OBJECTIVES OF TRAINING IN MEDICAL MICROBIOLOGY

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(Please see also the “Policies and Procedures” booklet.)

DEFINITION

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

1. Scientific and administrative direction of a clinical microbiology laboratory.
2. Creation and direction of a hospital infection control program.
4. Public health and communicable disease epidemiology and prevention.

GENERAL OBJECTIVES

In addition to these activities, Medical Microbiologists are often responsible for teaching undergraduate and postgraduate medical students, students in other health care disciplines, postgraduate science students and other residents. They also provide continuing education to medical and other health care professionals. Many are involved in medical research and in the supervision of research projects of graduate students.

Medical Microbiology training should provide residents with knowledge, which is current. Medical Microbiology residents should be prepared to conduct their practices in an ethical and cost effective manner. Emphasis is placed on effective communication in partnership with laboratory technologists, physicians and other health care providers, patients, and the community.

Residents must demonstrate the knowledge, skills, and attitudes relating to gender, culture, and ethnicity pertinent to medical microbiology. In addition, residents must demonstrate an ability to incorporate gender, cultural and ethnic perspectives in research methodology presentation and analysis.

On completion of the residency program, the resident MUST be competent to function as a consultant in Medical Microbiology.
SPECIFIC OBJECTIVES

At the completion of training, the resident will have acquired the following competencies and will function effectively as a:

**Medical Expert/Clinical Decision-Maker**

Specialists possess a defined body of knowledge and procedural skills which are used to collect and interpret data, make appropriate clinical decisions, and carry out diagnostic and therapeutic procedures within the boundaries of their discipline and expertise. Their care is characterized by up-to-date, ethical, and cost-effective clinical practice and effective communication in partnership with patients, other health care providers, and the community. The role of medical expert/clinical decision-maker is central to the function of specialist physicians, and draws on the competencies included in the roles of scholar, communicator, health advocate, manager, collaborator, and professional.

**General Requirements:**
1. Demonstrate diagnostic and therapeutic skills for ethical and effective patient care.
2. Access and apply relevant information to clinical practice.
3. Demonstrate effective consultation services with respect to patient care, education and legal opinions.

**Specific Requirements:**
1. The resident should demonstrate a thorough understanding of the laboratory practice of microbiology, with respect to:
   1.1. The nature of infecting organisms, the pathogenesis of infectious diseases, diagnostics and treatment.
   1.2. The clinical features of infectious diseases.
   1.3. The epidemiology of infectious diseases and the strategies which may be applied to their prevention, including public health aspects of infectious diseases.
   1.4. Anti-infective agents, their mechanisms of action, spectra of activity, pharmacokinetics and pharmacodynamics, adverse affects and their role in the treatment of infectious diseases as well as hospital wide policies regarding drug utilization.
   1.5. The principles and practice of an effective infection prevention and control program, including:
      1.5.1. the elements and reporting relationships of a program
      1.5.2. surveillance methods for detecting community acquired infections when a patient is admitted to the hospital
      1.5.3. surveillance methods for detecting hospital acquired infections
      1.5.4. detection, investigation and control of outbreaks of infection
      1.5.5. policies and procedures for prevention and control of infection, including:
         1.5.5.1. routine patient care practices to prevent infection
         1.5.5.2. application of additional precautions when indicated for suspect or diagnosed infection
         1.5.5.3. occupational health aspects of infection prevention & control
      1.5.6. Program Evaluation
2. Clinical Practice of Microbiology

Clinical Examination: In addition to responsibilities as laboratory physicians, Medical Microbiologists are also expected to possess knowledge, skills and attitudes required to assess and manage patients with infectious diseases. The resident should be able to obtain and record a complete history and physical examination, including:

2.1. Identifying and documenting the reasons that medical help is being sought (chief complaint).
2.2. Identifying and documenting the important symptoms, in sufficient detail, to present a clear picture of the clinical problem(s). (History of present illness)
2.3. Identifying and documenting all other important information from the past history, medications, allergies, review of systems, family history, social history, and travel history.
2.4. Conducting 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.

3. In terms of problem solving and decision making, the resident should be able to:

3.1. Demonstrate the ability to correlate, evaluate, prioritize and synthesize information, including the relevant ethical issues acquired by history taking and physical examination. The resident should recognize and define problems and generate a differential diagnosis and problem list.
3.2. Demonstrate effective communication in presenting assessments and recommendations in both verbal and written form.
3.3. 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.

4. Technical Skills

4.1. The resident should 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.
4.2. The resident should be able to assess specimens as to their appropriateness and the extent and nature of testing, including:

4.2.1. the performance and interpretation of microbiology testing within the clinical laboratory, including public health and other reference laboratories.
4.2.2. the performance of molecular methods applied to the detection of micro-organisms and their virulence factors and to determine the epidemiologic links between isolates.
4.2.3. the performance of all relevant microscopy, including but not limited to light, fluorescent and electron microscopy.
4.2.4. the performance of quality control/assurance testing of media, reagents, laboratory instrumentation and other materials used in microbiology laboratory.
4.2.5. the utilization of laboratory information systems for result reporting, storage, retrieval and analysis.
4.2.6. the role of the public health laboratory in the microbiology laboratory system
Communicator

A Medical Microbiologist must establish effective relationships with patients, laboratory technologists and other health care professionals. Communications skills are essential for the effective functioning of a Medical Microbiologist and are necessary for obtaining information from, and conveying information to patients and their families and to other members of the health care team. Residents should give close attention to the impact of ethnocultural background, social support and emotional influences on patients' illnesses. The resident must be able to demonstrate the ability to:

General Requirements:
1. Establish therapeutic relationships with patients/families.
2. Listen effectively.
3. Obtain and synthesize relevant history from patients/families/communities.
4. Explore the patient’s beliefs, concerns and expectations about their illness taking into consideration age, gender, ethnic, cultural and socio-economic background and spiritual values.

Specific Requirements:
The resident should be able to:
1. communicate effectively and discuss appropriate information with laboratory technologists, patients and their families, physicians and other members of the health care team.
2. listen effectively and obtain synthesized relevant history from patients and families.
3. educate laboratory technologists and other health care professionals in formal and informal health educational settings.
4. present problems clearly and concisely and correctly in both verbal and written reports.
5. respect individual patients, families, colleagues and other health care workers for their value systems, which may be different from the resident's own values.

Collaborator

Medical Microbiologists direct the activity of laboratory technologists, and are in partnership with others who are appropriately involved in patient care. Therefore, it is essential, that Medical Microbiologists collaborate effectively with other members of the health care team and with the patients and their families to provide optimal patient care, education, and research.

General Requirements:
1. Consult effectively with other physicians and health care professionals.
2. Contribute effectively to other interdisciplinary team activities.

Specific Requirements:
The resident should be to:
1. establish and maintain cooperative interpersonal relationships with a multidisciplinary team and with patients and their families.
2. contribute effectively to other interdisciplinary team activities.
Manager

Medical Microbiologists function as managers and make day-to-day decisions involving human and financial resources, co-workers, and use policies to direct decisions. Medical Microbiologists must demonstrate the ability to prioritize and to effectively direct staff through team work and make systematic decisions when allocating finite health care resources. Microbiologists take leadership positions within the context of their professional organization and within the broader Canadian health care community.

General Requirements:
1. Utilize resources effectively to balance patient care, learning needs, and outside activities.
2. Allocate finite health care resources wisely.
3. Work effectively and efficiently in a health care organization.
4. Utilize information technology to optimize patient care, and other laboratory activities.

Specific Requirements:
The resident should be able to:

1. describe basic personnel/ labour issues as applied to a diagnostic laboratory.
2. 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).
3. discuss the advantages, disadvantages, and relative costs of providing diagnostic services in different settings, including academic and non academic hospitals and private laboratories.
4. 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.
5. discuss methods of avoiding unnecessary investigation and hospitalization of patients.
6. discuss budget planning and allocation of resources in a diagnostic microbiology laboratory.
7. discuss the definitions and role of audits, quality management, risk management, incident reporting, and complaint management.
8. describe the systems of internal and external proficiency testing programs and of laboratory accreditation programs.
9. describe laboratory biosafety requirements.
10. 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.
11. appreciate the need to continually balance professional, institutional, and societal commitments.
12. consider alternate methods of service delivery.
13. describe the societal and governmental aspects of health care provision.

Health Advocate

Medical Microbiologists recognize the importance of advocacy activities relating to challenges in today's health care system. Health advocacy is appropriately expressed, both by the individual and collective responses of microbiologists in influencing public health and policy.

General Requirements:
1. Identify the important determinants of health affecting patients.
2. Contribute effectively to improved health of patients and communities.
3. Recognize and respond to those issues where advocacy is appropriate.
Specific Requirements:
The resident should demonstrate understanding of:

1. the determinants of health as these relate to the burden of illness from infectious diseases,
2. 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
3. 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),
4. 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)
5. the issues and opportunities to reduce morbidity and mortality from infectious diseases in the community and institutions.

Scholar

Medical Microbiologists are engaged in a life long pursuit of mastery of their specialty. They recognize the need for continuous learning. Through their scholarly activities, they contribute to appraisal, collection, and understanding of health care knowledge and facilitate the education of their technologists, students, house staff, patients, and other health care professionals.

General Requirements:
1. Develop, implement and monitor a personal continuing education strategy.
2. Learn to critically appraise sources of medical information.
3. Facilitate learning of patients, house staff/students and other health professionals.
4. Contribute to development of new knowledge.

Specific Requirements:
1. Recognize the importance of self assessment of professional competence and acceptance of responsibility for self directed learning as a life long goal. Learning should incorporate clinical appraisal and evaluation of medical and other relevant literature.
2. Maintain a questioning and inquisitive attitude towards medical information and an appreciation of the necessity of ongoing research to develop new knowledge.
   2.1. Demonstrate the ability to conduct independent or collaborative research.
   2.2. Pose a medical microbiology research question
   2.3. Develop a proposal to solve the research question:
      2.3.1. conduct an appropriate literature search based on the research question
      2.3.2. propose a methodological approach to solve the question
   2.4. Carry out the research outlined in the proposal
   2.5. Report and defend the results of the research
   2.6. Identify areas for further research that flow from the results
3. Facilitate the education of technologists, patients, students and other health care professionals and contribute to the development of new knowledge.
4. Demonstrate the ability to utilize information technology to optimize patient care, for ongoing medical education and other activities.

**Professional**

Microbiologists have a unique role in improving the quality of diagnostic services provided to patients with suspect infection, and in the treatment and the prevention of infections. Microbiologists are committed to the highest standards of excellence in clinical care and ethical conduct.

**General Requirements:**
1. Deliver highest quality care with integrity, honesty and compassion.
2. Exhibit appropriate personal and interpersonal professional behaviours.
3. Practise medicine ethically consistent with obligations of a physician.

**Specific Requirements:**
The resident should be able to:

1. 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.
2. describe ethical decision making processes.
3. discuss the legal and ethical codes of professional behaviour and the obligations of the physician that apply to microbiology, including issues relating to the notification of communicable diseases.
4. demonstrate trustworthiness (honesty, confidentiality) with respect to technologists, patients, and other health care providers.
5. recognize the personal limitations and a willingness to call upon others for their expertise.
6. demonstrate a willingness to accept peer and supervisor review of professional competence.
7. appreciate moral ethical implications of various forms of patient care and research.

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