



# **MEDICAL MICROBIOLOGY**

## **Residency Training Program**

# **CURRICULUM**

Revised June 2015

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## INTRODUCTION

Medical Microbiology in Oman encompasses both laboratory and clinical practice. The training program outlined in this curriculum aims to provide qualified medical microbiologists to serve the needs of the country in the different disciplines that are incorporated under this training program.

## MISSION AND VISION

### **Mission:**

The aim of training is to provide the Resident with both the theoretical foundation and the practical, technical, clinical and managerial skills necessary for the independent specialist practice of Medical Microbiology in a clinical environment and for the advancement of the subject. The laboratory work and clinical experience must be closely integrated; therefore laboratory associated clinical duties are essential components of the training programme.

### **Vision:**

To provide a well-qualified internationally recognized medical microbiologists with broad understanding of diagnosis and management of infectious diseases from lab and clinical perspective. They are expected to provide quality patient care in collaboration with laboratory scientists and health care team with strong microbiological interpretive skills and cost effective resource utilization.

## GENERAL OBJECTIVES OF TRAINING IN MEDICAL MICROBIOLOGY

Medical Microbiology is a branch of medicine concerned with the diagnosis, treatment and prevention of infectious diseases. The profession of medical microbiology consists primarily of four major roles of activity:

1. Scientific and administrative direction of medical microbiology laboratory.
2. Providing clinical consultation on the investigation, diagnosis and treatment of patients suffering from infectious diseases.
3. The establishment and direction of a clinical infection prevention and control program.
4. Public health and communicable disease epidemiology and prevention.

At the end of training, the Resident should have achieved competence in all the objectives specified in Medical Microbiology training record. Resident should also have passed FRCPATH Part 1 and FRCPATH Part 2 and attained a series of successful Record of In-Training Assessment.

The followings are the core competencies in Medical Microbiology training program:

### **Medical Knowledge:**

- Acquire detailed knowledge of normal microbiologic flora and the various specific bacteria, viruses, fungi and parasites including pathogens common at various infection sites.
- Demonstrate knowledge and clinical skills in infectious disease epidemiology, pathogenesis, clinical presentation and management in both community and health care settings in the various age groups and patient populations.
- Demonstrate thorough knowledge of infection in immunocompromised patients, transplantation, neutropenia, intensive care unit (ICU) patients and neonatal intensive care unit (NICU) in relation to common infective causes and appropriate clinical management.
- Demonstrate detailed knowledge of antimicrobial agents with respect to their mechanism of action, spectrum of activity, pharmacokinetics/pharmacodynamics and side effects.
- Identify and appropriately respond to outbreaks of infection in hospital and community.
- Demonstrate proficient and appropriate use of microbiologic laboratory procedural skills including manual, semi-manual and automated systems.
- Acquire ability to interpret and report microbiologic lab results efficiently.
- Demonstrate ability to utilize laboratory information system for result reporting, storage, retrieval and analysis.
- Recognize the role of public health laboratory in microbiology laboratory system.
- Understand principles of quality assurance and control and continual quality improvement as they relate to medical microbiology.
- Demonstrate familiarity with health and safety regulations in relation to medical microbiology department.
- Acquire knowledge of any developing newer techniques.

### **Interpersonal and Communication Skills:**

- Develop effective communication with other members of medical staff, house staff, and other members of the healthcare delivery team.
- Develop awareness of appropriate timeliness, clarity, and accuracy of verbal and written microbiology related communications.
- Learn to work effectively with other members of the laboratory and medical teams.
- Consult effectively with other physicians and health care professionals.
- Contribute effectively to other interdisciplinary team activities.

### **Practice Based Learning and Improvement:**

- Understand the role of the Medical Microbiology laboratory in the public health system and in population screening.
- Identify the important determinants of health affecting patients.
- Contribute effectively to improved health of patients and communities.
- Recognize and respond to those issues where advocacy is appropriate.
- Gain experience in the critical review of the Medical Microbiology literature.

- Acquire experience presenting new knowledge to other learners.
- Develop, implement and monitor a personal continuing education strategy.
- Facilitate the education of technologists, patients, students and other health care professionals and contribute to the development of new knowledge.
- Demonstrate the ability to conduct independent or collaborative research.

### **Professionalism:**

- Demonstrate appropriate personal and professional behaviour when interacting with patients, their families, technologists and colleagues.
- Deliver the highest quality of care with integrity, honesty, and compassion.
- Understand and practice ethical and medico-legal requirements of medical microbiologists.

### **System Based Practice:**

- Develop clinical, scientific, technical, management and leadership skills to run a laboratory and deliver a high quality clinical service.
- Manage time, resources, finance and personnel effectively.
- Effectively and efficiently utilize microbiological investigations.
- Proficiency with information technology
- Manage infection control and prevention in hospital.
- Work collaboratively to set an antimicrobial stewardship program.

### **Patient Care:**

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- Gather essential and accurate information about patients
- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- Develop and carry out patient management plans
- Use information technology to support patient care decisions and patient education
- Perform competently all laboratory procedures considered essential for patient management
- Provide health care services aimed at preventing health problems or maintaining health
- Work with health care professionals, including those from other disciplines, to provide patient-focused care
- Consider the patient safety as prime importance when processing patient samples and interpreting results.

## ADMISSION REQUIREMENTS

- Resident must be a holder of MD degree or bachelors in medicine and surgery or equivalent from a university recognized by the OMSB.
- Resident must have completed a year of internship.
- Resident must be of good conduct and medically fit for the speciality.
- Resident must pass the OMSB selection examination before being scheduled for interview.
- Resident must pass the interview. (He/She should satisfy the selection committee in terms of knowledge, attitude, aptitude and performance in his/her medical studies and previous jobs held.

## DURATION OF TRAINING

The resident must complete a total of 5 years (65 blocks); each year consists of 13 blocks including one block for leave.

These years are divided as follows:

- **R1**- one year of combined clinical rotations and basic microbiology.
- **R2-R5**- four years specialized training in medical microbiology. It is divided into two phases of training with graded responsibilities: Phase 1 (R2-R3) and phase 2 (R4-R5). During this stage, residents will be involved in the different areas related to Medical Microbiology training. Residents will be attached to a Medical Microbiology laboratory in the UK, Ireland or in other recognized international centers starting mid R4 for a minimum of one year.

Moving through these academic years requires completion of the requirements, i.e. achieve the objectives of each rotation (see under respective rotation) along with satisfactory evaluations and assessments. Duration of training may be extended depending on the availability of slots in UK, Ireland or in other recognized international centers.

## OUTLINE OF MAJOR AND MINOR ROTATIONS

ROTATIONS	R1	R2-R3	R4-R5	TOTAL
Basic Microbiology	5	-	-	<b>5</b>
Medical Microbiology	-	13	17	<b>30</b>
Adult Infectious Diseases	2	2	2	<b>6</b>
Paediatric Infectious Diseases	1	1	-	<b>2</b>
Haematology/Oncology	1	-	-	<b>1</b>
Gastroenterology	1	-	-	<b>1</b>
Respiratory Medicine	1	-	-	<b>1</b>
Intensive Care Unit	1	-	-	<b>1</b>
Virology	-	3	3	<b>6</b>
Mycobacteriology	-	2	-	<b>2</b>
Parasitology/Mycology	-	1	-	<b>1</b>
Infection Control	-	1	1	<b>2</b>
Research	-	1	1	<b>2</b>

Note: During mid R4, residents will be attached to a medical microbiology laboratory in the UK, Ireland or in other recognized international centers.

## MEMBERS OF THE TEACHING FACULTY

### Scientific Committee

<b>Dr. Amina Al Jardani</b>	<b>Chairperson</b>	<b>Central Public Health Lab</b>
<b>Dr. Saleh Al Azri</b>	<b>Program Director</b>	<b>Central Public Health Lab</b>
<b>Dr. Zakariya Al Muharrmi</b>	<b>Associate Program Director</b>	<b>Sultan Qaboos University Hospital</b>
<b>Dr. Mubarak Al Yaqoobi</b>	<b>Associate Program Director</b>	<b>Khoula Hospital</b>
<b>Dr. Fatma Al Yaqoubi</b>	<b>Associate Program Director</b>	<b>Royal Hospital</b>
<b>Dr. Nada Al Siyabi</b>	<b>Member</b>	<b>Al Nahdha Hospital</b>
<b>Dr. Hanan Al Kindi</b>	<b>Member</b>	<b>Central Public Health Lab</b>
<b>Dr. Zaina Al Maskari</b>	<b>Member</b>	<b>Royal Hospital</b>
<b>Dr. Khuloud Al Maamari</b>	<b>Member</b>	<b>Sultan Qaboos University Hospital</b>
<b>Dr. Hanaa Al Aرامي</b>	<b>Member</b>	<b>Royal Hospital</b>

### Trainers

<b>Dr. Jalila Al Lawati</b>	<b>Royal Hospital</b>
<b>Dr. Seif Salim Al Abri</b>	<b>Royal Hospital</b>
<b>Dr. Faryal Al Lawati</b>	<b>Royal Hospital</b>
<b>Dr. Amal Al Maani</b>	<b>Royal Hospital</b>
<b>Mrs. Zainab Al Balushi</b>	<b>Royal Hospital</b>
<b>Dr. Abdullah Balkhair</b>	<b>Sultan Qaboos University Hospital</b>
<b>Dr. Fatma Ba Alawi</b>	<b>Sultan Qaboos University Hospital</b>
<b>Dr. Badriya Al Adawi</b>	<b>Sultan Qaboos University Hospital</b>
<b>Mr. Emmanuel Serebour</b>	<b>Sultan Qaboos University Hospital</b>
<b>Mr. Jacob George</b>	<b>Sultan Qaboos University Hospital</b>
<b>Dr. Fatma Al Rashdi</b>	<b>Khoula Hospital</b>
<b>Mrs. Aisha Al Kharousi</b>	<b>Khoula Hospital</b>
<b>Dr. Alya Al Lawati</b>	<b>Al Nahdha Hospital</b>
<b>Dr. Azza Al Rashdi</b>	<b>Central Public Health Lab</b>
<b>Dr. Samira Al Mahruqi</b>	<b>Central Public Health Lab</b>



## PARTICIPATING TRAINING CENTRES

Training should be done at an accredited Microbiology laboratory. This should be an independent department adequately staffed and equipped. It should be headed by a consultant/senior specialist Microbiologist and have sufficient accredited trainers. There should be adequate number of samples and tests to justify training. At the present time, the Microbiology departments of the following centres fulfil the above criteria for training Residents in Medical Microbiology.

- Royal Hospital
- Sultan Qaboos University Hospital
- Central Public Health Laboratory
- Khoula Hospital
- Al-Nahdha Hospital

## SUPERVISION

All Residents must have covered by a certified trainer at all times. Every Resident will have a designated trainer who will be personally responsible for day-to-day training and who will be accountable to the Programme Director.

Residents are required to keep a training record detailing their training experience (Log Book – see *Appendix II*). Their trainer will inspect this regularly. Residents will be regularly informed of their progress and, in addition, must be encouraged and given every opportunity to discuss any deficiencies in their training programme. The Programme Director should discuss the resident progress with each trainer and should keep the Chairman of the Scientific Committee informed. A meeting involving the Programme Director, trainers and residents should be held every six months to discuss the progress of training and plan for the next six months. A report of this meeting should be forwarded to the Chairman of the Scientific Committee.

## EDUCATIONAL SUPERVISOR

There are educational supervisors assigned in each training centre who oversee the medical education of residents and ensure that residents make the necessary clinical and academic progress. They develop a learning agreement and educational objectives with the residents, which is mutually agreeable and is the point of reference for future appraisal. The program Director and Associate Program Directors should agree upon these action plans. The education supervisors also ensure that the residents maintain and develop their specialty learning portfolio (see *Appendix III*) and participate in the specialty assessment process. There are forms that are being utilized by the educational supervisors to evaluate the residents' progress and to ensure that they are fulfilling the program requirements in each year level (see *Appendix IV*).

## MANAGING CURRICULUM IMPLEMENTATION

The curriculum outlines the minimum Medical microbiology training requirements for delivery in a regional training program. It guides educational supervisors as to what is required to deliver the curriculum and trainees in the learning and assessment methods required for satisfactory completion of training. It is the responsibility of the Program Director and educational supervisors to ensure that the program delivers the depth and breadth of medical microbiology training outlined in the curriculum.

The curriculum should be reviewed every two years by involving chairperson, program director and curriculum subcommittee members.

## RESIDENT SAFETY

The OMSB provides the residents support to their academic performance, physical health and emotional wellbeing through the Performance and Wellness section. It aims to maximize their personal and professional productivity.

A resident may directly contact the Performance and Wellness section and request an assessment. In addition, the Chairperson/Program Director or Educational supervisor (with the approval of the Program Director) may also contact the section to discuss an area of concern related to a residents' performance or well-being. If appropriate, attempts will be made to assist the chairman/PD in managing the resident's issue internally. If the attempts are inappropriate or has failed, then a referral can be made for a face-to-face assessment of the resident.

A referral is required either from the Chairperson/Program Director or from the resident himself/herself. A filled referral form, available online at [www.omsb.org](http://www.omsb.org) or from the Program Administrator, is required.

In the event of a disaster/emergency situation, residents on-site in the training centers are expected to follow the instructions of their immediate supervisor to ensure both their safety and the continuation of patient care. Residents not on duty during the expected event are requested to secure their personal safety and then communicate with their immediate supervisors for instructions.

The Medical Microbiology residents are oriented about safety in the lab from the first day of residency in order to be familiar with the safety rules and regulations followed in the laboratories. The residents will be informed of the following:

- Department Safety Code
- Mechanical Hazards
- Biosafety
  - Containment level
  - Pathogen hazard group
- Chemical Hazards
- Fire Hazards
- Radiation Hazards
- Disposal of waste

- Handling of spillage and leaking specimens
- Reporting of laboratory accidents
- Hospital disaster plan

## **PATIENT SAFETY**

The patient safety is of prime importance when processing and reporting patient samples. This should be considered by residents and attending supervisor to ensure provision of health services in a timely, accurate manner. In addition, any microbiological consultation given to clinician should be evidence-based to ensure proper patient management.

## **METHODS OF TEACHING**

- Observation of, assisting and discussion with senior medical staff
- Working under consultant supervision
- Task specific on the job training
- Observation of laboratory methods
- Discussion with clinical scientists and senior BMS staff
- Practical bench work
- Personal study
- Appropriate postgraduate education courses
- Tailored clinical experience
- Laboratory and clinical team and directorate meetings
- Discussion with Infection Prevention & Control Nurses and/or a Consultant in Communicable Disease Control (CCDC)/CHP and/or Regional Epidemiologist (RE)
- Attendance and participation at relevant hospital committees
- Attending ward round and multidisciplinary team meetings and telephone advice to clinicians
- Teaching undergraduates and other health professionals
- Awareness of appropriate guidelines
- Attending regional, national and international medical or scientific conferences
- Interaction with/attachment to specialist reference laboratories
- E-learning
- Undertaking a laboratory-based project
- Learning with peers
- Work-based experiential learning
- Attendance of infectious disease clinics
- Consultant-led ward rounds
- Practical laboratory experience
- Formal postgraduate teaching
- Independent self-directed learning

## METHODS OF ASSESSMENT

Assessment is an essential and significant element of specialist medical training.

Assessment includes the following:

1. Monthly evaluation after each block & verbal feedback
2. Six monthly evaluation & verbal feedback
3. Annual evaluation
4. Workplace-based assessment (WPBA)

### A. MONTHLY EVALUATION:

The monthly evaluation is done after each block using OMSB forms which are based on CANMED and followed by verbal feedback indicating the strength and weakness of each resident on each block and suggestion for improvement. This type of evaluation also gives the resident chance to express his/her opinion about the rotation (See *Appendix V*).

### B. SIX MONTHLY AND THE ANNUAL EVALUATION:

The six monthly and annual evaluations will be reviewed with verbal feedback by the program director and results will be submitted to OMSB.

### C. WORKPLACE-BASED ASSESSMENT:

Workplace-based assessment (WPBA) forms are an important part of assessing the competency of trainees, and ensuring that they are making satisfactory progress. The principle is that trainees are assessed on work that they are actually doing and that, as far as possible, the assessment is integrated into their day-to-day work. Forms for WPBA are adapted from Royal College of Pathologists United Kingdom (See *Appendix VI*).

The work-based assessment includes multi-source feedback (MSF), Directed-Observation of Practical Skills (DOPS), Case-based Discussion (CBD), and Evaluation of Clinical Event (ECE). The number of each assessment is shown in Table 1.

**Table 1**

Specialty	Multi-source feedback (MSF)	Direct Observation of Practical Skills (DOPS)	Case-based Discussion (CBD)	Evaluation of Clinical Events (ECE)
Medical Microbiology (Trainees on the 2009 curriculum)	1 per year	Minimum 6 per year (For R1-R3 trainees)  Minimum 4 per year (for R4-R5 trainees)	Minimum 6 per year	Minimum 1 per year (For R1-R3 trainees)  Minimum 2 per year (for R4-R5 trainees)

## **GENERAL PROFESSIONAL TRAINING (R1)**

During their first year, residents shall do clinical rotations in disciplines relevant to Medical Microbiology. They should complete the following:

Adult Infectious diseases = 2 blocks  
Paediatric Infectious Diseases = 1 block  
Haematology/Oncology = 1 block  
Gastroenterology = 1 block  
Respiratory Medicine = 1 block  
Intensive Care Unit = 1 block

They should be exposed to presentation, investigation and management of diseases, particularly infectious diseases.

This is followed by:

Basic Microbiology = 5 blocks

The core competency framework will be applicable to the clinical rotations and will be the basis for resident's evaluation.

### **Objectives of Clinical Rotations:**

#### **Adult Infectious Diseases**

The Medical Microbiology resident will be attached to adult infectious diseases in medicine for two blocks. The attending consultant will supervise the resident. The resident should participate in all activities, including the daily rounds, meetings, clinics and educational activities.

At the end of the rotation, the resident will be able to achieve the following objectives:

#### **Medical Knowledge:**

- Demonstrate knowledge of the microbial characteristics of specific infectious agents, the pathogenesis and clinical features of diseases produced in patients presenting with various infectious diseases.
- Elicit history that is relevant to the patient's problem(s), including the relevant infectious diseases history (E.g. epidemiologic and travel history related to particular infectious diseases).
- Perform physical examination that is relevant and appropriate.
- Select the appropriate investigation tools, including microbiologic tests, in a cost-effective and useful manner.
- Use all pertinent information to arrive to the most appropriate clinical diagnosis and treatment plan.
- Demonstrate knowledge of non-infectious causes of syndromes that mimic infectious diseases.

- Demonstrate knowledge of the infections in immunocompromised patients (E.g. HIV patients and post-transplantation) and in returning traveller with the relevant investigations to be done.
- Demonstrate knowledge of the epidemiology and distribution of common tropical infections.

### **Interpersonal and Communication Skills:**

- Develop effective communications with other members of medical staff and other members of the healthcare delivery team.
- Develop awareness of appropriate timeliness, clarity, and accuracy of verbal and written infectious disease related communications.
- Communicate effectively and seek advice if unsure.
- Demonstrate effective communication with consulting/referring physicians and services.
- Learn to work effectively with other members of the medical teams.
- Consult effectively with other physicians and health care professionals.
- Contribute effectively to other interdisciplinary team activities.

### **Practice Based Learning & Improvement:**

- Identify the important determinants of infectious diseases affecting patients.
- Contribute effectively to improve health of patients and communities.
- Recognize and respond to those issues where advocacy is appropriate.
- Gain experience in the critical review of the infectious diseases literature.
- Acquire experience presenting new knowledge to other learners.
- Develop, implement and monitor a personal continuing education strategy.
- Facilitate the education of patients, students and other health care professionals and contribute to the development of new knowledge.
- Demonstrate the ability to conduct independent or collaborative research.

### **Professionalism:**

- Demonstrate appropriate personal and professional behaviour when interacting with patients, their families, and colleagues.
- Deliver the highest quality of care with integrity, honesty, and compassion.
- Understand and practice ethical and medico-legal requirements of an infectious disease physician.
- Provide effective consultation services with respect to all aspects of patient care and education.

### **System Based Practice:**

- Describe principles of departmental financing, budgeting and organizational funding.
- Set priorities and manage time to balance patient care, meetings and personal life.
- Demonstrate awareness of indications and urgency of diagnostic investigations.
- Utilize resources effectively and efficiently.
- Acquire proficiency with information technology.
- Develop leadership and administrative skills like managing conflicts, time management, supervision, leading the team, and working in harmony.
- Participate in quality improvement activities, such as audits, peer review and quality assurance activities.

### **Patient Care:**

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- Gather essential and accurate information about their patients
- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- Develop and carry out patient management plans, and discuss them with senior colleagues
- Counsel and educate patients and their families
- Use information technology to support patient care decisions and patient education
- Perform competently all medical and invasive procedures considered essential for the area of practice
- Provide health care services aimed at preventing health problems or maintaining health
- Work with health care professionals, including those from other disciplines, to provide patient-focused care
- Apply medical knowledge and gained skills safely in patient management.
- Report any incident that may affect patient safety and be open about mistakes, seek help from senior colleagues and learn from mistakes

### **Paediatric Infectious Diseases**

The Medical Microbiology resident will be attached to paediatric infectious disease for one block. He/she will be supervised by attending consultant.

At end of the rotation the resident should:

### **Medical Knowledge:**

- Be able to recognize infections that can be transmitted from mother to baby during the antenatal, perinatal and postnatal period.
- Be aware of the role of risk avoidance, therapeutic interventions, immunization and caesarean section in the prevention of congenital infections.
- Know the pathophysiology, clinical signs and symptoms of infectious diseases in children (E.g. neonatal meningitis, group B sepsis, intraventricular shunts infections).
- Know the available diagnostic techniques
- Know the pharmacokinetics of prescribing for children and the need to avoid certain antimicrobials.

### **Interpersonal and Communication Skills:**

- Develop effective communications with other members of medical staff and other members of the healthcare delivery team.
- Develop awareness of appropriate timeliness, clarity, and accuracy of verbal and written pediatric infectious disease related communications.
- Communicate effectively and seek advice if unsure.
- Demonstrate effective communication with consulting/referring physicians and services.
- Learn to work effectively with other members of the medical teams.
- Consult effectively with other physicians and health care professionals.

- Contribute effectively to other interdisciplinary team activities.

### **Practice Based Learning & Improvement:**

- Identify the important determinants of infectious diseases affecting children.
- Contribute effectively to improved health of children and communities.
- Recognize and respond to those issues where advocacy is appropriate.
- Gain experience in the critical review of the pediatric infectious diseases literature.
- Acquire experience presenting new knowledge to other learners.
- Develop, implement and monitor a personal continuing education strategy.
- Facilitate the education of patients, parents, students and other health care professionals and contribute to the development of new knowledge.
- Demonstrate the ability to conduct independent or collaborative research.

### **Professionalism:**

- Demonstrate appropriate personal and professional behaviour when interacting with patients, their families, and colleagues.
- Deliver the highest quality of care with integrity, honesty, and compassion.
- Understand and practice ethical and medico-legal requirements of an infectious disease physician.
- Provide effective consultation services with respect to all aspects of patient care and education.

### **System Based Practice:**

- Describe principles of departmental financing, budgeting and organizational funding.
- Set priorities and manage time to balance patient care, meetings and personal life.
- Demonstrate awareness of indications and urgency of diagnostic investigations.
- Utilize resources effectively and efficiently.
- Acquire proficiency with information technology.
- Develop leadership and administrative skills like managing conflicts, time management, supervision, leading the team, and working in harmony.
- Participate in quality improvement activities, such as audits, peer review and quality assurance activities.

### **Patient Care:**

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- Gather essential and accurate information about their patients
- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- Develop and carry out patient management plans, and discuss them with senior colleagues
- Counsel and educate patients and their families
- Use information technology to support patient care decisions and patient education
- Perform competently all medical and invasive procedures considered essential for the area of practice
- Provide health care services aimed at preventing health problems or maintaining health



- Work with health care professionals, including those from other disciplines, to provide patient-focused care
- Apply medical knowledge and gained skills safely in patient management.
- Report any incident that may affect patient safety and be open about mistakes, seek help from senior colleagues and learn from mistakes

### Haematology - Oncology

The Medical Microbiology resident will be attached to haematology-oncology team for one block. He/she will be supervised by attending consultant.

At end of the rotation the resident should achieve the following objectives:

#### **Medical Knowledge:**

- Know the common infection problems in haematology-oncology patients, e.g. febrile neutropenia, portacath related infections, post BMT infections.
- Know the infections related to blood disorders e.g. salmonella infections in sickle cell disease patients like cholecystitis or osteomyelitis following bone necrosis.
- Understand the principles of investigating these groups of patients to identify focus of infection
- Know the fungal infections like Aspergillosis in these patients and how to diagnose and treat.

#### **Interpersonal and Communication Skills:**

- Develop effective communications with other members of medical staff and other members of the healthcare delivery team.
- Develop awareness of appropriate timeliness, clarity, and accuracy of verbal and written infectious disease related communications.
- Communicate effectively and seek advice if unsure.
- Demonstrate effective communication with consulting/referring physicians and services.
- Learn to work effectively with other members of the medical teams.
- Consult effectively with other physicians and health care professionals.
- Contribute effectively to other interdisciplinary team activities.

#### **Practice Based Learning & Improvement:**

- Identify the important determinants of infectious diseases affecting patients with hematological disorders and patients with oncologic disease.
- Contribute effectively to improved health of patients and communities.
- Recognize and respond to those issues where advocacy is appropriate.
- Gain experience in the critical review of the infectious diseases literature.
- Acquire experience presenting new knowledge to other learners.
- Develop, implement and monitor a personal continuing education strategy.
- Facilitate the education of patients, students and other health care professionals and contribute to the development of new knowledge.
- Demonstrate the ability to conduct independent or collaborative research.

### **Professionalism:**

- Demonstrate appropriate personal and professional behaviour when interacting with patients, their families, and colleagues.
- Deliver the highest quality of care with integrity, honesty, and compassion.
- Understand and practice ethical and medico-legal requirements of an infectious disease physician.
- Provide effective consultation services with respect to all aspects of patient care and education.

### **System Based Practice:**

- Describe principles of departmental financing, budgeting and organizational funding.
- Set priorities and manage time to balance patient care, meetings and personal life.
- Demonstrate awareness of indications and urgency of diagnostic investigations.
- Utilize resources effectively and efficiently.
- Acquire proficiency with information technology.
- Develop leadership and administrative skills like managing conflicts, time management, supervision, leading the team, and working in harmony.
- Participate in quality improvement activities, such as audits, peer review and quality assurance activities.

### **Patient Care:**

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- Gather essential and accurate information about patients
- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- Develop and carry out patient management plans
- Use information technology to support patient care decisions and patient education
- Perform competently all laboratory procedures considered essential for patient management
- Provide health care services aimed at preventing health problems or maintaining health
- Work with health care professionals, including those from other disciplines, to provide patient-focused care
- Consider the patient safety as prime importance when processing patient samples and interpreting results.

## **ICU**

The Medical Microbiology resident will be attached to adult ICU for one block. He/she will be supervised by attending consultant.

At end of the rotation the resident should achieve the following objectives:

### **Medical Knowledge:**

- Know the Common infection problems in the ICU setting, e.g. ventilator-associated pneumonia, line-infections, septicaemia and Outcomes of infections.
- Know the evidence-base for diagnosis and management.

- Be aware of the Rationale for interventions
- Recognize and manage specific infectious problems in the critically ill.
- Recognize the consequences of severe infection including disseminated intravascular coagulation (DIC) and sepsis syndrome.

### **Interpersonal and Communication Skills:**

- Develop effective communications with other members of medical staff and other members of the healthcare delivery team.
- Develop awareness of appropriate timeliness, clarity, and accuracy of verbal and written intensive care related communications.
- Communicate effectively and seek advice if unsure.
- Demonstrate effective communication with consulting/referring physicians and services.
- Learn to work effectively with other members of the medical teams.
- Consult effectively with other physicians and health care professionals.
- Contribute effectively to other interdisciplinary team activities.

### **Practice Based Learning & Improvement:**

- Identify the important determinants of infectious diseases affecting patients with severe sepsis.
- Contribute effectively to improved health of patients and communities.
- Recognize and respond to those issues where advocacy is appropriate.
- Gain experience in the critical review of the infectious diseases literature.
- Acquire experience presenting new knowledge to other learners.
- Develop, implement and monitor a personal continuing education strategy.
- Facilitate the education of patients, students and other health care professionals and contribute to the development of new knowledge.
- Demonstrate the ability to conduct independent or collaborative research.

### **Professionalism:**

- Demonstrate appropriate personal and professional behaviour when interacting with patients, their families, and colleagues.
- Deliver the highest quality of care with integrity, honesty, and compassion.
- Understand and practice ethical and medico-legal requirements of an infectious disease physician.
- Provide effective consultation services with respect to all aspects of patient care and education.

### **System Based Practice:**

- Describe principles of departmental financing, budgeting and organizational funding.
- Set priorities and manage time to balance patient care, meetings and personal life.
- Demonstrate awareness of indications and urgency of diagnostic investigations.
- Utilize resources effectively and efficiently.
- Acquire proficiency with information technology.
- Develop leadership and administrative skills like managing conflicts, time management, supervision, leading the team, and working in harmony.
- Participate in quality improvement activities, such as audits, peer review and quality assurance activities.

### **Patient Care:**

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- Gather essential and accurate information about their patients
- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- Develop and carry out patient management plans, and discuss them with senior colleagues
- Counsel and educate patients and their families
- Use information technology to support patient care decisions and patient education
- Perform competently all medical and invasive procedures considered essential for the area of practice
- Provide health care services aimed at preventing health problems or maintaining health
- Work with health care professionals, including those from other disciplines, to provide patient-focused care
- Apply medical knowledge and gained skills safely in patient management.
- Report any incident that may affect patient safety and be open about mistakes, seek help from senior colleagues and learn from mistakes

## **Gastroenterology**

The Medical Microbiology resident will be attached to gastroenterology team for one block. The attending consultant will supervise the resident:

At end of the rotation the resident should achieve the following objectives:

### **Medical Knowledge:**

- Know about Viral hepatitis, including clinical presentation, various risk factors for each cause and relevant investigation of individual cases.
- Know the various gastrointestinal infections including their clinical presentation, investigations and management.
- Know the non-infectious gastrointestinal diseases that can mimic infectious diseases.

### **Interpersonal and Communication Skills:**

- Develop effective communications with other members of medical staff and other members of the healthcare delivery team.
- Develop awareness of appropriate timeliness, clarity, and accuracy of verbal and written infectious disease related communications.
- Communicate effectively and seek advice if unsure.
- Demonstrate effective communication with consulting/referring physicians and services.
- Learn to work effectively with other members of the medical teams.
- Consult effectively with other physicians and health care professionals.
- Contribute effectively to other interdisciplinary team activities.

### **Practice Based Learning & Improvement:**

- Identify the important determinants of gastrointestinal infections affecting patients.

- Contribute effectively to improved health of patients and communities.
- Recognize and respond to those issues where advocacy is appropriate.
- Gain experience in the critical review of the gastrointestinal infections literature.
- Acquire experience presenting new knowledge to other learners.
- Develop, implement and monitor a personal continuing education strategy.
- Facilitate the education of patients, students and other health care professionals and contribute to the development of new knowledge.
- Demonstrate the ability to conduct independent or collaborative research.

### **Professionalism:**

- Demonstrate appropriate personal and professional behaviour when interacting with patients, their families, and colleagues.
- Deliver the highest quality of care with integrity, honesty, and compassion.
- Understand and practice ethical and medico-legal requirements of an infectious disease physician.
- Provide effective consultation services with respect to all aspects of patient care and education.

### **System Based Practice:**

- Describe principles of departmental financing, budgeting and organizational funding.
- Set priorities and manage time to balance patient care, meetings and personal life.
- Demonstrate awareness of indications and urgency of diagnostic investigations.
- Utilize resources effectively and efficiently.
- Acquire proficiency with information technology.
- Develop leadership and administrative skills like managing conflicts, time management, supervision, leading the team, and working in harmony.
- Participate in quality improvement activities, such as audits, peer review and quality assurance activities.

### **Patient Care:**

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- Gather essential and accurate information about their patients
- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- Develop and carry out patient management plans, and discuss them with senior colleagues
- Counsel and educate patients and their families
- Use information technology to support patient care decisions and patient education
- Perform competently all medical and invasive procedures considered essential for the area of practice
- Provide health care services aimed at preventing health problems or maintaining health
- Work with health care professionals, including those from other disciplines, to provide patient-focused care
- Apply medical knowledge and gained skills safely in patient management.
- Report any incident that may affect patient safety and be open about mistakes, seek help from senior colleagues and learn from mistakes

## Respiratory Medicine

The Medical Microbiology resident will be attached to respiratory team in medicine for one block. The attending consultant will supervise the resident.

At end of rotation the resident should achieve the following objectives:

### **Medical Knowledge:**

- Know the various respiratory infections (e.g. CAP, atypical pneumonias, HAP and pulmonary TB) including their clinical presentation and appropriate management.
- Be aware of the possible respiratory tract infection complications (E.g. empyema, pleural effusion and pneumothorax) and their management.
- Know the role of appropriate empirical antimicrobial treatments bearing in mind clinical background of patients.
- Know the methods of sputum collection and the need for invasive investigation in certain situations, including bronchoscopy and pleural aspiration or biopsy.
- Know the viral respiratory infections.
- Know the isolation methods of patient's with certain reparatory infections e.g. TB and influenza.

### **Interpersonal and Communication Skills:**

- Develop effective communications with other members of medical staff and other members of the healthcare delivery team.
- Develop awareness of appropriate timeliness, clarity, and accuracy of verbal and written infectious disease related communications.
- Communicate effectively and seek advice if unsure.
- Demonstrate effective communication with consulting/referring physicians and services.
- Learn to work effectively with other members of the medical teams.
- Consult effectively with other physicians and health care professionals.
- Contribute effectively to other interdisciplinary team activities.

### **Practice Based Learning & Improvement:**

- Identify the important determinants of respiratory infectious diseases affecting patients.
- Contribute effectively to improved health of patients and communities.
- Recognize and respond to those issues where advocacy is appropriate.
- Gain experience in the critical review of the respiratory infections literature.
- Acquire experience presenting new knowledge to other learners.
- Develop, implement and monitor a personal continuing education strategy.
- Facilitate the education of patients, students and other health care professionals and contribute to the development of new knowledge.
- Demonstrate the ability to conduct independent or collaborative research.

### **Professionalism:**

- Demonstrate appropriate personal and professional behaviour when interacting with patients, their families, and colleagues.
- Deliver the highest quality of care with integrity, honesty, and compassion.

- Understand and practice ethical and medico-legal requirements of an infectious disease physician.
- Provide effective consultation services with respect to all aspects of patient care and education.

### **System Based Practice:**

- Describe principles of departmental financing, budgeting and organizational funding.
- Set priorities and manage time to balance patient care, meetings and personal life.
- Demonstrate awareness of indications and urgency of diagnostic investigations.
- Utilize resources effectively and efficiently.
- Acquire proficiency with information technology.
- Develop leadership and administrative skills like managing conflicts, time management, supervision, leading the team, and working in harmony.
- Participate in quality improvement activities, such as audits, peer review and quality assurance activities.

### **Patient Care**

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- Gather essential and accurate information about their patients
- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- Develop and carry out patient management plans, and discuss them with senior colleagues
- Counsel and educate patients and their families
- Use information technology to support patient care decisions and patient education
- Perform competently all medical and invasive procedures considered essential for the area of practice
- Provide health care services aimed at preventing health problems or maintaining health
- Work with health care professionals, including those from other disciplines, to provide patient-focused care
- Apply medical knowledge and gained skills safely in patient management.
- Report any incident that may affect patient safety and be open about mistakes, seek help from senior colleagues and learn from mistakes

## **Basic Microbiology Rotations (5 Blocks)**

During the 5 blocks of Basic Microbiology period, trainees should have an understanding of the principles of the following, together with how they may be applied to clinical and research problems:

### **Medical Knowledge:**

- Acquire knowledge of microbial structure, physiology and genetics.
- Acquire knowledge of microbial taxonomy, classification and typing methods.
- Acquire knowledge of host defence mechanisms, the immune system and immunity to infection.

- Acquire knowledge of microbial pathogenicity.
- Acquire knowledge of epidemiology of infectious diseases.
- Acquire knowledge of antimicrobial agents, their mode of action and mechanisms of microbial resistance.
- Acquire knowledge of laboratory safety.
- Acquire knowledge of local procedures for the safe transport of specimens or cultures and also for postal and packaging regulations for such material.
- Acquire knowledge of current requirements and recommendations of the communicable disease control (CDC), Control of Substances Hazardous to Health (COSHH) and National Institute for occupational safety and health (NOISH) e.g. viral hepatitis, HIV, prior diseases, haemorrhagic fevers.
- Acquire knowledge of the principles and operation of microbiological safety cabinets and the procedures for their decontamination and monitoring of air flow.
- Be aware for each specimen type, of the optimal methods for collection, transport, storage, reception, identification and documentation, including the requirements for high risk specimens.
- Develop a sense of the continuity of identification of specimens from collection through culture and further testing to the issuing of a final report. He/she needs to be aware of critical points in processing where this continuity may fail and be able to minimize the risk of this.
- Be able to assess degrees of urgency for the processing of specimens, including the provision of out of hour's service and the communication of preliminary results as applicable.
- Be able to decide upon further testing or processing of a specimen as appropriate.
- Be aware of existing reference facilities and their appropriate use.
- Understand the principles of light, dark ground, phase contrast, fluorescent and electron microscopy and be able to set up a light microscope with dark ground and phase contrast facilities;
- Be able to perform routine staining techniques including fluorescent dyes;
- Be familiar with the appearance of stained preparations and be able to recognize artefacts and their possible origin.
- Acquire knowledge of the diversity of microbial metabolism.
- Be aware of the wide range of selective, enrichment and inhibitory media available for general and specialized use and be able to choose relevant media in common use or in medical and environmental laboratories.
- Be familiar with physical growth requirements of microorganisms including atmosphere and optimal temperature and have an appreciation of the growth kinetics of both solid phase and broth cultures. It is important in this context to know those micro-organisms and clinical situations in which detectable growth may require prolonged incubations.
- Be familiar with the preparation of media in common use and have an understanding of internal quality control of such preparations.
- Be able to process all common specimens, recognize potential pathogens from a mixture of colonies on culture plates, and separate such colonies in order to achieve the pure growth necessary for further work.

### **Interpersonal and Communication Skills:**

- Develop effective communications with technologists, other members of medical staff and other members of the healthcare delivery team.
- Develop awareness of appropriate timeliness, clarity, and accuracy of verbal and



written infectious disease related communications.

- Communicate effectively and seek advice if unsure.
- Learn to work effectively with technologists, colleagues and other members of the medical teams.
- Consult effectively with other physicians and health care professionals.
- Contribute effectively to other interdisciplinary team activities.

### **Practice Based Learning & Improvement:**

- Identify the important determinants of infectious diseases affecting patients.
- Contribute effectively to improved health of patients and communities.
- Recognize and respond to those issues where advocacy is appropriate.
- Gain experience in the critical review of the infectious diseases literature.
- Acquire experience presenting new knowledge to other learners.
- Develop, implement and monitor a personal continuing education strategy.
- Facilitate the education of patients, students and other health care professionals and contribute to the development of new knowledge.
- Demonstrate the ability to conduct independent or collaborative research.

### **Professionalism:**

- Demonstrate appropriate personal and professional behaviour when interacting with technologists and colleagues.
- Deliver the highest quality of care with integrity, honesty, and compassion.
- Understand and practice ethical and medico-legal requirements of an infectious disease physician.
- Provide effective consultation services with respect to all aspects of patient care and education.

### **System Based Practice:**

- Describe principles of departmental financing, budgeting and organizational funding.
- Set priorities and manage time to balance patient care, meetings and personal life.
- Demonstrate awareness of indications and urgency of diagnostic investigations.
- Utilize the resources effectively and efficiently.
- Acquire proficiency with information technology.
- Develop leadership and administrative skills like managing conflicts, time management, supervision, leading the team, and working in harmony.
- Participate in quality improvement activities, such as audits, peer review and quality assurance activities.

### **Patient Care:**

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- Gather essential and accurate information about patients
- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- Develop and carry out patient management plans
- Use information technology to support patient care decisions and patient education
- Perform competently all laboratory procedures considered essential for patient management

- Provide health care services aimed at preventing health problems or maintaining health
- Work with health care professionals, including those from other disciplines, to provide patient-focused care
- Consider the patient safety as prime importance when processing patient samples and interpreting results.

At the end of the first year, residents will sit for their first "End-of-Year Examination". When they passed, they move to R2.

## **SPECIALIZED TRAINING (R2 – R5)**

Residents will get specialized training for four years preceded by a formal introduction on the basic principle of Medical Microbiology. It is divided into two phases: Phase 1 (R2-R3) for 26 blocks and phase 2 (R4-R5) for another 26 blocks. Residents will be attached to a Medical Microbiology laboratory in the UK, Ireland or in other recognized international centers after the first quarter of phase 2.

## **GRADED RESPONSIBILITIES**

Laboratory responsibilities are escalated according to the progress and experience of the resident. Residents in phase 1 (R2-R3) of their training should have direct physical supervision during their training to ensure high quality service. During phase 2 (R4-R5), residents are expected to work more independently while continuing to have direct and indirect supervision by their trainers to ensure patient safety and maintain high quality service.

In addition, critical results should never be reported without direct input of attending consultant.

Graded responsibilities should be guided by the monthly/yearly evaluations and examinations.

Residents are allowed graded responsibility based on their competence, knowledge, phase of training and according to the training centers' guidelines and SOPs for verification and reporting of results.

### **I. PHASE 1: R2 – R3 (26 BLOCKS):**

At this stage, the resident will continue to broaden their experience and understanding of medical microbiology under direct supervision. At the end of this stage the resident should be able to deal with most of the day to day issues in a hospital microbiology laboratory to an adequate level but they will still require consultant input with regard to management and clinical issues.

The knowledge gained during this stage will be assessed by yearly "End of Year" Examination and FRCPATH Part I examination.

Core training in Medical Microbiology consists of training and rotations over 24 blocks at the Royal Hospital, SQUH, Khoula Hospital, Central Public Health Laboratory and Al Nahdha Hospital with 1 block leave per year. It includes the following 24 rotations:

Medical Microbiology	= 13 blocks
Virology	= 3 blocks
Mycobacteriology / PHL	= 2 blocks
Parasitology/Mycology	= 1 block
Adult Infectious Diseases	= 2 blocks
Paediatric Infectious Diseases	= 1 block
Infection Control	= 1 block
Research	= 1 block

Residents start with an initial 8-week orientation period, where they do weekly bench rotations between the various sections of the Microbiology laboratory e.g. Urine, blood culture, respiratory samples, genital specimens, wound swabs and tissues, fluids including cerebrospinal fluid, faeces and sensitivity testing.

Following the initial rotation, two to four weeks should be spent in each section, depending on the workload. During this time, tutorials and private study is aimed at basic organism morphology and identification with an introduction to the clinical syndromes associated with infection with each organism. During this stage the resident will be introduced to principles of laboratory safety, sterilization and disinfection, handling of specimens, microscopy, culture methods and antimicrobial investigations.

## Medical Microbiology

### **Medical Knowledge:**

#### **1. Clinical Practice in Microbiology**

- Understand the nature of infecting organisms, the pathogenesis of infectious diseases, diagnostics and treatment.
- Understand the clinical features of infectious diseases.
- Know the epidemiology of infectious diseases and the strategies which may be applied to their prevention, including public health aspects of infectious diseases.
- Know Anti-infective agents, their mechanisms of action, spectra of activity, pharmacokinetics and pharmacodynamics, adverse effects and their role in the treatment of infectious diseases as well as hospital wide policies regarding drug utilization.
- Understand The principles and practice of an effective infection prevention and control program, including:
  1. The elements and reporting relationships of a program
  2. Surveillance methods for detecting community acquired infections when a patient is admitted to the hospital
  3. Surveillance methods for detecting hospital acquired infections
  4. Detection, investigation and control of outbreaks of infection
- Identify and document the reasons that medical help is being sought (chief complaint).
- Identify and document the important symptoms, in sufficient detail, to present a clear picture of the clinical problem(s). (History of present illness)

- Identify and document all other important information from the past history, medications, allergies, review of systems, family history, social history, and travel history.
- Conduct an efficient, orderly, and competent physical examination, demonstrating sensitivity to the patient's needs, modified according to the patient's age, gender, culture, and problem, and to record this information by regions or systems.

## 2. Laboratory Skills

- Understand principles of laboratory safety.
- Understand local procedures for the safe transport of specimens or cultures and also for postal and packaging regulations for such material.
- Know the current requirements and recommendations of the communicable disease control (CDC), Control of Substances Hazardous to Health (COSHH) and National Institute for occupational safety and health (NOISH) e.g. viral hepatitis, HIV, prior diseases, haemorrhagic fevers.
- Understand the principles and operation of microbiological safety cabinets and the procedures for their decontamination and monitoring of air flow.
- Be aware for each specimen type, of the optimal methods for collection, transport, storage, reception, identification and documentation, including the requirements for high risk specimens.
- Develop a sense of the continuity of identification of specimens from collection through culture and further testing to the issuing of a final report. He/she needs to be aware of critical points in processing where this continuity may fail and be able to minimize the risk of this.
- Be able to assess degrees of urgency for the processing of specimens, including the provision of out of hour's service and the communication of preliminary results as applicable.
- Be able to decide upon further testing or processing of a specimen as appropriate.
- Be aware of existing reference facilities and their appropriate use.
- Understand the principles of light, dark ground, phase contrast, fluorescent and electron microscopy and be able to set up a light microscope with dark ground and phase contrast facilities;
- Be able to perform routine staining techniques including fluorescent dyes;
- Be familiar with the appearance of stained preparations and be able to recognize artefacts and their possible origin.
- Be aware of the wide range of selective, enrichment and inhibitory media available for general and specialized use and be able to choose relevant media in common use or in medical and environmental laboratories;
- Be familiar with physical growth requirements of microorganisms including atmosphere and optimal temperature and have an appreciation of the growth kinetics of both solid phase and broth cultures. It is important in this context to know those micro-organisms and clinical situations in which detectable growth may require prolonged incubations;
- Be familiar with the preparation of media in common use and have an understanding of internal quality control of such preparations;
- Be able to process all common specimens, recognize potential pathogens from a mixture of colonies on culture plates, and separate such colonies in order to achieve the pure growth necessary for further work.
- Know the pathogenesis and laboratory diagnosis of blood stream infections.

- Understand the principles by which the automated and manual blood culture systems operate.
- Know the criteria to identify blood culture isolates as likely pathogens or contaminant.
- Advise users regarding the appropriate collection method and number of blood cultures needed to diagnose a blood stream infection.
- Operate the blood culture system and to perform appropriate sub-culturing.
- Identify the intrinsic pathogen of skin and soft tissue infections.
- Know the collection methods for various body fluids and how they are handled.
- Know the processing methods for various body fluid specimens.
- Know the sensitivity and specificity of antigen detection in CSF.
- Know the concept of significant bacteriuria.
- Know Semi-quantitative urine culture methods
- Quantify urine cultures results and predict clinical significance.
- Identify the typical urinary pathogens based on standard biochemical tests.
- Know the Collection and transport of specimens for anaerobic culture.
- Know the methods of anaerobic culture and antibiotic susceptibility testing.
- Know the current susceptibility profiles of common anaerobic pathogens.
- Know the appropriate methods for collection of genital specimens.
- Know the sensitivity and specificity of direct Gram's stains for urethral and endocervical specimens in symptomatic patients.
- Understand Serological tests used for the diagnosis of syphilis.
- Know the appropriate investigations for *Chlamydia trachomatis* and *Mycoplasma* infections.
- Identify, based on the microscopic appearance, the presence of *Trichomonas vaginalis* and *Candida spp.* in a vaginal specimen, and *Neisseria gonorrhoeae* in urethral and endocervical specimens.
- Understand the proper collection of throat and nasopharyngeal swabs for bacterial and viral investigations.
- Understand the serological tests used to diagnose bacterial pathogens of the upper and lower respiratory tracts.
- Know the principle of direct fluorescent antibody assay.
- Understand the handling of different types of bronchoscopy specimens.
- Know the value of serological studies in the investigations for different types of fungal infections.
- Understand the diagnosis of legionella infections.
- Determine respiratory specimens that are appropriate and those that are inappropriate for culture.
- Identify the common respiratory pathogens.
- Know the virulence features of the various enteric pathogens.
- Know the appropriate samples that must be submitted for investigations of suspected food poisoning and gastroenteritis.
- Understand Laboratory diagnosis of *Clostridium difficile* infection.
- Isolate and identify enteric bacterial pathogens.
- Determine which enteric bacterial pathogens should have susceptibility results reported.
- Know the reference methods of susceptibility testing.
- Know the methods used to determine antimicrobial levels in body fluids.
- Know the methods used to perform MIC and MBC testing.

- Understand the mechanism of action for various antimicrobial agents and the mechanism of resistance for common resistant pathogens.
- Understand the concepts of synergy and antagonism.
- Know how to Set up disk diffusion and the automated susceptibility testing system
- Interpret the  $\beta$  –lactamase test.
- Setup and interpret MIC/MBC.
- Demonstrate knowledge and skills relating to the effective performance of microbiology testing, including the pre-analytic, analytic, and post-analytic factors which affect such tests.
- Be able to assess specimens as to their appropriateness and the extent and nature of testing, including:
  - The performance and interpretation of microbiology testing within the clinical laboratory, including public health and other reference laboratories.
  - The performance of molecular methods applied to the detection of microorganisms and their virulence factors and to determine the epidemiologic links between isolates.
  - The performance of all relevant microscopy, including but not limited to light, fluorescent and electron microscopy.
  - The performance of quality control/assurance testing of media, reagents, laboratory instrumentation and other materials used in microbiology laboratory.
  - The utilization of laboratory information systems for result reporting, storage, retrieval and analysis.
  - The role of the public health laboratory in the microbiology laboratory system

### **Interpersonal and Communication Skills:**

- Communicate effectively and discuss appropriate information with laboratory technologists, patients and their families, physicians and other members of the health care team.
- Listen effectively and obtain synthesized relevant history from patients and families.
- Educate laboratory technologists and other health care professionals in formal and informal health educational settings.
- Present problems clearly and concisely and correctly in both verbal and written reports.
- Respect individual patients, families, colleagues and other health care workers for their value systems, which may be different from the residents own values.
- Demonstrate effective communication in presenting assessments and recommendations in both verbal and written form.
- Establish and maintain cooperative interpersonal relationships with technologists, a multidisciplinary team and with patients and their families.
- Contribute effectively to other interdisciplinary team activities.
- Recognize personal limitations and demonstrate a willingness to call upon others with special expertise and to make referrals when appropriate. A consultative approach is appropriate in terms of patient care, education, and legal and ethical issues as they arise.

### **System Based Practice:**

- Describe basic personnel/ labor issues as applied to a diagnostic laboratory.
- Describe the various ways in which the practice of microbiology is undertaken in different settings (e.g. tertiary care, public health, community hospital and for profit laboratories).

- Discuss the advantages, disadvantages, and relative costs of providing diagnostic services in different settings, including academic and non academic hospitals and private laboratories.
- Discuss the role of microbiologists in provision of preventative and therapeutic health care based on sound scientific evidence, and the various means of assessing quality in medical care.
- Discuss methods of avoiding unnecessary investigation and hospitalization of patients.
- Discuss budget planning and allocation of resources in a diagnostic microbiology laboratory.
- Discuss the definitions and role of audits, quality management, risk management, incident reporting, and complaint management.
- Describe the systems of internal and external proficiency testing programs and of laboratory accreditation programs.
- Describe laboratory biosafety requirements.
- Demonstrate knowledge of the cost / benefit ratios of diagnostic and therapeutic interventions, cost containment and efficiency, effectiveness and efficacy as they relate to medical care.
- Appreciate the need to continually balance professional, institutional, and societal commitments.
- Consider alternate methods of service delivery.
- Describe the societal and governmental aspects of health care provision.

### **Practice Based Learning & Improvement:**

- Understand the determinants of health as these relate to the burden of illness from infectious diseases
- Understand public health policy related to infectious diseases, how such policy is developed and current policies that affect health, either positively or negatively, such as immunization programs, infection control and antimicrobial utilization
- Understand the role of public health and social services in the prevention and management of particular infectious diseases (e.g. HIV, sexually transmitted diseases, tuberculosis and vaccine preventable diseases),
- Know the patient groups at risk of particular infectious diseases in order to target primary and secondary prevention strategies (e.g. HIV, sexually transmitted diseases, tuberculosis and vaccine preventable diseases)
- Understand the issues and opportunities to reduce morbidity and mortality from infectious diseases in the community and institutions.
- Recognize the importance of self assessment of professional competence and acceptance of responsibility for self directed learning as a lifelong goal. Learning should incorporate clinical appraisal and evaluation of medical and other relevant literature.
- Maintain a questioning and inquisitive attitude towards medical information and an appreciation of the necessity of ongoing research to develop new knowledge.
- Demonstrate the ability to conduct independent or collaborative research.
- Pose a medical microbiology research question
- Develop a proposal to solve the research question:
- Carry out the research outlined in the proposal
- Report and defend the results of the research
- Facilitate the education of technologists, patients, students and other health care professionals and contribute to the development of new knowledge.

- Demonstrate the ability to utilize information technology to optimize patient care, for ongoing medical education and other activities.

### **Professionalism:**

- Discuss the principles of medical ethics, including the best interests of the patients, autonomy, beneficence, and non malfeasance , confidentiality, truth telling, justice, respect for persons, conflict of interest, and resource allocation.
- Describe ethical decision making processes.
- Discuss the legal and ethical codes of professional behavior and the obligations of the physician that apply to microbiology, including issues relating to the notification of communicable diseases.
- Demonstrate trustworthiness (honesty, confidentiality) with respect to technologists, patients, and other health care providers.
- Recognize the personal limitations and a willingness to call upon others for their expertise.
- Demonstrate a willingness to accept peer and supervisor review of professional competence.
- Appreciate moral ethical implications of various forms of patient care and research.

### **Patient Care:**

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- Gather essential and accurate information about patients
- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- Develop and carry out patient management plans
- Use information technology to support patient care decisions and patient education
- Perform competently all laboratory procedures considered essential for patient management
- Provide health care services aimed at preventing health problems or maintaining health
- Work with health care professionals, including those from other disciplines, to provide patient-focused care
- Consider the patient safety as prime importance when processing patient samples and interpreting results

## **Virology**

### **Medical Knowledge:**

- Know the Classification of Medically important viruses.
- Know the Virus structure and replication.
- Know the Methods of virus isolation and identification.
- Know the General knowledge of antiviral drugs.
- Understand the Principals, application and limitations of various molecular microbiology methods (eg DNA /RNA extraction, detection and amplification of DNA, RT-PCR, nested PCR...ect).



- Describe the investigation, intervention and advice for women with, or in contact with, rash/illness in pregnant.
- Describe risk, and absence of evident risk, of viral immunizations.
- Describe the investigation, intervention, reporting and advice following ascertainment of a healthcare worker with a blood-borne viral infection.
- Describe the risk factors for, clinical presentation, management and investigation of viral infection in immunocompromised.
- Select appropriate tests and be able to interact with reference laboratories in arranging specimen transport and testing when needed; interpret relevant virological tests
- Advise clinical teams on treatment.
- Advise infection prevention and control team where appropriate.

#### **Interpersonal and Communication Skills:**

- Acquire competency to liaise with reference facilities in investigation, and to advise infection prevention and control teams.
- Be able to promptly make decisions with clear communication.
- Recognize limits of knowledge and need to seek specialist advice.
- Able to co-operate within a multidisciplinary team.
- Able to create and maintain productive relationships with all involved.

#### **Professionalism:**

- Be competent to select, perform and interpret relevant virological tests.

#### **Practice Based Learning & Improvement:**

- Gain experience in the critical review of the infectious diseases literature in relation to viral infections.
- Acquire experience presenting new knowledge to other learners.
- Develop, implement and monitor a personal continuing education strategy.
- Facilitate the education of patients, students and other health care professionals and contribute to the development of new knowledge.
- Demonstrate the ability to conduct independent or collaborative research.

#### **Patient Care:**

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- Gather essential and accurate information about patients
- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- Develop and carry out patient management plans
- Use information technology to support patient care decisions and patient education
- Perform competently all laboratory procedures considered essential for patient management
- Provide health care services aimed at preventing health problems or maintaining health
- Work with health care professionals, including those from other disciplines, to provide patient-focused care
- Consider the patient safety as prime importance when processing patient samples and interpreting results.

## Mycobacteriology

### **Medical Knowledge:**

- Know which specimens are appropriate for investigation of mycobacterial disease.
- Know the basis of acid fastness and the principle of AFB staining.
- Know the various methods used for culture, species identification (including DNA probes /PCR) and susceptibility of mycobacteria.

### **Interpersonal and Communication Skills:**

- Be able to promptly make decision with clear communication
- Develop skills for multidisciplinary-team work
- Be familiar with risk-based approach
- Establish close rapport and understanding with laboratory staff
- Use reference services appropriately

### **Professionalism:**

- Plan an appropriate investigation scheme for individuals at risk of mycobacterial infection including contacts.

### **Practice Based Learning & Improvement:**

- Gain experience in the critical review of the infectious diseases literature in relation to mycobacterial infections.
- Acquire experience presenting new knowledge to other learners.
- Develop, implement and monitor a personal continuing education strategy.
- Facilitate the education of patients, students and other health care professionals and contribute to the development of new knowledge.
- Demonstrate the ability to conduct independent or collaborative research.

### **Patient Care:**

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- Gather essential and accurate information about patients
- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- Develop and carry out patient management plans
- Use information technology to support patient care decisions and patient education
- Perform competently all laboratory procedures considered essential for patient management
- Provide health care services aimed at preventing health problems or maintaining health
- Work with health care professionals, including those from other disciplines, to provide patient-focused care
- Consider the patient safety as prime importance when processing patient samples and interpreting results.

## Parasitology

### **Medical Knowledge:**

- Know the proper collection methods for stool examination of parasites.
- Know the Collection of specimens and examination for tissue and blood parasites.
- Know the life cycle of the clinically important parasites.
- Describe the epidemiology of parasitic infections with an emphasis on the infections e.g. malaria, intestinal protozoa, intestinal helminths, leishmaniasis, trypanosomiasis, filariasis and schistosomiasis, toxoplasmosis, toxocariasis, giardiasis, hydatid disease.
- Know the parasitic infections associated with severely immunocompromised patients e.g. microsporidiosis, cryptosporidiosis.
- Describe the environmental conditions under which infections are acquired so that the risk of infection to patients can be assessed.
- Describe the clinical features and laboratory diagnosis of imported parasitic infections, endemic parasitic and parasitic infections associated with immunocompromised.
- Know the common arthropods associated with parasitic infections.
- Examine blood, stool and other tissues for the presence of protozoa and helminthes.
- Identify major parasitic species.
- Measure parasite size under the microscope.
- Estimate malaria parasite numbers.
- Select appropriate serological and molecular diagnostics for parasitic infections.
- Use reference facilities appropriately.
- Recommend appropriate treatment.

### **Interpersonal and Communication Skills:**

- Demonstrate prompt and relevant decision making with clear communication
- Able to co-operate in multidisciplinary-team working
- Demonstrate risk-based approach
- Establish close rapport and understanding with laboratory staff
- Use reference services appropriately

### **Professionalism:**

- Plan an appropriate investigation scheme for individuals at risk of tropical infection

### **Practice Based Learning & Improvement:**

- Gain experience in the critical review of the infectious diseases literature in relation to parasitic infections.
- Acquire experience presenting new knowledge to other learners.
- Develop, implement and monitor a personal continuing education strategy.
- Facilitate the education of patients, students and other health care professionals and contribute to the development of new knowledge.
- Demonstrate the ability to conduct independent or collaborative research.

### **Patient Care:**

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- Gather essential and accurate information about patients

- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- Develop and carry out patient management plans
- Use information technology to support patient care decisions and patient education
- Perform competently all laboratory procedures considered essential for patient management
- Provide health care services aimed at preventing health problems or maintaining health
- Work with health care professionals, including those from other disciplines, to provide patient-focused care
- Consider the patient safety as prime importance when processing patient samples and interpreting results.

## Mycology

### **Medical Knowledge:**

- Describe the aetiology, risk factors and clinical presentation and treatment of fungal infections of skin, hair, nails and mucous membranes.
- Describe the aetiology, risk factors and clinical presentation of systemic and opportunistic mycoses including candidosis, Aspergillosis, cryptococcosis, mucormycosis, pneumocystis jirovecii, histoplasmosis, coccidioidomycosis and blastomycosis.
- Describe use of appropriate antifungal agents.
- Describe methods available for susceptibility testing and their limitations.
- Describe the use of chemoprophylaxis and environmental measures to prevent infection in the Immunocompromised.
- Recognize the presence of fungal elements in direct specimens.
- Perform identification of clinically significant yeasts.
- Describe the different diagnostic tools to diagnose fungal infections.
- Identify the typical features of common pathogenic fungi.

### **Interpersonal and Communication Skills:**

- Be able to promptly make decision with clear communication
- Develop skills for multidisciplinary-team work
- Use risk-based approach
- Establish close rapport and understanding with laboratory staff
- Use reference services appropriately

### **Professionalism:**

- Plan an appropriate investigation scheme for individuals at risk of fungal infection

### **Practice Based Learning & Improvement:**

- Gain experience in the critical review of the infectious diseases literature in relation to fungal infections
- Acquire experience presenting new knowledge to other learners.
- Develop, implement and monitor a personal continuing education strategy.

- Facilitate the education of patients, students and other health care professionals and contribute to the development of new knowledge.
- Demonstrate the ability to conduct independent or collaborative research.

### **Patient Care:**

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- Gather essential and accurate information about patients
- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- Develop and carry out patient management plans
- Use information technology to support patient care decisions and patient education
- Perform competently all laboratory procedures considered essential for patient management
- Provide health care services aimed at preventing health problems or maintaining health
- Work with health care professionals, including those from other disciplines, to provide patient-focused care
- Consider the patient safety as prime importance when processing patient samples and interpreting results.

## **Adult Infectious Diseases**

### **Medical Knowledge:**

- Demonstrate knowledge of the microbial characteristics of specific infectious agents, the pathogenesis and clinical features of diseases produced in patients presenting with various infectious diseases.
- Elicit history that is relevant to the patient's problem(s), including the relevant infectious diseases history (E.g. epidemiologic and travel history related to particular infectious diseases).
- Perform physical examination that is relevant and appropriate.
- Select the appropriate investigation tools, including microbiologic tests, in a cost-effective and useful manner.
- Use all pertinent information to arrive to the most appropriate clinical diagnosis and treatment plan.
- Demonstrate knowledge of non-infectious causes of syndromes that mimic infectious diseases.
- Demonstrate knowledge of the infections in immunocompromised patients (E.g. HIV patients and post-transplantation) and in returning traveller with the relevant investigations to be done.
- Demonstrate knowledge of the epidemiology and distribution of common tropical infections

### **Interpersonal and Communication Skills:**

- Develop effective communications with other members of medical staff and other members of the healthcare delivery team.
- Develop awareness of appropriate timeliness, clarity, and accuracy of verbal and written infectious disease related communications.

- Communicate effectively and seek advice if unsure.
- Demonstrate effective communication with consulting/referring physicians and services.
- Learn to work effectively with other members of the medical teams.
- Consult effectively with other physicians and health care professionals.
- Contribute effectively to other interdisciplinary team activities.

### **Practice Based Learning & Improvement:**

- Identify the important determinants of infectious diseases affecting patients.
- Contribute effectively to improved health of patients and communities.
- Recognize and respond to those issues where advocacy is appropriate.
- Gain experience in the critical review of the infectious diseases literature.
- Acquire experience presenting new knowledge to other learners.
- Develop, implement and monitor a personal continuing education strategy.
- Facilitate the education of patients, students and other health care professionals and contribute to the development of new knowledge.
- Demonstrate the ability to conduct independent or collaborative research.

### **Professionalism:**

- Demonstrate appropriate personal and professional behaviour when interacting with patients, their families, and colleagues.
- Deliver the highest quality of care with integrity, honesty, and compassion.
- Understand and practice ethical and medico-legal requirements of an infectious disease physician.
- Provide effective consultation services with respect to all aspects of patient care and education.

### **System Based Practice:**

- Describe principles of departmental financing, budgeting and organizational funding.
- Set priorities and manage time to balance patient care, meetings and personal life.
- Demonstrate awareness of indications and urgency of diagnostic investigations.
- Utilize resources effectively and efficiently.
- Acquire proficiency with information technology.
- Demonstrate leadership and administrative skills like managing conflicts, time management, supervision, leading the team, and working in harmony.
- Participate in quality improvement activities, such as audits, peer review and quality assurance activities.

### **Patient Care:**

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- Gather essential and accurate information about their patients
- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- Develop and carry out patient management plans, and discuss them with senior colleagues
- Counsel and educate patients and their families
- Use information technology to support patient care decisions and patient education

- Perform competently all medical and invasive procedures considered essential for the area of practice
- Provide health care services aimed at preventing health problems or maintaining health
- Work with health care professionals, including those from other disciplines, to provide patient-focused care
- Apply medical knowledge and gained skills safely in patient management.
- Report any incident that may affect patient safety and be open about mistakes, seek help from senior colleagues and learn from mistakes

## Paediatric Infectious Diseases

### **Medical Knowledge:**

- Be able to recognize infections that can be transmitted from mother to baby during the antenatal, perinatal and postnatal period.
- Be aware of the role of risk avoidance, therapeutic interventions, immunization and caesarean section in the prevention of congenital infections.
- Know the pathophysiology, clinical signs and symptoms of infectious diseases in children (E.g. neonatal meningitis, group B sepsis, intraventricular shunts infections).
- Know the available diagnostic techniques
- Know the pharmacokinetics of prescribing for children and the need to avoid certain antimicrobials.

### **Interpersonal and Communication Skills:**

- Develop effective communications with other members of medical staff and other members of the healthcare delivery team.
- Develop awareness of appropriate timeliness, clarity, and accuracy of verbal and written pediatric infectious disease related communications.
- Communicate effectively and seek advice if unsure.
- Demonstrate effective communication with consulting/referring physicians and services.
- Learn to work effectively with other members of the medical teams.
- Consult effectively with other physicians and health care professionals.
- Contribute effectively to other interdisciplinary team activities.

### **Practice Based Learning & Improvement:**

- Identify the important determinants of infectious diseases affecting children.
- Contribute effectively to improved health of children and communities.
- Recognize and respond to those issues where advocacy is appropriate.
- Gain experience in the critical review of the pediatric infectious diseases literature.
- Acquire experience presenting new knowledge to other learners.
- Develop, implement and monitor a personal continuing education strategy.
- Facilitate the education of patients, parents, students and other health care professionals and contribute to the development of new knowledge.
- Demonstrate the ability to conduct independent or collaborative research.

### **Professionalism:**

- Demonstrate appropriate personal and professional behaviour when interacting with patients, their families, and colleagues.
- Deliver the highest quality of care with integrity, honesty, and compassion.
- Understand and practice ethical and medico-legal requirements of an infectious disease physician.
- Provide effective consultation services with respect to all aspects of patient care and education.

### **System Based Practice:**

- Describe principles of departmental financing, budgeting and organizational funding.
- Set priorities and manage time to balance patient care, meetings and personal life.
- Demonstrate awareness of indications and urgency of diagnostic investigations.
- Utilize resources effectively and efficiently.
- Acquire proficiency with information technology.
- Develop leadership and administrative skills like managing conflicts, time management, supervision, leading the team, and working in harmony.
- Participate in quality improvement activities, such as audits, peer review and quality assurance activities.

### **Patient Care:**

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- Gather essential and accurate information about their patients
- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- Develop and carry out patient management plans, and discuss them with senior colleagues
- Counsel and educate patients and their families
- Use information technology to support patient care decisions and patient education
- Perform competently all medical and invasive procedures considered essential for the area of practice
- Provide health care services aimed at preventing health problems or maintaining health
- Work with health care professionals, including those from other disciplines, to provide patient-focused care
- Apply medical knowledge and gained skills safely in patient management.
- Report any incident that may affect patient safety and be open about mistakes, seek help from senior colleagues and learn from mistakes

## **Infection Control**

### **Medical Knowledge:**

- Demonstrate knowledge of local infection control problems, including, outbreaks of infection and their management;
- Be familiar with the workings of infection control meetings including local and regional infection control committees;



- Be aware of those areas of hospital and community health that requires infection control policies.
- Work closely with the infection control nurse both in day- to- day duties and in the education of those involved with infection control issues.
- Use all pertinent information to arrive to the most appropriate infection control advice on clinical and non-clinical areas; including kitchen inspections.
- Develop relationships with key personnel in the CSSD, pharmacy and laundry.
- Have an understanding of the principles of patient isolation and their application.
- Be familiar with any documents relevant to infection control and also have a knowledge of any existing working party recommendations (e.g. MRSA, Shigella, Clostridium difficile);
- Demonstrate an experience on public health microbiology with secondment if necessary to the Public Health Laboratory;
- Demonstrate an experience on communicable disease control in the community.

### **Interpersonal and Communication Skills:**

- Develop effective communications with other members of infection control team and other members of the healthcare delivery team.
- Develop awareness of appropriate timeliness, clarity, and accuracy of verbal and written infection control related communications.
- Communicate effectively and seek advice if unsure.
- Demonstrate effective communication with consulting/referring physicians and services.
- Learn to work effectively with other members of the infection control team.
- Consult effectively with other physicians and health care professionals.
- Contribute effectively to other interdisciplinary team activities.

### **Practice Based Learning & Improvement:**

- Identify the important determinants of infection control affecting patients.
- Contribute effectively to improved health of patients and communities.
- Recognize and respond to those issues where advocacy is appropriate.
- Gain experience in the critical review of the infection control literature.
- Acquire experience presenting new knowledge to other learners.
- Develop, implement and monitor a personal continuing education strategy.
- Facilitate the education of patients, students and other health care professionals and contribute to the development of new knowledge.
- Demonstrate the ability to conduct independent or collaborative research.

### **Professionalism:**

- Demonstrate appropriate personal and professional behaviour when interacting with patients, their families, and colleagues.
- Deliver the highest quality of care with integrity, honesty, and compassion.
- Understand and practice ethical and medico-legal requirements of an infection control physician.
- Provide effective consultation services with respect to all aspects of patient care and education.

### **System Based Practice:**

- Describe principles of departmental financing, budgeting and organizational funding.

- Set priorities and manage time to balance patient care, meetings and personal life.
- Demonstrate awareness of indications and urgency of diagnostic investigations.
- Utilize resources effectively and efficiently.
- Acquire proficiency with information technology.
- Develop leadership and administrative skills like managing conflicts, time management, supervision, leading the team, and working in harmony.
- Participate in quality improvement activities, such as audits, peer review and quality assurance activities.

### **Patient Care:**

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- Gather essential and accurate information about patients
- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- Develop and carry out patient management plans
- Use information technology to support patient care decisions and patient education
- Perform competently all laboratory procedures considered essential for patient management
- Provide health care services aimed at preventing health problems or maintaining health
- Work with health care professionals, including those from other disciplines, to provide patient-focused care
- Consider the patient safety as prime importance when processing patient samples and interpreting results.

## **II. PHASE 2: R4 – R5 (26 BLOCKS):**

At the end of this stage the resident will have in-depth knowledge and understanding of the principle of medical microbiology. He/she should be competent to discuss and deal with the subject (or perform the task/procedure), demonstrating a level of clinical or professional judgment commensurate with independent professional practice at consultant level.

The FRCPath Part 2 will -in part - summatively assess this stage.

The aims of this phase are to fulfil the requirements of the independent stage of training and should culminate the knowledge and experience for obtaining the OMSB qualifying examination and/or FRCPath Part 2 examination. During this period, they will have to complete the following rotations:

- Medical microbiology = 17 blocks
- Virology = 3 blocks
- Infection control = 1 block
- Adult Infectious disease = 2 blocks
- Research = 1 block

During Phase 2 of training, the residents will culminate knowledge and experience as follows:

### **Medical Knowledge:**

- Increase knowledge of clinically important bacteria, viruses, fungi and parasites.
- Increase knowledge of infectious disease pathogenesis.
- Increase knowledge of hospital infection control and prevention activities.
- Increase knowledge of disinfection and sterilization and the appropriate handling and disposal of infectious materials.
- Acquire knowledge of rules and regulations relating to notifiable communicable diseases.
- Increase knowledge of common infectious diseases as they relate to body sites.
- Increase knowledge of molecular diagnostic methodologies (including molecular fingerprinting, resistance, determination, and the detection of pathogens).

### **Skills:**

- Apply common bench level methods, including manual, semi-manual, and automated systems.
- Interpret Gram, acid fast and other special stains for fungi and parasites.
- Perform and interpret fluorescent microscopy.
- Recognize common bacterial species using conventional biochemical tests and commonly used kits.
- Recognize common bacteria and parasites in human tissue.
- Utilize serologic and culture investigations for the diagnosis of common infections.
- Perform and interpret susceptibility testing and to interpret the results.
- Develop the ability to develop and subsequently interpret a quality management program within the Medical Microbiology laboratory.

### **Interpersonal and Communication Skills:**

- Communicate effectively with other members of medical staff, house staff, and other members of the healthcare delivery team.
- Understand and apply of appropriate timeliness, clarity, and accuracy of verbal and written microbiology related communications.
- Work effectively with other members of the healthcare team, with emphasis on interactions with Public Health staff and the Infectious Diseases and Infection Control teams.

### **System Based Practice:**

- Develop awareness of resource utilization in the Microbiology laboratory.
- Understand the principles underlying utilization management.
- Understand how to use information technology to more efficiently manage the laboratory.
- Be familiar with human resource management and budgeting.
- Understand how a microbiology laboratory funding is structured.
- Understand how microbiology workload is measured.
- Understand principles around quality control, quality assurance, and continued quality improvement as they relate to microbiology
- Gain experience in directing the activities of laboratory technologists
- Gain experience in evaluating clinical specimens

- Acquire knowledge of employee health and safety issues.
- Understand the process of budget development.
- Have an understanding of the principles of audit.
- Have participated in microbiological audit of clinical specialties.

### **Practice Based Learning & Improvement:**

- Understand the role of the Microbiology laboratory in the public health system.
- Understand role of the microbiology laboratory in population screening.
- Learn to match available resources with laboratory priorities and the demands for patient testing.
- Understand when to use laboratory resources for the benefit of individual patients vs. the benefit of the population.
- Understand the role of advocacy for a strong public health and diagnostic laboratory system.
- Understand the role for advocacy for quality programs at the hospital, provincial and federal levels.
- Increase experience in the critical review of the Medical Microbiology literature.
- Increase experience in presenting new knowledge to other learners.

### **Patient Care:**

The patient safety is of prime importance when processing and reporting patient samples. This should be seriously considered by residents and attending supervisor to ensure providing health services with timely, accurate information. In addition, any microbiological consultation given to colleagues should be evidence-based to ensure proper patient management.

## **Public Health**

### **Medical Knowledge:**

- Know the different methods of organism typing.
- Review the principles and applications of PCR, restriction enzymes and PFGE.
- Know how to conduct an outbreak investigation and surveillance studies in the community.
- Understand the principles microbiological examination of water, milk and food.
- Be able to perform microbiological examination of water by different methods.
- Know the classification of mycobacteria.
- Be able to examine clinical specimens for acid fast bacilli.
- Know the principles and be able to do cultivation, identification and susceptibility testing of mycobacteria.

### **Interpersonal and Communication Skills:**

- Be able to promptly make decisions with clear communication.
- Develop effective communications with other members of medical laboratory team, and other members of the healthcare delivery team.
- Develop awareness of appropriate timeliness, clarity, and accuracy of verbal and written microbiology related communications.
- Learn how to work effectively with microbiology and communicable diseases teams.
- Learn how to use the reference services appropriately.

### **Professionalism:**

- Plan an appropriate investigation scheme for surveillance.

### **Practice Based Learning & Improvement:**

- Gain experience in the critical review of the Medical Microbiology literature.
- Acquire experience presenting new knowledge to other learners.

### **Patient Care:**

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- Gather essential and accurate information about patients
- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- Develop and carry out patient management plans
- Use information technology to support patient care decisions and patient education
- Perform competently all laboratory procedures considered essential for patient management
- Provide health care services aimed at preventing health problems or maintaining health
- Work with health care professionals, including those from other disciplines, to provide patient-focused care
- Consider the patient safety as prime importance when processing patient samples and interpreting results.

## **Virology**

The resident should spend not less than six months in virology (in Oman and UK) to learn clinical and diagnostic virology. This is done at departments of Microbiology, College of Medicine, SQU and Central Public Health Laboratory. At the end of formal training, the trainee should have knowledge of:

### **Medical Knowledge:**

- Acquire a more detailed knowledge of viral taxonomy, virus-cell interactions, and mechanisms of viral replication.
- Learn the immunologic response to viral infection.
- Learn about the pathogenesis of viral infections including, concepts of latency and persistence.
- Learn the appropriate clinical specimens to diagnosing important virologic infections, including, specimen collection and transport.
- Learn the various specimen transportation systems available to a virology laboratory.
- Learn the usual cell culture lines used in clinical virology labs, the typical changes seen in cell culture, the maintenance and quality control of tissue culture lines.
- Learn the principles associated with immunofluorescence.
- Learn the principles of serologic testing including, hemagglutination inhibition testing, enzyme immunoassay, plaque reduction neutralization testing, immunofluorescence, complement fixation testing.
- Learn the uses for antigen detection assays and the diagnosis of viral infection.

- Learn the typical immunologic responses to viral infection including, HIV, hepatitis A, B, and C, EBV, etc.
- Learn to perform electron microscopy and to recognize commonly occurring viruses from their EM morphology.
- Recognize the common patterns of cytopathogenic effect in tissue culture.
- Learn about commercial systems currently available for serologic and nucleic acid amplification testing.
- Review the clinical manifestations of important viral infections.
- Understand the principles associated of a viral genotyping, especially as applied to HCV.
- Develop a detailed knowledge of the available antiviral drugs, their mechanism of action, pharmacokinetics and pharmacodynamics, adverse effects and clinical indications.
- Learn the mechanisms of antiviral resistance.
- Understand the methodologies and roles for viral quantitative assays.
- Understand how antiviral resistance testing is undertaken and its clinical application.
- Increase knowledge of the vaccination strategies universally applied and those of use in specific circumstances.
- Learn the role of viral infection/diseases in transplantation.

#### **Skills:**

- Learn to manipulate cell cultures, to examine them microscopically and recognize common cell lines.
- Learn how to prepare specimens for electron microscopy, perform the electron microscopy, and recognize common viruses.
- Learn to prepare and inoculate tissue culture specimens.

#### **Interpersonal and Communication Skills:**

- Increase skills in communicating with laboratory staff, Infectious Disease physicians, Infection Control, public health officials, and referring laboratories and physicians.

#### **Practice Based Learning & Improvement:**

- Understand the role of the Virology Laboratory in disease surveillance.
- Understand the role of the laboratory in supporting public health immunization programs.
- Understand the role of the Virology Laboratory in the recognition and control of outbreaks.
- Gain further experience in the critical review of the medical microbiology literature as it relates to virology.

#### **Patient Care:**

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- Gather essential and accurate information about patients
- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- Develop and carry out patient management plans
- Use information technology to support patient care decisions and patient education

- Perform competently all laboratory procedures considered essential for patient management
- Provide health care services aimed at preventing health problems or maintaining health
- Work with health care professionals, including those from other disciplines, to provide patient-focused care
- Consider the patient safety as prime importance when processing patient samples and interpreting results.

## Infection Control

The Medical Microbiology resident will be attached to infection control department for one block. The attending consultant/ senior nurse will supervise the resident. The resident should participate in all activities, including the daily rounds, meetings, audits and educational activities. At the end of the rotation, the resident will be able to achieve the following objectives:

### **Medical Knowledge:**

- Demonstrate knowledge of local infection control problems, including, outbreaks of infection and their management;
- Be familiar with the workings of infection control meetings including local and regional infection control committees;
- Be aware of those areas of hospital and community health that requires infection control policies.
- Work closely with the infection control nurse both in day- to- day duties and in the education of those involved with infection control issues.
- Use all pertinent information to arrive to the most appropriate infection control advice on clinical and non-clinical areas; including kitchen inspections.
- Develop relationships with key personnel in the CSSD, pharmacy and laundry.
- Have an understanding of the principles of patient isolation and their application.
- Be familiar with any documents relevant to infection control and also have a knowledge of any existing working party recommendations (e.g. MRSA, Shigella, Clostridium difficile);
- Demonstrate an experience on public health microbiology with secondment if necessary to the Public Health Laboratory;
- Demonstrate an experience on communicable disease control in the community.

### **Interpersonal and Communication Skills:**

- Develop effective communications with other members of infection control team and other members of the healthcare delivery team.
- Develop awareness of appropriate timeliness, clarity, and accuracy of verbal and written infection control related communications.
- Communicate effectively and seek advice if unsure.
- Demonstrate effective communication with consulting/referring physicians and services.
- Learn to work effectively with other members of the infection control team.
- Consult effectively with other physicians and health care professionals.
- Contribute effectively to other interdisciplinary team activities.

### **Practice Based Learning & Improvement:**

- Identify the important determinants of infection control affecting patients.
- Contribute effectively to improved health of patients and communities.
- Recognize and respond to those issues where advocacy is appropriate.
- Gain experience in the critical review of the infection control literature.
- Acquire experience presenting new knowledge to other learners.
- Develop, implement and monitor a personal continuing education strategy.
- Facilitate the education of patients, students and other health care professionals and contribute to the development of new knowledge.
- Demonstrate the ability to conduct independent or collaborative research.

### **Professionalism:**

- Demonstrate appropriate personal and professional behaviour when interacting with patients, their families, and colleagues.
- Deliver the highest quality of care with integrity, honesty, and compassion.
- Understand and practice ethical and medico-legal requirements of an infection control physician.
- Provide effective consultation services with respect to all aspects of patient care and education.

### **System Based Practice:**

- Describe principles of departmental financing, budgeting and organizational funding.
- Set priorities and manage time to balance patient care, meetings and personal life.
- Demonstrate awareness of indications and urgency of diagnostic investigations.
- Utilize resources effectively and efficiently.
- Acquire proficiency with information technology.
- Develop leadership and administrative skills like managing conflicts, time management, supervision, leading the team, and working in harmony.
- Participate in quality improvement activities, such as audits, peer review and quality assurance activities.

### **Patient Care:**

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- Gather essential and accurate information about patients
- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- Develop and carry out patient management plans
- Use information technology to support patient care decisions and patient education
- Perform competently all laboratory procedures considered essential for patient management
- Provide health care services aimed at preventing health problems or maintaining health
- Work with health care professionals, including those from other disciplines, to provide patient-focused care
- Consider the patient safety as prime importance when processing patient samples and interpreting results.



## Research

Two research blocks will be allocated for each resident, one in each phase of specialized training. Conducting at least one research is mandatory for completion of training in Medical Microbiology program. The trainer identifies a project suitable for investigation and guides the resident through the process of designing, undertaking and writing up the study.

Residents are also required to conduct at least two audit activities during their specialized training period.

Objectives of the research blocks:

### **Medical Knowledge:**

- Understand how to formulate a research question
- Realize the importance of ethical approval and be familiar with the procedures
- Know the different types of studies with their strengths and weaknesses
- Comprehend how to utilize statistical and epidemiological methods.

### **Practice Based Learning & Improvement:**

- Know the essential steps involved in answering research questions by clinical and basic research
- Participate in a clinical or basic research project in order to develop the potential for a research career.(Clinical research is defined as research involving human subjects or experimental studies of direct clinical relevance, the results of which are reported at local or national meetings and are suitable for publication in a scientific journal.)

### **Interpersonal and Communication Skills:**

- Know the process involved in communicating the findings of research to colleagues in written and oral formats
- Recognize the need to collaborate effectively with research colleagues including in multidisciplinary settings.

### **Professionalism:**

- Know the ethical issues as they apply to research involving human and non-human subjects, relationships with industry and confidentiality including investigational protocols
- Be able to present and defend submissions to an ethics review board.

### **Patient Care:**

- Communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- Gather essential and accurate information about patients
- Make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- Develop and carry out patient management plans
- Use information technology to support patient care decisions and patient education
- Perform competently all laboratory procedures considered essential for patient management

- Provide health care services aimed at preventing health problems or maintaining health
- Work with health care professionals, including those from other disciplines, to provide patient-focused care
- Consider the patient safety as prime importance when processing patient samples and interpreting results.

If residents complete their training in Oman satisfactorily, they shall proceed to the UK, Ireland or to other recognized international centers for advanced training.

### **Advanced Training in Recognized International Centers (mid R4-R5)**

At entry of phase 2, the resident will be attached to a medical microbiology laboratory in the UK, Ireland or other recognized international centers. There, they should be exposed to advanced molecular technology, virology, mycology, parasitology, and health care epidemiology. He/she should also get familiarized with microbiology problems particular to the training center and enhance the clinical exposure in a different setting and culminate their skills and knowledge.

During the advanced training, the resident is expected to sit the FRCPath Part 2 examination.

## **EDUCATIONAL ACTIVITIES AND WORKSHOPS**

Themed teaching activity for Medical Microbiology Program

The topics are repeated in two years cycle.

### Anti-infective agents:

- Molecular mechanisms of antibiotics resistance in bacteria
- Pharmacokinetics & pharmacodynamics of anti-infective agents
- Penicillins
- Cephalosporins
- Other  $\beta$ -lactam Antibiotics
- B-lactams allergy
- Fusidic acid
- Aminoglycosides
- Tetracyclines & Chloramphenicol
- Rifamycins
- Metronidazole
- Macrolides, clindamycin & ketolides
- Glycopeptides, streptogramins & lipopeptides
- polymexins
- Oxazolidinones
- Sulphonamides & trimethoprim
- Quinolones

- Urinary agents: Nitrofurantoin, methenamine
- Antimycobacterial agents
- Systemic antifungal agents
- Antiviral agents
- Agents active against parasite & pneumocystis

### Basic Bacteriology

#### Gram positive cocci

- Staphylococcus
- Classification of Streptococci:
  1. S. Pyogenes GAS
  2. S. Pneumonia
  3. S. Agalactiae GBS
  4. Viridans Streptococci, GCS, GGS, Gemella

#### Gram-positive Bacilli

- Corynebacterium diphtheria and other Coryneform & Rhodococcus
- Listeria monocytogenes
- Bacillus Anthracis
- OTHER Bacillus spp

#### Gram-negative Cocci

- Neisseria meningitides
- Neisseria gonorrhoea
- Moraxella catarrhalis and other GNC

#### Gram-negative Bacilli

- Vibrio cholera and other pathogenic vibrios
- Campylobacter and related spp
- Helicobacter pylori
- Enterobacteriaceae
- Pseudomonas Aeruginosa
- Stenotrophomonas maltophilia and Burkholderia cepacia
- Burkholderia mallei and B. pseudomallei
- Acinetobacter spp
- Salmonella /Shigella and Yersinia spp
- Haemophilus infection
- Brucella spp
- Francisella tularensis
- Pasteurella spp
- Bordetella, S. moniliformis
- Legionella spp
- Capnocytophaga, Bartonella

#### Spirochetes

- Treponema pallidum (Syphilis)
- Leptospirosis
- Borrelias

- Spirillum minus

#### Anaerobic Bacteria

- Clostridia: Tetanus, Botulism, Gas gangrene
- Bacteroides and other GNB anaerobes
- Anaerobic cocci

#### Mycobacterial Diseases

- TB
- Non tuberculous
- Mycobacteria
- M. leprae

#### Higher Bacterial Disease

- Nocardia spp
- Actinomycosis

#### Chlamydia and Mycoplasma Diseases

#### Rickettsiosis and Ehrlichiosis

#### Basic Virology

- DNA viruses
- Poxviridae
- Herpesviridae: HSV, CMV, EBV, HHV6,7,8, Herpes B virus
- Adenovirus
- Papoviridae: HPV, JC, BK
- Hepadnaviridae: HBV
- Parvovirus B19
- RNA Viruses
- Reoviruses
- Togaviruses: Rubella
- Flaviviruses: Yellow fever, Dengue, WNV
- Hepatitis viruses
- Coronaviruses: SARS
- Paramyxoviridae
- Parainfluenza, mumps, RSV, HMP, Measles, Zoonotic viruses
- Rhabdoviridae
- Filoviridae: Ebola, Marburg, VHF
- Orthomyxoviridae: Influenza
- Bunyaviridae
- Arenaviridae
- Retroviridae: HIV, HTLV type 1, 2
- Picornaviridae: Enteroviruses, Polio, Coxsackie, Rhino
- Calciviridae: Norovirus, Astrovirus
- Prion Diseases

#### Mycology

- Candida spp

- Aspergillus spp
- Mucormycosis and related spp
- Chromoblastomycosis
- Agents of Mycetoma
- Sporothrix Schenkii
- Cryptosporidium neoformans
- Dimorphic fungi
- Dermatophytes
- Pneumocystis spp
- Uncommon fungi

#### Protozoal Diseases

- Amoebiasis and free living ameba
- Plasmodium spp
- Leishmania spp
- Trypanosoma spp
- Toxoplasma gondii
- Giardia lamblia and Trichomonas vaginalis
- Babesiasis
- Cryptosporidiosis
- Cyclospora spp
- Microsporidiosis

#### Diseases due to Helminths

- Intestinal nematodes
- Tissue nematodes
- Trematodes
- Cestodes
- Visceral larva migrans

Ectoparasitic Diseases: Mite, scabies

### **Clinical Microbiology**

#### **Central nervous system:**

- Acute meningitis
- Chronic meningitis
- Encephalitis
- Brain abscess
- CSF shunt infection
- Subdural empyema, epidural abscess and suppurative intracranial thrombophlebitis

#### **Respiratory infection**

- Community acquired pneumonia
- Hospital acquired pneumonia
- Cystic fibrosis

- Lung abscess
- TB
- Atypical mycobacteria

#### **Intra-abdominal infection**

- Peritonitis and intraperitoneal abscess
- Infection of the liver and biliary system
- Pancreatic infection
- Splenic abscess

#### **Cardiovascular infection**

- Endocarditis and intravascular infection
- Infection of prosthetic valves and other cardiovascular device
- Prophylaxis for infective endocarditis
- Myocarditis and pericarditis
- Myocarditis

#### **Gastrointestinal infection**

- Food borne disease
- Intra-abdominal infection
- Enteric fever
- Antibiotics associated diarrhoea
- Whipple's disease

#### **Skin and soft tissue infection**

- Cellulitis and subcutaneous infection
- Myositis
- Lymphadenitis and lymphangitis

#### **Bone and joint infection**

- Septic arthritis
- Osteomyelitis
- Infection of prosthesis in bone and joints

#### **Sexually transmitted disease**

- Genital skin and mucous membrane
- Urethritis
- Vulvovaginitis and cervicitis
- Infection of female pelvis
- Prostatitis, epididymitis and orchitis

#### **Hepatitis**

- Acute viral hepatitis
- Chronic viral hepatitis

#### **Acquired immunodeficiency syndrome**

- Epidemiology and prevention of AIDS
- Diagnosis of HIV infection
- Immunology of HIV

- General manifestation of HIV
- Pulmonary manifestation of HIV

### **Infection in Special Host**

- Infection in immunocompromised host general principle
- Infection in patient with haematological malignancies
- Infection in injection drug users
- Infection in solid organ transplant
- Infection in recipients in Hematopoietic Stem Cell Transplant
- Infection in Asplenic Patients
- Burns
- Bites

### **Immunization**

#### **Bioterrorism**

- Overview of Bioterrorism
- Agents used in Bioterrorism

#### **Infection Control**

- Introduction in infection control
- Standard Infection control Policies
- Types of isolation
- MDROs guideline and prevention
- CDAD
- Healthcare worker related infection and prevention
- TB related Infection Control policies
- Outbreak Management
- Antibiotics stewardship
- Infection control during construction
- Disinfection and sterilization
- Infectious waste management
- Surveillance

#### **Other Topics**

- Epidemiology
- Descriptive statistics
- Critical Appraisal
- Immunology
- Quality Assurance in microbiology
- Audit

## SIMULATION LEARNING

The Medical Microbiology Residency Program conducts the following simulation activities annually:

### 1. Infection Control and Prevention Workshop

This is a 1-day activity that focuses on infection transmission in health care settings. It provides knowledge and increases awareness about the magnitude of health care associated infections and emphasizes the role of individual health care workers in promoting patient safety by applying infection prevention and control strategies. The workshop involves theoretical as well as practical parts including video demonstration, hand hygiene training and Personal Protective Equipment (PPE) donning and doffing.

### 2. Parasitology Course

This is a 2-day course which will cover theoretical and practical sessions. The objectives are as follows:

- Introduction to medical parasitology
- Updates in parasites epidemiology
- Updates in malaria diagnoses and management
- Blood film preparation and examination
- Emerging parasitic infections
- Intestinal parasites diagnosis and management
- Stool examination for parasites

### 3. Mycology Course

The course is designed to help the residents identify yeasts and moulds that are commonly encountered in microbiology laboratory. The course aims to make the residents be able to:

- Understand principles of mould identification
- Be familiar with commonly encountered yeast and moulds
- Be able to rationally approach the identification
- Appreciate the types and range of infections caused by yeast and mould
- Appreciate the susceptibility testing on mould and yeast and its interpretation.

The course is intended to be for 3 days which will include theoretical and practical parts. It will be taken at R2 level.

## ON-CALL DUTY ROTA

Once judged to be suitable experienced, the resident should be included in the on-call Medical Microbiology Rota and should cover weekends and official holidays.



# HANDOVER POLICY

## Introduction

It is essential that critical information is effectively communicated as an essential component of patient safety as continuity of information is vital to the safety of our patients.

Each institution must therefore ensure good current handover policy is in place. The handover policy must be distributed to all doctors and compliance to the policy must be ensured.

In Medical Microbiology, the handover is done as written handover from the current team covering service to the consultant microbiology and first on call covering the weekend or public holidays. It involves clinical and microbiological critical issues that need to be followed and act up on which include an organism identification, sensitivity testing, requested test results follow up, antibiotic treatment advise etc.

## Definition

Clinical Handover is the transfer of professional responsibility and accountability for some or all aspects of care for a patient or group of patients, to another person or professional group in a temporary or permanent basis.

## Objective

To ensure reliable, confidential and appropriate transfer of patient information between medical staff on duty

## Principle

The doctor on duty should provide a written document to highlight all issues need to be followed up during the weekend or public holiday. These issues should include patient clinical condition, microbiological workup for a specific strain, or infection control issue including current outbreak, if any.

## Time of handover

In medical microbiology handover usually takes place on Thursday after daily clinical meeting at 12:00 pm or the last working day before any public holiday, so that all the important issues need to be followed are included in the handover form.

## Handover process

- A face to face handover is preferred along with written handover if the doctor covering the on call is present in the same institute,
- A clear written handover should be provided using the handover form provided with document if the doctor covering the on call is not present in the same institute,
- Information should be included in the handover form: (See *Appendix VII*)
  - Patient name and Identification number
  - Type of sample identification number
  - Bacterial strain/s under follow up
  - Diagnosis/ differential diagnosis (include any risks or warnings) and any clinical issues need to be followed up
  - Outstanding microbiological issues that need to be followed up (tasks to be done e.g. sensitivity testing, ID, API, etc)
  - Investigation advised by microbiologist e.g (Echo, MRI), to be documented if done or not

- Document whether the outstanding issue/s was completed or not so the coming team after the weekend or the holiday can follow up the issues
- Inform about any current outbreak or other infection control issues
- Inform about the current issues in the microbiology laboratory, e.g. shortage or in-availability of certain tests or reagents
- All new doctors/residents working or doing attachment in the department should be informed about the policy.

### **Audit of compliance**

Each institute is advised to conduct an audit to assess the compliance of handover process and utilization of handover form which can be conducted by quality officer or HOD and results can be used to improve the service. This audit can be conducted annually

## **VACATION & LEAVE**

### ➤ **Annual Leave**

The Resident's Annual Leave should be planned before the beginning of each academic year. It can be taken all at once (30 days) or on parts (i.e. one week per block / 75% of the block must be attended full credit for the block) throughout the academic year. The annual leave which is not utilized within the academic year will not be transferred to the following year.

### ➤ **Scientific Leave**

The Resident may be granted a leave, not exceeding 10 days, for scientific purposes during each academic year provided that he/she presents proof of attending the activity (e.g, Certificate of Attendance, an Exam Certificate, etc.)

### ➤ **Sick Leave**

The Resident should submit the Leave Form attached with Sick-Leave Certificate (from an authorized hospital) within two weeks from taking the leave. If the leave exceeds 7 days, the Resident should compensate that period for an equivalent period before he/she is awarded a Certificate of Completion of Training.

### ➤ **Emergency Leave**

The Resident should have valid and convincing reasons for taking the emergency leaves. It will be allowed under the following circumstances:

- Death of first degree (parents, siblings, spouse, children, grandparents, immediate Uncles & Aunts)
- Dealing with natural disaster, accidents, & fires that prevents the Resident from reaching the designated rotation.

A maximum of seven (7) days will be permitted for Emergency leave.

### ➤ **Maternity Leave**

The Resident will be granted a leave of 50 days from the day of giving birth. The Resident should submit a copy of Maternity leave Certificate and Child Birth Certificate.

➤ **Compensation Leave for Public Holiday**

In the Compensation leave (maximum of 10 days), the Resident must submit a letter signed by the PD or Assist. PD, in addition to, the rotation schedule which proves that he/she worked during Public Holidays within two weeks from the Public Holiday. The training program will then arrange and schedule for the Resident's Compensation Leave subsequently.

**Notes:**

1. The Leave & Return from leave Forms should include two signatures: the signature of the PD or Assistant PD, and the rotation Supervisor (If the PD of the Training Program is also the Rotation Supervisor, then he/she should sign on both sections)
2. Make sure that the Resident submits their Return form Leave Form immediately after reporting back to their Training Program.
3. Any certificate (e.g. sick, exam, etc.) not attached with the Leave or Return from Leave Forms will not be accepted.
4. Regular On-Call or Weekend duty does not qualify as part of the Compensation Leave.
5. The Leave Form should be submitted a minimum of three months prior of the effective date of leave.

## EXAMINATION REQUIREMENTS

At the end of each year, residents will be required to sit “End of year” examination before moving to next academic year. See Table 2 for exam format.

At the end of Phase 1, residents will be required to sit the FRCPath Part I examination. They should complete not less than 12 months of specialty training in Microbiology before sitting the examination.

During or after the training in any recognized international centers and completing not less than 3 years of specialty training in Microbiology, residents may sit the FRCPath Part II, which is considered as the exit examination.

**Table 2**  
**Examination Components**

<b>RESIDENCY LEVEL</b>	<b>R1-R3</b>	<b>R4-R5</b>
<b>COMPONENTS</b>	100 MCQs (type A)	<b>Written:</b> <ul style="list-style-type: none"> <li>• 1 long essay</li> <li>• 6 short essays</li> <li>• Journal article</li> </ul> <b>Practical:</b> <ul style="list-style-type: none"> <li>• 4 real specimens</li> <li>• 20 OSCEs</li> <li>• 6 spotters</li> </ul>
<b>WEIGHT % AND DETAILS OF SCORES EACH COMPONENT</b>	100 marks total 100% total 60% bacteriology 25% virology 15% parasitology, mycology, infection control, clinical epidemiology	<b>Written: 100 marks, 40%</b> <ul style="list-style-type: none"> <li>• 1 long essay: 20 marks</li> <li>• 6 short essays: 60 marks</li> <li>• Journal article: 20 marks</li> </ul> <b>Practical: 200 marks, 60%</b> <ul style="list-style-type: none"> <li>• 4 real specimens: 100 marks, 40%</li> <li>• 20 OSCEs: 50 marks, 10%</li> </ul> 5 spotters: 50 marks, 10%
<b>FINAL PASSING MARK</b> If the percentage of the residents passing the examination is less than 70%, the passing score can be adjusted to achieve 70% passing rate.	R1-R2 = 50% R3 = 60 %	60%
<b>CONSEQUENCE OF FAILING</b>	Re-sit exams will be given to a resident three (3) months after failing the End-of-Year Exam. A resident who fails both, End-of-Year and Re-sit exam will have to repeat the year at the same residency training level.	

## PROGRESSION CRITERIA

- **R1 to R2**
  - a. Passed the end-of-year examination
  - b. Achieved at least “meets expectations” in the annual evaluation with satisfactory workplace-based assessment evaluation
  
- **R2 to R3**
  - a. Passed the end-of-year examination
  - b. Achieved at least “meets expectations” in the annual evaluation with satisfactory workplace-based assessment evaluation
  
- **R3 to R4**
  - a. Passed the end-of-year examination
  - b. Achieved at least “meets expectations” in the annual evaluation with satisfactory workplace-based assessment evaluation
  - c. Passed FRCPATH part 1 examination or equivalent examination
  
- **R4 to R5**
  - a. Passed the end-of-year examination
  - b. Achieved at least “meets expectations” in the annual evaluation with satisfactory workplace-based assessment evaluation
  - c. Passed FRCPATH Part 1 examination or equivalent examination
  
- **R5**

At the end of R5, the resident must be able to:

  - a. Passed all end of year examinations
  - b. Achieved satisfactory evaluations
  - c. Passed FRCPATH Part 1 examination or equivalent examination
  - d. Attempted the FRCPATH Part 2 examination
  - e. Completed Final-In-Training Evaluation Report (FITER)
  - f. Completed successfully the residents development program
  - g. Provided evidence of a research project during residency

## QUALITY ASSURANCE

To ensure that high standards are maintained, Quality Assurance is being implemented by the program. Indicators for assessing the QA include minutes of the meetings (Scientific Committee, residents and trainers), resident records, internal review report, accreditation committee report, external reviewer’s report (if any), annual report of the program, and passing rate of examinations.

## EXIT QUALIFICATIONS

By end of training, the resident will be issued a certificate of completion of training based on fulfilling the following:

- Passed all end of year exams
- Achieved satisfactory evaluation
- Passed OMSB part 1 or equivalent (FRCPATH part 1)
- Completed final-in-training evaluation report (FITER)
- Completed successfully the resident development program
- Provide evidence of a research project during residency.

For awarding specialty training certificate, the above are required in addition to FRCPATH II.

## APPENDIX I

### SUGGESTED READING MATERIALS

#### Textbooks

- Koneman's Color Atlas and Textbook of Diagnostic Microbiology.** Elmer Koneman & Washington Winn, Jr. (*Lippincott Williams & Wilkins*).
- Microbiology Methods.** Collins and Lyne's eds. (*Arnold*)
- Diagnostic Microbiology.** Baily & Scott
- Manual of Clinical Microbiology.** (*ASM*)
- Medical Microbiology.** Murray & Rosenthal. Mosby
- Problem Oriented Cases in Microbiology.** Humphrey's
- Color Atlas and Textbook of Diagnostic Microbiology.** Washington et al. (*Lippincott Williams & Wilkins*).
- Antibiotic and Chemotherapy.** Finch, Greenwood and Norby ed. (*Churchill Livingstone*).
- Principles and Practice of Infectious Diseases.** Mandell, Douglas and Bennett's ed. (*Churchill Livingstone*).
- Infectious Disease Manual.** David Wilks.
- Infectious Diseases.** Barbara. (*Blackwell Science*).
- Hospital Epidemiology and Infection Control.** Mayhall. (*Lippincott Williams & Wilkins*).

#### Journals and Electronic Resources

- Clinical Microbiology and Infection** (*Blackwell Publishing*)
- Clinical Infectious Diseases** (*The University of Chicago Press*)
- The Journal of Antimicrobial Chemotherapy** (*Oxford Journals*)
- The Journal of Clinical Microbiology** (*ASM*)
- The Journal of Hospital Infection**
- The Lancet Infectious Diseases**
- Hospital Epidemiology and Infection Control**
- Journal of Infection**
- Clinical Microbiology Reviews**
- Journal of Infectious Diseases**
- Clinical Microbiology Newsletter**
- www.uptodate.com**
- www.cdc.gov**
- www.hpa.org.uk**
- www.who.int**

## APPENDIX II

### MEDICAL MICROBIOLOGY LOGBOOK (INDEX)

No.	Topics	Page
I	General Procedures in the Clinical Microbiology Laboratory	1
	Equipment	1
	Quality Management	2
	Sterilization & Disinfection	3
	Handling of Specimens	4
II	Bacteriology	5
	Staining Techniques	5
	Bacteriological Culture Media	7
	Identification Methods	8-11
	Antimicrobial Susceptibility Testing	12-13
	Preservation of Bacteria	14
III	Processing of Clinical Specimens	15
	Blood Culture	15
	Body Fluids & Tissues	16-17
	Swabs & Respiratory Specimens	18-19
	Stool Samples	20
	Urine Samples	21
	Data Handling	22
IV	Infection Control	23
V	Mycology	24-25
VI	Cell Culture-Virology	26
VII	Viral Serology	27-28
VIII	Bacterial/Parasitic Serology	29-30
IX	Molecular Diagnostic Techniques - Virology	31
X	Reference Laboratory (Microbiology CPHL/TB)	32
XI	Parasitology	33
XII	Research Projects	34-35
XIII	Case Reports	36-37
XIV	Journal Club Presentations	38-40
XV	Presentations (e.g. Meetings, ID/Micro Rounds, Multidisciplinary Meetings, etc.)	41-43
XVI	Local/International Workshops/Conference Attended	43



## APPENDIX III

### PORTFOLIO

1. **Personal Data**  
(Name, date of birth, nationality, MOH staff number/OMSB no. , mail address, e-mail, phone/mobile)
2. **Qualifications** (Year obtained, title, awarding body)
3. **Achievements & awards**
4. **Training history**
5. **Presentations** (departmental , Program CME, national & international level)
6. **Research and Audits** (mention title, dates, outcome)
7. **Publications**
8. **Work Place Based Assessment** (includes CBD, DOPS, ECE how many per year accomplished)
9. **Interesting cases seen** (write reflections and what learned from the case)
10. **Training courses** (mention title, dates conducted national & international)
11. **Workshops/symposiums/Conferences** (national/international, date, title)
12. **Advanced training and attachments done abroad** (mention period, institutes and learning outcome)
13. **Management/meetings attended**
14. **Teaching experience**

# APPENDIX IV

## Medical Microbiology Training Program Resident's Progress Report

Resident's Name: \_\_\_\_\_

Level: \_\_\_\_\_

Date: \_\_\_\_\_

	Satisfactory	Unsatisfactory	Comments (Points to improve)
<b>Medical education progress (Are they meeting rotation objectives?)</b>			
Clinical Activity (Meeting specific rotation objectives?)			
Academic Activity (CME, CPD activities, teaching, research and publication)			
<b>Educational supervision and appraisal progress</b>			
Adherence to master schedule rotation			
Completing WPBA			
6 monthly evaluation			
Maintain specialty learning portfolio			
<b>Residents' complaints and well-being</b>			
Training			
Social issues			
Psychological issues			
<b>Points from trainers evaluation of the residents</b>			
Professionalism			
Education requirements versus service provision balance			
<b>Strengths and weakness of the residents (learning and development opportunities)</b>			
Strengths			
Weakness			

Name of Educational Supervisor: \_\_\_\_\_

Signature: \_\_\_\_\_

Name of Resident: \_\_\_\_\_

Signature: \_\_\_\_\_

**Medical Microbiology  
Resident Progress throughout the Residency Program**

Residency year	Task to be achieved	Target number	Time due	Status	Comments by the Educational Supervisor
R1	DOPS	minimum 6	To finish by the end of R1		
	CBD	minimum 6	To finish by the end of R1		
	ECE	minimum 1	To finish by the end of R1		
	MSF	minimum 1	To finish by the end of R1		
	Presentation Evaluation	Minimum 4	To finish by the end of R1		
	End of year exam		June		
R2	Proposal for research/audit (1)		to be submitted by the end of R2		
	DOPS	Minimum 6	To finish by the end of R2		
	CBD	Minimum 6	To finish by the end of R2		
	ECE	Minimum 1	To finish by the end of R2		
	MSF	minimum 1	To finish by the end of R2		
	Presentation Evaluation	Minimum 4	To finish by the end of R2		
End of year exam		June			
R3	FRCPATH 1	-	during the 1 <sup>st</sup> 6 blocks of R3		
	Collection of data/analysis and writing up the research/audit (1)		Allocated Research block		
	DOPS	Minimum 6	To finish by the end of R3		
	CBD	Minimum 6	To finish by the end of R3		
	ECE	Minimum 1	To finish by the end of R3		
	MSF	minimum 1	To finish by the end of R3		
	Presentation Evaluation	Minimum 4	To finish by the end of R3		
End of year exam		June			
R4	*Proposal for research/audit (2)		During 2 <sup>nd</sup> 6 blocks of R4		
	DOPS	minimum 4	To finish by the end of R4		
	CBD	Minimum 6	To finish by the end of R4		
	ECE	Minimum 2	To finish by the end of R4		
	MSF	minimum 1	To finish by the end of R4		
	Presentation Evaluation	Minimum 4	To finish by the end of R4		
End of year exam		June			
R5	FRCPATH 2		During the 2 <sup>nd</sup> 6 blocks of R5		
	Collection of data/analysis and writing up the research/audit (2)		Allocated research block		
	DOPS	Minimum 4	To finish by the end of R5		
	CBD	Minimum 6	To finish by the end of R5		
	ECE	Minimum 2	To finish by the end of R5		
	MSF	minimum 1	To finish by the end of R5		
	Presentation Evaluation	Minimum 4	To finish by the end of R5		
End of year exam		June			

**(DOPS):** Direct Observation of Practical Skills

**(CBD):** Case-based Discussion

**(ECE):** Evaluation of Clinical Events

**(MSF):** Multi-source feedback

\*Second research block will be allocated only for those who will submit proposal before end of R4

## APPENDIX V

### EVALUATION AND EXAMINATIONS

#### R1

Date	Task	Result
March	6 months evaluation	
June	End of Year Examination	
September	End of Year Evaluation	

#### R2

Date	Task	Result
March	6 months evaluation	
June	End of the year examination	
September	End of Year Evaluation	

#### R3

Date	Task	Result
March	6 months evaluation	
June	End of the year examination	
September	End of the year evaluation	
	FRCPATH Part 1 examination	

#### R4

Date	Task	Result
March	6 months evaluation	
June	End of the year examination	
September	End of the year evaluation	

#### R5

Date	Task	Result
	Final FRCPATH II examination	

## In-Training Evaluation for Laboratory Rotations



### RADIOLOGY & LAB EVALUATION IN-TRAINING EVALUATION REPORT (PER BLOCK)

Name: \_\_\_\_\_ Resident Level: \_\_\_\_\_ OMSB #: \_\_\_\_\_ Program: \_\_\_\_\_

Block: \_\_\_\_\_ Training Center: \_\_\_\_\_ Rotation: \_\_\_\_\_ Date of Rotation: FROM \_\_\_\_\_ TO \_\_\_\_\_

CRITERIA	Unsatisfactory 1	Below Expectations 2	Meets Expectations 3	Exceeds Expectations 4	Not Applicable
<b>I. MEDICAL EXPERT</b>					
1 Basic Science Knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 Clinical Knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 History/Physical Exam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 Synthesis of Clinical & Laboratory Data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5 Decision Making & Management Plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6 Instrumentation Knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7 Management of Emergencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8 Procedural Skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9 Reporting Skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>II. PROFESSIONAL</b>					
10 Punctual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11 Sensitive to Cultural Diversity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12 Responsible & Self-Disciplined	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13 Recognition of Own Limitations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14 Ethical Practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15 Compassionate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>III. COMMUNICATOR</b>					
16 Communication with Physicians	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17 Communication with Allied Health Professionals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18 Communication with Patients & Families	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>IV. COLLABORATOR</b>					
19 Collaboration with all Health Professionals appropriately	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20 Effective Delegation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>V. MANAGER</b>					
21 Proficiency with Information Technology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22 Appropriate Use of Resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23 Leadership and Administrative Skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24 Participation in Quality Improvement Activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>VI. HEALTH ADVOCATE</b>					
25 Promotion of Patient and Community Health Needs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>VII. SCHOLAR</b>					
26 Life long Self-Learner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27 Critical Appraisal of Medical Literature	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28 Teaching Skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29 Progress of Research Project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>VIII. PATIENT SAFETY</b>					
30 Commitment to Patient Safety Measures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>OVERALL ASSESSMENT</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## In-Training Evaluation for Clinical Rotations



### OMAN MEDICAL SPECIALTY BOARD IN-TRAINING EVALUATION REPORT (PER BLOCK)

Name: \_\_\_\_\_ Resident Level: \_\_\_\_\_ OMSB #: \_\_\_\_\_ Program: \_\_\_\_\_  
 Block: \_\_\_\_\_ Training Center: \_\_\_\_\_ Rotation: \_\_\_\_\_ Date of Rotation: FROM \_\_\_\_\_ TO \_\_\_\_\_

CRITERIA	Unsatisfactory 1	Below Expectations 2	Meets Expectations 3	Exceeds Expectations 4	Not Applicable
<b>I. MEDICAL EXPERT</b>					
1 Basic Science Knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 Clinical Knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 History/Physical Exam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 Data Interpretation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5 Clinical Judgment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6 Efficient Patient Management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7 Management of Emergencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8 Procedural Skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>II. PROFESSIONAL</b>					
9 Punctual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10 Sensitive to Cultural Diversity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11 Responsible & Self-Disciplined	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12 Recognition of Own Limitations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13 Ethical Practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14 Compassionate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>III. COMMUNICATOR</b>					
15 Communication with Physicians	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16 Communication with Allied Health Professionals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17 Communication with Patients & Families	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18 Written Communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>IV. COLLABORATOR</b>					
19 Collaboration with all Health Professionals appropriately	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20 Effective Delegation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>V. MANAGER</b>					
21 Proficiency with Information Technology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22 Appropriate Use of Resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23 Leadership and Administrative Skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24 Participation in Quality Improvement Activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>VI. HEALTH ADVOCATE</b>					
25 Promotion of Patient and Community Health Needs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>VII. SCHOLAR</b>					
26 Life long Self-Learner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27 Critical Appraisal of Medical Literature	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28 Teaching Skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29 Progress of Research Project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>VIII. PATIENT SAFETY</b>					
30 Commitment to Patient Safety Measures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>OVERALL ASSESSMENT</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## APPENDIX VI

### WORKPLACE-BASED ASSESSMENT FORMS (WPBA)



#### OMAN MEDICAL SPECIALTY BOARD

#### WORKPLACE-BASED ASSESSMENT FORM

#### MEDICAL MICROBIOLOGY

#### Evaluation of Clinical / Management Events (ECE)

Name of Resident:		OMSB#:	
Program:	Resident Level:	Rotation:	
Setting:	Date of Presentation:		
<input type="checkbox"/> Clinical governance/quality	<input type="checkbox"/> Audit	<input type="checkbox"/> Managerial	<input type="checkbox"/> Teaching / presentation
<input type="checkbox"/> Infection control	<input type="checkbox"/> Written exercise	<input type="checkbox"/> Other	<input type="checkbox"/> Laboratory practice
<input type="checkbox"/> Clinical care	Please specify: _____		

  

Please grade the following areas using the scale provided. This should relate to the standard expected for the end of the appropriate stage of training:		Unsatisfactory	Below Expectations	Meets Expectations	Exceeds Expectations	Not Applicable
		1	2	3	4	N/A
1	Understanding of theory of encounter/ event/process					
2	Applies clinical/microbiological knowledge appropriately					
3	Ability to make appropriate clinical/ managerial judgements					
4	Adheres to established procedures (e.g. SOP)					
5	Demonstrates appropriate communication skills (verbal and written)					
6	Maintains a patient focus and delivers patient centered care(e.g. respect for patient dignity, consent, confidentiality, turnaround times)					
7	Considers professional issues (record keeping, consultation with colleagues, linkage of department to others, Hospital rules, plan for feedback)					
8	Maintains professional standards					
9	Organisation and efficiency					
10	Overall competency					
11	Ability to work effectively with other healthcare professionals as part of a team					

  

**Comments:** (Please use this space to record areas of strengths or any suggestions for development.)

  

**Agreed Action:**

  

Assessor's Name:	Signature:	Date:
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Designation of Assessor:

*\*Adapted from RCP*



# OMAN MEDICAL SPECIALTY BOARD

WORKPLACE-BASED ASSESSMENT FORM

## MEDICAL MICROBIOLOGY

### Direct Observation of Practical Skills (DOPS)

Name of Resident:		OMSB#:				
Program:	Resident Level:	Rotation:				
Setting:	Procedure being observed:					
Brief outline of procedure, indicating focus for assessment (refer to topics in curriculum). Tick category of procedure or describe in space available.						
<input type="checkbox"/> Sample handling and preparation	<input type="checkbox"/> Microscopy & staining	<input type="checkbox"/> Identification	<input type="checkbox"/> Safe disposal			
<input type="checkbox"/> Ability to separate mixtures - importance of pure culture	<input type="checkbox"/> Use of selective media	<input type="checkbox"/> Antimicrobial sensitivity testing (setting up, reading & interpretation)	<input type="checkbox"/> Therapeutic drug monitoring (practical aspects)			
<input type="checkbox"/> Serology	<input type="checkbox"/> Molecular methodologies	<input type="checkbox"/> Other (please specify)				
<b>Specimen</b>						
<input type="checkbox"/> Blood culture	<input type="checkbox"/> CSF	<input type="checkbox"/> Tissue	<input type="checkbox"/> Bone/joint aspirate			
<input type="checkbox"/> Faeces	<input type="checkbox"/> Urine	<input type="checkbox"/> Serum/serology	<input type="checkbox"/> Serum/blood level			
<input type="checkbox"/> Wound	<input type="checkbox"/> Respiratory	<input type="checkbox"/> Genital	<input type="checkbox"/> Other (please specify)			
Please grade the following areas using the scale provided. This should relate to the standard expected for the end of the appropriate stage of training:		Unsatisfactory	Below Expectations	Meets Expectations	Exceeds Expectations	Not Applicable
		1	2	3	4	N/A
1	Understands the scientific principles of the procedure, including the basic biology underpinning it					
2	Complies with health and safety requirements: Safe lab practice, standard precautions, hazard group, containment levels, safe disposal, etc.					
3	Has read and understands the appropriate SOP					
4	Understands the principles of internal and external quality control associated with the test					
5	Is aware of the limitations of the test					
6	Overall technical ability and correct use of equipment					
7	Overall ability to perform procedure					
8	Communication of results (written and verbal reports), including report validation					
9	Is aware of importance of patient/specimen identification checks & appropriate documentation					
Comments: <i>(Please use this space to record areas of strengths or any suggestions for development.)</i>						
Agreed Action:						
Assessor's Name:		Signature:		Date:		
Designation of Assessor:						

*\*Adapted from RCP*





# OMAN MEDICAL SPECIALTY BOARD

## WORKPLACE-BASED ASSESSMENT FORM

### MEDICAL MICROBIOLOGY

#### Case-Based Discussion (CbD)

Name of Resident:	OMSB#:
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Program:	Resident Level:	Rotation:
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Setting:	Case being discussed:
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Infection (circle one or more)							
Blood stream	Cardiac/vascular	Respiratory	Bone or joint	Wound/soft tissue	Enteric	CNS	Serological diagnosis
Intra-abdominal	Urinary tract	Burn/plastics	Sexually transmitted	Others (please state)			

**Clinical setting:** Hospital/General Practice (please circle)

HOSPITAL	Medical	Surgical	Adult ITU	Specialist Unit (please specify)	Other (please state)
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**Focus of clinical case:**

Medical record keeping	Clinical/microbiological assessment	Clinical management (including test selection, interpretation & treatment)	Infection control	Health protection	Professionalism
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<u>Please ensure this patient is not identifiable</u>		Unsatisfactory	Below Expectations	Meets Expectations	Exceeds Expectations	Not Applicable
Please grade the following areas using the scale provided. This should relate to the standard expected for the end of the appropriate stage of training:		1	2	3	4	N/A
1	Medical record keeping					
2	Clinical/microbiological assessment					
3	Selection of appropriate investigation(s), reporting and interpretation of results					
4	Clinical advice including recommendations for antimicrobial therapy, prophylaxis and immunisation					
5	Infection control advice (if appropriate)					
6	Health protection/public health advice					
7	Follow up					
8	Overall laboratory and clinical judgement					
9	Overall professionalism					

**Comments:** (Please use this space to record areas of strengths or any suggestions for development.)

**Agreed Action:**

Assessor's Name:	Signature:	Date:
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Designation of Assessor:

*\*Adapted from RCP*

## APPENDIX VII

### OMAN MEDICAL SPECIALTY BOARD MEDICAL MICROBIOLOGY WEEKEND HANDOVER FORM

Hospital/Centre: \_\_\_\_\_

Date: \_\_\_\_\_

Handed over by: \_\_\_\_\_

Handed over to: \_\_\_\_\_

Patient Name/ID	Sample Type & No.	Diagnosis/ differential diagnosis & clinical issues (include any risks or warnings)	Outstanding microbiology issues (tasks to be done e.g. sensitivity testing, ID, API, etc)	If investigation advised by microbiologist e.g (Echo, MRI): Done or not	Outstanding issue: Completed or Not