Specialty Training Requirements (STR)

Name of Specialty:	Medical Microbiology
Chair of STC:	Dr Nancy Tee
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Contents

Note: In addition to the training requirements stated in this STR, residents must comply with any other regulatory requirements or practice-based requirements mandated by the healthcare institutions or place of practice.

Scope of Medical Microbiology

Medical microbiology, as a medical discipline, applies the science of microbiology to the diagnosis, prevention and management of diseases caused by infectious agents in humans. These are the key components:

a) At its core is the study of microorganisms, their structure, function, mechanisms of pathogenicity, transmission routes, survival and elimination, that cause diseases in human beings, including bacteria, viruses, fungi, and parasites;
b) The practical application relates to diagnostic guidance through laboratory techniques, including culturing, microscopy, serological tests, and molecular methods;
c) The other important application is therapeutic guidance including antimicrobial and preventive therapy such as vaccine and antibiotic prophylaxis;
d) Infection Control, Epidemiology and Public Health Microbiology, which relates to the implementation of measures to prevent the spread of infections within healthcare settings, investigation of occurrence, distribution, and determinants of infectious diseases within populations, and contribution to public health efforts by monitoring and controlling the spread of infectious diseases at the community and population levels; and
e) Research and development to advance the understanding of microbial diseases, develop innovative solutions for diagnosis and treatment, and improve clinical microbiology services.

Purpose of the Residency Programme

The aim of this programme is to produce trained medical microbiologists to provide specialist opinion in clinical microbiology and who should have developed the appropriate management skills to lead the laboratory.

At the end of training the competent medical microbiologist is able to:

a) Supervise a clinical microbiology laboratory;
b) Provide clinical liaison and consultation based on an understanding of the biology of pathogens, interpretation of laboratory tests and clinical correlates of infection;
c) Provide advice in infection prevention and control.
d) Provide advice and help in implementing a multi-faceted antimicrobial stewardship programme;
e) Conduct or support research to discover new knowledge or improve clinical microbiology services;
f) Provide teaching and education to healthcare staff, trainees, students and medical technologists; and
g) Collaborate with authorities and other parties in public health surveillance and outbreak investigation.

This programme will enable microbiology expertise, combined with high quality laboratory service, to support the diagnosis, treatment and prevention of infectious diseases.

Admission Requirements

At the point of application for this residency programme:

a) Applicants must be employed by employers endorsed by Ministry of Health (MOH); and
b) Residents who wish to switch to this residency programme must have waited at least one year between resignation from his / her previous residency programme and application for this residency programme.

At the point of entry to this residency programme, residents must have fulfilled the following requirements:

a) Hold a local medical degree or a primary medical qualification registrable under the Medical Registration Act (Second Schedule);
b) Have completed Post-Graduate Year 1 (PGY1); and
c) Have a valid Conditional or Full Registration with Singapore Medical Council (SMC).

Selection Procedures

Applicants must apply for the programme through the bi-annual residency intake matching exercise conducted by MOH Holdings (MOHH).

Continuity plan: Selection should be conducted via a virtual platform in the event of a protracted outbreak whereby face-to-face on-site meeting is disallowed and cross institution movement is restricted.

Less Than Full Time Training

Less than full time training is not allowed. Exceptions may be granted by Specialist Accreditation Board (SAB) on a case-by-case basis.

Non-traditional Training Route

The programme should only consider the application for mid-stream entry to residency training by an International Medical Graduates (IMG) if he/she meets the following criteria:

a) He/she is an existing resident or specialist trainee in the United States, Australia, New Zealand, Canada, United Kingdom and Hong Kong, or in other centres/countries where training may be recognised by the Specialist Accreditation Board (SAB)

b) His/her years of training are assessed to be equivalent to the local training by JCST and/or SAB.

Applicants may enter residency training at the appropriate year of training as determined by the Programme Director and STC. The latest point of entry into residency for these applicants is Year 1 of the senior residency phase.

Separation

The PD must verify residency training for all residents within 30 days from the point of notification for residents' separation / exit, including residents who did not complete the programme.

Duration of Specialty Training

The training duration must be 60 months.

Maximum candidature: All residents must complete the training requirements, requisite examinations and obtain their exit certification from JCST not more than 36 months beyond the usual length of their training programme. The total candidature for Medical Microbiology is 60 months Medical Microbiology residency + 36 months candidature.

"Make-up" Training

"Make-up" training must be arranged when residents:

- Exceed days of allowable leave of absence / duration away from training; or
- Fail to make satisfactory progress in training.

The duration of make-up training should be decided by the JCC and should depend on the duration away from training and / or the time deemed necessary for remediation in areas of deficiency. The JCC should review residents' progress at the end of the "make-up" training period and decide if further training is needed.

Any shortfall in core training requirements must be made up by the stipulated training year and / or before completion of residency training.

Learning Outcomes: Entrustable Professional Activities (EPAs)

Residents must achieve level 4 of the following EPAs by the end of residency training:

	Title
EPA 1	Authorising laboratory results
EPA 2	Assisting the implementation of quality management systems.
EPA 3	Assisting the implementation of laboratory safety management systems
EPA 4	Providing consultations related to patient management.

EPA 5	Providing advice on infection control and management of antimicrobial use

Learning Outcomes: Core Competencies, Sub-competencies and Milestones

The programme must integrate the following competencies into the curriculum, and structure the curriculum to support resident attainment of these competencies in the local context.

Residents must demonstrate the following core competencies:

1) Patient care and Procedural Skills

Residents must demonstrate the ability to:

- Gather essential and accurate information about the patient
- Counsel patients and family members
- Make informed diagnostic and therapeutic decisions
- Prescribe and perform essential medical procedures
- Provide effective, compassionate and appropriate health management, maintenance, and prevention guidance

While providing a medical microbiology service, residents must demonstrate the ability to:

- Gather essential and accurate information about the patient
- Make informed diagnostic and therapeutic decisions specific to microbiology
- Provide effective, compassionate and appropriate health management, maintenance, and prevention guidance

Residents must demonstrate competency in:

- Laboratory methods: Microbial detection and identification, susceptibility testing, interpretation and reporting
- Providing consultation to the healthcare team including doctors, nurses and other healthcare workers, and public health officials
- Infection prevention and control

2) Medical knowledge

Residents must demonstrate knowledge of established and evolving biomedical, clinical, epidemiological and social-behavioural sciences, as well as the application of this knowledge to patient care.

Residents must demonstrate knowledge of fundamental and diagnostic medical microbiology test development, validation and application.

3) System-based practice

Residents must demonstrate the ability to:

- Work effectively in various health care delivery settings and systems relevant to their clinical specialty
- Coordinate patient care within the health care system relevant to their clinical specialty
- Incorporate considerations of cost awareness and risk / benefit analysis in patient care
- Advocate for quality patient care and optimal patient care systems
- Work in inter-professional teams to enhance patient safety and improve patient care quality. This includes effective transitions of patient care and structured patient hand-off processes
- Participate in identifying systems errors and in implementing potential systems solutions

Residents must demonstrate the ability to:

- Plan laboratory resource utilisation, finance, costing and manpower
- Manage laboratory biosafety

4) Practice-based learning and improvement

Residents must demonstrate a commitment to lifelong learning.

Resident must demonstrate the ability to:

- Investigate and evaluate patient care practices
- Appraise and assimilate scientific evidence
- Improve the practice of medicine
- Identify and perform appropriate learning activities based on learning needs

Residents must demonstrate ability to evaluate research proposals involving microbiology laboratory and its resources.

5) Professionalism

Residents must demonstrate a commitment to professionalism and adherence to ethical principles including the SMC's Ethical Code and Ethical Guidelines (ECEG).

Residents must:

- Demonstrate professional conduct and accountability
- Demonstrate humanism and cultural proficiency
- Maintain emotional, physical and mental health, and pursue continual personal and professional growth
- Demonstrate an understanding of medical ethics and law

6) Interpersonal and communication skills

Residents must demonstrate ability to:

- Effectively exchange information with patients, their families and professional associates
- Establish therapeutic relationships with patients and families, with attention to patient / family concerns and context
- Align patient / family values, goals and preferences with treatment options to make a personalised care plan
- Acknowledge as well as address uncertainty and conflict
- Work effectively as a member or leader of a health care team
- Maintain accurate medical records

Other Competency: Teaching and Supervisory skills.

Residents must demonstrate ability to:

- Teach others
- Supervise others

Residents must demonstrate ability to:

- Teaching and training technologists, nurses and other healthcare workers including doctors
- Supervise technologists, junior residents and medical officers

Learning Outcomes: Others

Residents must attend Medical Ethics, Professionalism and Health Law course conducted by Singapore Medical Association (SMA).
For progression from R3 to R4, residents must achieve Level 3 for EPAs 1, 4, and 5.

For progression from R4 to R5, residents must pass FRCPA Part 1.

Curriculum

The curriculum and detailed syllabus relevant for local practice must be made available in the Residency Programme Handbook and given to the residents at the start of residency.

The PD must provide clear goals and objectives for each component of clinical experience.

Adequate information on the programme of assessments, core conditions to be assessed and expectations on performance during residency must be made available to all residents and faculty members.

The curriculum is expressed as a table of Knowledge and Skills.

Learning Methods and Approaches: Scheduled Didactic and Classroom Sessions

Residents must attend at least 70% of the following teaching sessions:

- National Training Programme,
- Infectious Disease Grand Rounds,
- Infection Prevention and Control meetings, Antimicrobial Stewardship Programme (ASP) meetings,
- Microbiology Plate rounds,
- Multidisciplinary rounds,
- Peer Review Learning (PRL),
- Microbiology Journal Club, and
- Infection control workshops.

Continuity Plan: Teaching sessions should be held online in the event of a protracted outbreak whereby face-to-face on-site meeting is disallowed and cross institution movement is restricted, where possible.

Learning Methods and Approaches: Clinical Experiences

Residents must complete the following rotations:

	Core – General	Core – Subdiscipline (pls refer to the minimum duration listed under "Core – Subdiscipline rotations")	Elective
R1	9 – 12 months	Up to 3 months	Not allowed
R2	0 – 12 months	Up to 12 months	Not allowed
R3	6 – 12 months	Up to 6 months	0 – 3 months
R4	6 – 12 months	Up to 6 months	0 – 3 months
R5	6 – 12 months	Up to 6 months	0 – 3 months

Core – General rotations:
1. Tan Tock Seng Hospital (TTSH -Department of Laboratory Medicine)
2. Singapore General Hospital (SGH -Department of Microbiology)
3. National University Hospital (NUH Department of Laboratory Medicine)
4. Changi General Hospital (CGH Department of Laboratory Medicine)
5. Khoo Teck Puat Hospital (KTPH Department of Laboratory Medicine)
6. Ng Teng Fong General Hospital (NTFGH Department of Laboratory Medicine)
7. Sengkang General Hospital (SKH Department of Laboratory Medicine) - (not yet an approved site)
8. Woodlands Hospital (WH Department of Laboratory Medicine) - (not yet an approved site)

Core – Subdiscipline rotations:
1. Singapore General Hospital (Department of Microbiology - Central TB Laboratory for Mycobacteriology) *(minimum of 1 month)*
2. Singapore General Hospital (Department of Microbiology - Virology) *(minimum of 1 month)*

3. KK Women's and Children's Hospital (KKH) (Department of Pathology and Laboratory Medicine for paediatric, obstetrics & gynaecology cases) or
National University Hospital (Department of Laboratory Medicine for paediatric, obstetrics & gynaecology cases) *(minimum of 3 months)*

Elective rotations
1. National Public Health Laboratory (NPHL)
2. Tuberculosis Control Unit
3. Department of Sexually Transmitted Infections Control (DSC) Clinic

Continuity Plan: Rotations should be delayed in the event of a protracted outbreak whereby face-to-face on-site meeting is disallowed and cross institution movement is restricted, where possible.

Learning Methods and Approaches: Scholarly / Teaching Activities

Residents must complete a major project and a minor project.

1.	*Major Project (required by Royal College of Pathologists of Australasia, RCPA)*	*The major project is a significant piece of laboratory-based research work related to the pathogenesis, antimicrobial therapy or diagnosis of infectious diseases. The resident must personally have done at least 80% of the bench work, either supervised or unsupervised, during accredited training and must generate as well as analyse the data. The project should demonstrate the resident's ability to plan, perform and present the results of a scientific investigation in medical microbiology.* *The Major project is a component of the FRCPA Part II examination. A pass in the Part II examination will be delayed until the project has been graded as satisfactory.* *Please see Appendix 7, page 58. Major project proposal and project guidelines. Microbiology Trainee Handbook 2024. Dec 2023 RCPA*
2.	*Minor Project (Required by RCPA)*	*The minor project should demonstrate the resident's understanding of laboratory practice.* *The Minor project is a component of the FRCPA Part II examination. A pass in the Part II examination will be delayed until the project has been graded as satisfactory.* *Please see Appendix 8, page 62. Minor project guidelines. Microbiology Trainee Handbook 2024. Dec 2023 RCPA*

Please refer to embedded document for the Microbiology Trainee Handbook 2024:

Microbiology Trainee Handbook 2

Learning Methods and Approaches: Documentation of Learning

Residents must complete and log the following entrustment-based discussion (EbD), case-based discussions (CbD), directly observed procedures (DOPS) and sign-off forms for different activities such as participation in laboratory quality, audit and infection control.

EPA 1, 4, 5. EbD after each CbD	
EPA 1: Authorising laboratory results	3 CbD + 3 EbD / year
EPA 4: Providing consultations related to patient management	3 CbD + 3 EbD/ year
EPA 5: Providing advice on infection control and management of antimicrobial use	1 CbD + 1 EbD/year
EPA 2, 3. Participation in audits/investigation and EbD after each task	
EPA 2: Assisting the implementation of quality management systems	2 EbD by the end of 5 years: Trainees to observe 1 and lead or prepare the lab for 1 laboratory audit
EPA 3 Assisting the implementation of laboratory safety management systems	2 EbD by the end of 5 years **Either:** 2 safety audits to be done: To observe 1 and to lead or prepare the audit for 1 Or 2 lab safety manual reviews Or Risk assessments done Or 2 investigations of laboratory safety incidents

Summative Assessments

	Summative assessments	
	Clinical, patient-facing, psychomotor skills etc.	Cognitive, written etc.
R5	FRCPA Part II Major and Minor projects **6 monthly JCC summative EPA assessment**	FRCPA Part II Oral Examination FRCPA Part II Portfolio of learning activities **6 monthly JCC summative EPA assessment**
R4	Residents re-attempt FRCPA Part I if unsuccessful in R3 **6 monthly JCC summative EPA assessment**	
R3	FRCPA Part I Phase 1 Wet Practical Examination **6 monthly JCC summative EPA assessment**	FRCPA Part I Phase 1 written examination FRCPA Part I Phase 2 Oral examination ***Progression to R4 depends on satisfactory EPA scores***
R2	**6 monthly JCC summative EPA assessment**	**6 monthly JCC summative EPA assessment**
R1	 **6 monthly JCC summative EPA assessment**	FRCPA Basic Pathological Sciences (BPS) Examination **6 monthly JCC summative EPA assessment**

S/N	**Learning outcomes**	**Summative assessment components**			
		Component a: BPS	Component b: FRCPA Part I Phase 1	Component c: FRCPA Part I Phase 2	Component d: FRCPA Part II
1	EPA 1: Authorising laboratory results	✓	✓	✓	✓
2	EPA 2: Assisting the implementation of a quality management system			✓	✓
3	EPA 3: Assisting the implementation of a laboratory safety management system			✓	✓
4	EPA 4: Providing consultations related to patient management	✓		✓	✓
5	EPA 5: Providing advice on infection control and management of antimicrobial use	✓		✓	✓

6	Other learning outcome: Teaching and supervising technologists, nurses and other healthcare workers including doctors	✓	✓	✓	✓

Please refer to embedded document for specific assessment modalities of FRCPA examination against learning outcomes:

Mapping of FRCPA Suite of Assessment.p