehtd.org/parasitology.aspx
Galactomannin antigen EIA	Serum, BAL, Tracheal aspirates	7 days	Microbiology, St James's Hospital, Dublin.	http://search.stjames.ie/Labmed/
Cryptococcal antigen	Serum, CSF	7 days	Microbiology, St James's Hospital, Dublin.	http://search.stjames.ie/Labmed/
Helicobacter pylori culture	Gastric biopsy in sterile saline	19 days	Gastrointestinal Bacteria Reference Unit, UKHSA	https://www.gov.uk/government/publications/bacteriology-reference-department-brd-user-manual
Coxiella Burnettii (Q fever)	Serum	3 days	Eurofins Biomnis	https://www.eurofins.ie/biomnis/test-information/test-guide/
Rickettsia	Serum	5 days	Rare and Imported Pathogens Laboratory, UK HSA	https://www.gov.uk/government/publications/rare-and-imported-pathogens-laboratory-ripl-user-manual Tests selected by RIPL based on clinical details.
Pneumococcal antibodies	Serum	28 days	Manchester Medical Microbiology Partnership	https://mft.nhs.uk/the-trust/other-departments/laboratory-medicine/manchester-medical-microbiology-partnership/

TEST	SAMPLE	TURNAROUND TIME	TESTING LABORATORY	NOTES
Meningococcal antibodies	Serum	28 days	Manchester Medical Microbiology Partnership	https://mft.nhs.uk/the-trust/other-departments/laboratory-medicine/manchester-medical-microbiology-partnership/
H. influenza antibodies	Serum	28 days	Manchester Medical Microbiology Partnership	https://mft.nhs.uk/the-trust/other-departments/laboratory-medicine/manchester-medical-microbiology-partnership/
Tetanus antibodies	Serum	28 days	Manchester Medical Microbiology Partnership	https://mft.nhs.uk/the-trust/other-departments/laboratory-medicine/manchester-medical-microbiology-partnership/
Diptheria antibodies	Serum	28 days	Manchester Medical Microbiology Partnership	https://mft.nhs.uk/the-trust/other-departments/laboratory-medicine/manchester-medical-microbiology-partnership/
Legionella pneumophila PCR (from urinary antigen positive patients only)	BAL, Sputa, Tracheal aspirate		Respiratory and vaccine preventable bacteria Reference Unit, UKHSA	https://www.gov.uk/government/publications/bacteriology-reference-department-brd-user-manual
Bordetella pertussis Serology – anti-PT IgG antibodies (not suitable for immune status)	Serum	12 days	Respiratory and vaccine preventable bacteria Reference Unit, UKHSA	https://www.gov.uk/government/publications/bacteriology-reference-department-brd-user-manual

TEST	SAMPLE	TURNAROUND TIME	TESTING LABORATORY	NOTES
Bordetella pertussis PCR and culture	Charcoal pernasal swab	5-6 days	Microbiology, CHI Crumlin	INFANTS (up to and including one year of age): A single nasopharyngeal aspirate or per-nasal swab for culture and PCR testing should be taken at the time of hospital admission or as soon as possible post onset of disease. CHILDREN OVER 12 MONTHS AND ADULTS: A single nasopharyngeal aspirate or per-nasal swab for culture and PCR testing is recommended in the early stages of illness i.e within three weeks of onset. The preferred specimen type for *Bordetella pertussis* PCR is a nasopharyngeal aspirate, a sputum sample or alternatively a per-nasal swab. BAL and pleural fluid specimens can also be examined. Throat swabs and nasal swabs are sub-optimal specimens for the detection of *Bordetella* by PCR. https://www.childrenshealthireland.ie/list-of-services/laboratory/
Chlamydia psittaci	Serum	5 days	Eurofins Biomnis	https://www.eurofins.ie/biomnis/test-information/test-guide/
Mycoplasma pneumoniae	Serum	4 days	Eurofins Biomnis	https://www.eurofins.ie/biomnis/test-information/test-guide/ IgG on all age pts, IgM on <15yrs and adults where IgG is positive
BK polyomavirus (PCR)	Serum/Urine	5 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Borrelia burgdorferii serology	Serum	5 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Chlamydia pneumoniae	Lower respiratory	3-5 days	National Virus Reference Laboratory,	https://nvrl.ucd.ie/usermanual

TEST	SAMPLE	TURNAROUND TIME	TESTING LABORATORY	NOTES
PCR	tract sample		Dublin	
Chlamydia trachomatis PCR	Aptima swab/Urine	5 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Cytomegalovirus (CMV) Serology/PCR	Serology: Serum PCR: EDTA blood, BAL, post mortem, urine, dried blood spot	Serology: 7 days PCR: 5 days Dried blood spots: 4-6 weeks	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Enterovirus PCR	CSF, Stool, Swab	CSF: 3 days Other: 5 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Epstein Barr Virus Serology/PCR	Serology: Serum PCR: EDTA blood	Serology: 3 days PCR: 5 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Hepatitis A, B, C, D, E confirmatory testing	Serum		National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual Referred from Biochemistry Department. Consult Biochemistry User Manual for details.
Herpes Simplex Virus (Type 1 and 2) Serology/PCR	Serology: Serum PCR: Swab, CSF, BAL	Serology: 7 days CSF PCR: 3 days PCR (other): 5 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Human	Serum	3 days	National Virus	https://nvrl.ucd.ie/usermanual

TEST	SAMPLE	TURNAROUND TIME	TESTING LABORATORY	NOTES
Herpesvirus 6 PCR			Reference Laboratory, Dublin	
HIV Serology/PCR	Serology: serum PCR: EDTA blood (plasma)	Serology: 7 days PCR: 7 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Human Metapneumovirus PCR	Resp NPA	3-5 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Human T cell Lymphotropic Virus (HTLV) serology	Serum	3-7 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Influenza virus A/B PCR	Respiratory sample	3-5 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
JC Polyomavirus PCR	CSF, Blood, Serum, Urine	7 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Leptospira interrogans serology	Serum	4-14 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Measles virus serology/PCR	Serology: Serum PCR: Oral fluid, Urine, swabs, CSF	Serology: 4-7 days PCR: 7 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Monkeypox (MPOX) PCR	Skin swab, vesicle fluid,	3 days	National Virus Reference Laboratory,	https://nvrl.ucd.ie/usermanual Contact Consultant Microbiologist and Medical

TEST	SAMPLE	TURNAROUND TIME	TESTING LABORATORY	NOTES
	throat swab Swabs are available from Microbiology.		Dublin	Scientist in Microbiology prior to sending samples.
Mumps virus serology/PCR	Serology: Serum PCR: Oral fluid, throat swab, CSF	Serology: 5-7 days PCR: 7 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Mycoplasma genitalium PCR	Urine, anogenital swab (Aptima collection device)	5 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Neisseria gonorrhoea PCR	Aptima swab/Urine	5 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Parainfluenza virus 1,2,3 PCR	Respiratory sample	3-5 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Parechovirus PCR	Respiratory, stool, CSF, swabs	CSF: 3 days Other: 5 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Parvovirus B19 serology/PCR	Serology: Serum PCR: Amniotic fluid, EDTA blood (plasma)	Serology: 3 days PCR: 5 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Pneumocystis	BAL, Sputum	5 days	National Virus	https://nvrl.ucd.ie/usermanual

TEST	SAMPLE	TURNAROUND TIME	TESTING LABORATORY	NOTES
jirovecii (PJP) PCR			Reference Laboratory, Dublin	
Respiratory syncytial virus (RSV) PCR	Respiratory, throat swab	3-5 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Rubella virus serology	Serum, oral fluid	3-7 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
SARS-CoV-2 PCR/serology	Serology: Serum Only available by prior arrangement PCR: Combined nasal/throat swab, BAL, Sputum	Serology: 7 days PCR: 3 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Syphilis (*Treponema pallidum*) serology	Serum	3-7 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Toxoplasma gondii serology	Serum	3 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Trichomonas vaginalis PCR	Aptima swab	5 days	National Virus Reference Laboratory, Dublin	https://nvrl.ucd.ie/usermanual
Varicella Zoster	Serology:	Serology: 3-7	National Virus	https://nvrl.ucd.ie/usermanual

TEST	SAMPLE	TURNAROUND TIME	TESTING LABORATORY	NOTES
Virus Serology/PCR	Serum PCR: CSF, swabs, vesicular fluid	days CSF PCR: 3 days Other PCR: 5 days	Reference Laboratory, Dublin	

7 EUCAST

The Microbiology Department in LUH follow EUCAST (European Committee on Antimicrobial Susceptibility Testing) guidelines for antimicrobial susceptibility testing. EUCAST has recently changed the definitions of susceptibility testing categories S, I and R.

- S - Susceptible, standard dosing regimen: A microorganism is categorised as "Susceptible, standard dosing regimen", when there is a high likelihood of therapeutic success using a standard dosing regimen of the agent.
- I - Susceptible, increased exposure*: A microorganism is categorised as "Susceptible, Increased exposure*" when there is a high likelihood of therapeutic success because exposure to the agent is increased by adjusting the dosing regimen or by its concentration at the site of infection.
- R - Resistant: A microorganism is categorised as "Resistant" when there is a high likelihood of therapeutic failure even when there is increased exposure.

*Exposure is a function of how the mode of administration, dose, dosing interval, infusion time, as well as distribution and excretion of the antimicrobial agent will influence the infecting organism at the site of infection.

8 NORMAL CSF VALUES

As per UK Standards for Microbiology Investigations, Public Health England (Investigation of Cerebrospinal Fluid B27 Issue No:6.1)

Leucocytes	Neonates: <1 month	0 - 30 cells /µL
	Infants: 1 - 12 months	0 - 15 cells /µL
	Children/Adults: >1 year	0 - 5 cells /µL
Erythrocytes	No RBCs should be present in normal CSF	
Protein	Neonates: <1 month	0.65 – 1.5 g/L
	Infants: 1 - 2 months	0.5 – 0.9 g/L
	Children: 2 months-18 years	0.05 – 0.35 g/L
	Adults: 18 – 60 years	0.15 – 0.45 g/L
	Adults: >60 years	0.15 – 0.6 g/L
Glucose	Neonates: <1 month	1.94 – 5.55 mmol/L
	Infants: 1 – 2 months	1.55 – 5.55 mmol/L
	Infants: 2 – 12 months	1.94 – 5.0 mmol/L
	Children/Adults: >1 year	2.22 – 4.44 mmol/L

These values represent the approximate upper and lower limits of normality and are for guidance only.

9 SEMEN ANALYSIS PROTOCOL (MF-0041)

PROTOCOL FOR SEMEN ANALYSIS AT LETTERKENNY UNIVERSITY HOSPITAL.

All G.P.'s and Gynaecologists are requested to conform to the following WHO guidelines:

1. All semen analyses will be carried out strictly by appointment only. Patients should be informed to make an appointment with the Microbiology Laboratory to bring / send semen samples (07491-23610).

2. The sample should be collected after a 2-7 day period of abstinence from sexual activity.

3. The entire sample should be collected into the container provided. (If any portion of the ejaculate is not collected, or if the container leaks during transport, the sample should not be used for analysis.)

Please Note that there are NO facilities for specimen collection in the laboratory

4. Condoms must not be used as a means of collection. (They may interfere with the viability of the spermatozoa.)

5. Coitus Interuptus is not acceptable as a means of collection. (It is likely that there will be a loss of the first portion of the ejaculate, which contains the highest concentration of spermatozoa.)

6. The form and container should be labelled with:

1. The Name of the Male partner (NOT the female partner)
2. The Date of Birth of the Male partner
3. The Hospital Number of the Male partner
4. Date and Time of sample collection.

7. The laboratory request form must state all additional required and relevant details.

INFERTILITY SAMPLES

8. The sample should be protected from extremes of temperature- keep the sample close to the body during transport.

9. The sample should be delivered to the Laboratory within 1 hour of its collection. Samples received after 1 hour of collection will be analysed but delay may adversely affect results

POST VASECTOMY SAMPLES

8. The sample should be delivered to the Laboratory within 4 hours of its collection.

10 BLOOD CULTURE COLLECTION PROTOCOL