

This document applies to those who begin training on or after July 1, 2018.

DEFINITION

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

1. Scientific development, and administrative and clinical direction of a microbiology laboratory;
2. Clinical consultations, in both inpatient and outpatient settings, on the investigation, diagnosis, treatment, and prevention of infectious diseases;
3. Infection prevention and control;
4. Antibiotic stewardship; and
5. The epidemiology of communicable diseases.

GOALS

Upon completion of training, a resident is expected to be a competent specialist in Medical Microbiology, capable of assuming a consultant's role in the specialty. The resident must acquire a working knowledge of the theoretical basis of the specialty, including its foundations in the basic medical sciences and research, and be competent in clinical medicine. Residents must develop skills to be lifelong learners, be able to effectively teach others, and be capable of research in their field of interest.

Emphasis is placed on effective communication in partnership with laboratory technologists, other physicians and health care providers, patients, and the other end-users of laboratory services.

Residents must demonstrate the requisite knowledge, skills, and behaviours for effective patient-centred care and service to diverse populations. In all aspects of specialist practice, the graduate must be able to address ethical issues and issues of gender, sexual orientation, age, culture, ethnicity, and beliefs in a professional manner.

MEDICAL MICROBIOLOGY COMPETENCIES

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

Medical Expert

Definition:

As *Medical Experts*, Medical Microbiologists integrate all of the CanMEDS Roles, applying medical knowledge, clinical skills, and professional values in their provision of high-quality and safe patient-centred care. *Medical Expert* is the central physician Role in the CanMEDS framework and defines the physician's clinical scope of practice.

Key and Enabling Competencies: Medical Microbiologists are able to...

1. Practise medicine within their defined scope of practice and expertise

- 1.1. Demonstrate a commitment to high quality care of their patients
- 1.2. Integrate the CanMEDS Intrinsic Roles into their practice of medicine
- 1.3. Apply knowledge of the clinical and biomedical sciences relevant to Medical Microbiology
 - 1.3.1. Principles and practice of laboratory Medical Microbiology, including
 - 1.3.1.1. Taxonomy, epidemiology, life cycle and pathology, and the principles of laboratory identification and speciation of clinically relevant and other important microorganisms
 - 1.3.1.2. Laboratory diagnostic tools, including the principles, use, evaluation, implementation, and clinical interpretation of new tests, methods, and new technology; and their application in organisms clinically relevant to medical microbiology, including:
 - 1.3.1.2.1. Microscopy, including principles of staining
 - 1.3.1.2.2. Rapid diagnostic tests, including point of care testing
 - 1.3.1.2.3. Common laboratory culture media and techniques
 - 1.3.1.2.4. Identification methods, including biochemical and nonbiochemical tests
 - 1.3.1.2.5. Susceptibility testing methods
 - 1.3.1.2.6. Laboratory automation systems and analysers
 - 1.3.1.2.7. Molecular technology
 - 1.3.1.2.8. Serology
 - 1.3.1.2.9. Histology and immunochemistry
 - 1.3.1.2.10. Electron microscopy
 - 1.3.1.3. Elements of pre-analytic, analytic, and post-analytic testing

OBJECTIVES OF TRAINING IN MEDICAL MICROBIOLOGY (2018)

- 1.3.1.4. Diagnostic test performance and test accuracy, precision, sensitivity, specificity, and positive and negative predictive values
 - 1.3.1.5. Principles and applications of biosafety and biosecurity for different biocontainment levels
 - 1.3.1.6. Regulatory requirements for the Transportation of Dangerous Goods (TDG) for specimens and isolates
 - 1.3.1.7. Components of laboratory safety, including Workplace Hazardous Materials Information System (WHMIS)
 - 1.3.1.8. Utilization of laboratory and other information systems for instrument interfaces; result reporting, storage, retrieval, and analysis; and security of personal information
- 1.3.2. Principles and practice of an effective laboratory quality management system including:
- 1.3.2.1. Structure of a quality management team and the components of an effective quality management system
 - 1.3.2.2. Regulatory and accreditation requirements including competency testing and internal and external proficiency testing
 - 1.3.2.3. Verification and validation of diagnostic systems, reagents, and media
 - 1.3.2.4. Selection, measurement, and monitoring of appropriate quality indicators
 - 1.3.2.5. Occurrence reporting and discordant result analysis
- 1.3.3. Clinical infectious disease practice
- 1.3.3.1. The nature, pathogenesis, and virulence factors of infecting microorganisms and host susceptibility and responses to infection (innate and adaptive), including infections in the following populations:
 - 1.3.3.1.1. Immune-compromised patients
 - 1.3.3.1.2. HIV-infected patients
 - 1.3.3.1.3. Pregnant patients
 - 1.3.3.1.4. Neonatal and pediatric patients
 - 1.3.3.1.5. Post-operative, ICU, and burn patients
 - 1.3.3.1.6. Immigrants, refugees, and travelers
 - 1.3.3.1.7. Hospitalized and non-hospitalized patients
 - 1.3.3.2. Clinical features of infectious diseases in all organ systems and syndromes
 - 1.3.3.3. Pharmacologic and non-pharmacologic prevention, treatment, and management of infectious diseases

OBJECTIVES OF TRAINING IN MEDICAL MICROBIOLOGY (2018)

- 1.3.3.4. Anti-infective agents, their mechanisms of action and organism resistance, spectra of activity, pharmacokinetics and pharmacodynamics, adverse effects, and their role in the treatment of infectious diseases
 - 1.3.3.5. Benefits and risks associated with vaccines
 - 1.3.3.6. Vaccine schedules and administration routes of vaccinations
 - 1.3.4. Principles, practice, and implementation of an antimicrobial stewardship program in all health care settings
 - 1.3.4.1. Key elements of an antimicrobial stewardship program
 - 1.3.4.2. Selective pressure and risks of development and spread of resistance
 - 1.3.5. Principles, practice, implementation, and components of an Infection Prevention and Control (IPAC) program, including:
 - 1.3.5.1. Elements and reporting relationships of IPAC
 - 1.3.5.1.1. Occupational health and safety and public health aspects of IPAC
 - 1.3.5.2. Legislation and regulatory requirements for IPAC
 - 1.3.5.3. Detection, investigation, and control of outbreaks; emerging infectious diseases; and pandemic preparedness in the institutional setting
 - 1.3.5.4. Approaches to policies and procedures for prevention and control of infection
 - 1.3.5.5. Strategies to prevent and manage blood and body fluid exposures
 - 1.3.6. Elements of public health microbiology related to the detection, investigation and control of outbreaks; emerging infectious diseases; and pandemic preparedness in the community setting
 - 1.4. Perform appropriately timed clinical assessments with recommendations that are presented in an organized manner
 - 1.5. Carry out professional duties in the face of multiple competing demands
 - 1.6. Recognize and respond to the complexity, uncertainty, and ambiguity inherent in medical practice
- 2. Perform a patient-centred clinical assessment and establish a management plan**
- 2.1. Prioritize issues to be assessed in a patient encounter

- 2.2. Elicit a history, perform a physical exam, select appropriate investigations, and interpret their results for the purposes of diagnosis and management, disease prevention, and health promotion
 - 2.2.1. Generate an infectious and non-infectious differential diagnosis
 - 2.2.2. Apply appropriate infection control practices during patient interaction
 - 2.3. Establish goals of care in collaboration with patients and their families, which may include slowing disease progression, treating symptoms, achieving cure, improving function, and palliation
 - 2.4. Establish a patient-centred management plan
 - 2.4.1. Guide physicians and other end users on appropriate test ordering, specimen collection, and the interpretation of laboratory results
 - 2.4.2. Provide advice on appropriate utilization of antimicrobial agents
- 3. Plan and perform diagnostic tests and therapies for the purposes of assessment and/or management**
- 3.1. Determine the most appropriate diagnostic tests or therapies
 - 3.2. Obtain and document informed consent explaining the risks and benefits of, and the rationale for, a proposed diagnostic test or therapy
 - 3.3. Prioritize diagnostic tests or therapies, taking into account clinical urgency and available resources
 - 3.4. Perform diagnostic tests in a skilful and safe manner, adapting to unanticipated findings or changing clinical circumstances
 - 3.4.1. Perform and interpret microbiological tests
 - 3.4.1.1. Microscopy and staining
 - 3.4.1.2. Use common laboratory culture media, including planting, interpretation, and other related techniques
 - 3.4.1.3. Biochemical-based and non-biochemical based organism identification methods
 - 3.4.1.4. Antimicrobial susceptibility methods
 - 3.4.1.5. Molecular diagnostics
 - 3.4.1.6. Rapid diagnostic tests, including point of care tests
 - 3.4.2. Perform and interpret quality control/assurance testing of media, reagents, laboratory instrumentation and other materials used in the microbiology laboratory
 - 3.4.3. Document and disseminate information related to diagnostic tests performed and their outcomes

4. Establish plans for ongoing care and, when appropriate, timely consultation

- 4.1. Implement a patient-centred care plan that supports ongoing care, followup on investigations, response to treatment, and further consultation
 - 4.1.1. Demonstrate insight into one's own limits of expertise
 - 4.1.2. Demonstrate effective, appropriate, and timely consultation of other health professionals as needed for optimal patient care
 - 4.1.3. Ensure adequate follow-up is arranged for diagnostic tests performed
 - 4.1.4. Arrange appropriate follow-up care services for a patient and their family¹

5. Actively contribute, as an individual and as a member of a team providing care, to the continuous improvement of health care quality and patient safety

- 5.1. Recognize and respond to harm from health care delivery, including patient safety incidents
- 5.2. Adopt strategies that promote patient safety and address human and system factors
 - 5.2.1. Implement and monitor procedures which ensure patient and laboratory staff safety at all times

Communicator

As *Communicators*, Medical Microbiologists form relationships with patients and their families that facilitate the gathering and sharing of essential information for effective health care.

Key and Enabling Competencies: Medical Microbiologists are able to...

1. Establish professional therapeutic relationships with patients and their families

- 1.1. Communicate using a patient-centred approach that encourages patient trust and autonomy and is characterized by empathy, respect, and compassion
 - 1.1.1. Demonstrate good communication skills as a medical microbiologist to foster quality care, patient satisfaction, adherence to an agreed plan of care, and improved clinical outcomes
 - 1.1.2. Establish positive therapeutic relationships with patients and their families that are characterized by understanding, trust, respect, honesty, and empathy
 - 1.1.3. Respect patient autonomy, privacy, and confidentiality

¹ Throughout this document, references to the patient's family are intended to include all those who are personally significant to the patient and are concerned with his or her care, including, according to the patient's circumstances, family members, partners, caregivers, legal guardians, and substitute decision-makers.

- 1.2. Optimize the physical environment for patient comfort, dignity, privacy, engagement, and safety
 - 1.2.1. Ensure that patient interactions are conducted in an atmosphere of comfort, dignity, and privacy
 - 1.3. Recognize when the perspectives, values, or biases of patients, physicians, technologists, or other health care professionals may have an impact on the quality of care, and modify the approach to the patient accordingly
 - 1.3.1. Elicit and respond appropriately to a patient's beliefs, concerns, expectations, and illness experience
 - 1.3.2. Respect diversity and difference, including the impact of gender and sexual orientation, religion, and cultural beliefs on decision-making
 - 1.4. Respond to a patient's non-verbal behaviours to enhance communication
 - 1.5. Manage disagreements and emotionally charged conversations
 - 1.5.1. Address challenging communication issues, such as delivering bad news, and addressing conflict
 - 1.6. Adapt to the unique needs and preferences of each patient and to his or her clinical condition and circumstances
- 2. Elicit and synthesize accurate and relevant information, incorporating the perspectives of patients and their families**
- 2.1. Listen effectively
 - 2.2. Use patient-centred interviewing skills to effectively gather relevant biomedical and psychosocial information
 - 2.2.1. Identify and explore problems to be addressed from a patient encounter, including the patient's context, concerns, and preferences and their risk factors for infectious disease
 - 2.3. Provide a clear structure for and manage the flow of an entire patient encounter
 - 2.3.1. Ensure the patient understands that the clinical encounter includes a directed history, physical and the development of a management plan
 - 2.4. Seek and synthesize relevant information from other sources, including the patient's family, with the patient's consent

3. Share health care information and plans with patients and their families

- 3.1. Share information and explanations that are clear, accurate, and timely, while checking for patient and family understanding
 - 3.1.1. Deliver information to a patient and family in a way that it is understandable and empathetic, and encourages discussion, questions, and participation in decision-making
 - 3.1.2. Assist patients in their understanding of laboratory findings
 - 3.1.3. Provide clear instructions for collection of specimens to optimize specimen quality
 - 3.1.4. Convey significant results in a timely and clear manner to patients when appropriate
- 3.2. Disclose harmful patient safety incidents to patients and their families accurately and appropriately
 - 3.2.1. Identify the circumstances where patient notification is required
 - 3.2.2. Demonstrate an understanding of the principles of patient disclosure
 - 3.2.3. Demonstrate skills necessary for disclosure and successful resolution of unanticipated medical outcomes and events, including ethical, psychological, and legal aspects, and the impact on resources
 - 3.2.4. Provide a clear honest explanation which is understandable to the patient and formulate an appropriate plan

4. Engage patients and their families in developing plans that reflect the patient's health care needs and goals

- 4.1. Facilitate discussions with patients and their families in a way that is respectful, non-judgmental, and culturally safe
- 4.2. Assist patients and their families to identify, access, and make use of information and communication technologies to support their care and manage their health
- 4.3. Use communication skills and strategies that help patients and their families make informed decisions regarding their health

5. Document and share written and electronic information about the medical encounter to optimize patient safety, confidentiality, and privacy

- 5.1. Document clinical encounters in an accurate, complete, timely, and accessible manner, in compliance with regulatory and legal requirements
 - 5.1.1. Maintain timely, clear, concise, accurate, and appropriate records of clinical encounters and plans
 - 5.1.2. Ensure that microbiology reports are timely, relevant, clear, and concise and follow a standardized format and approved guidelines

- 5.2. Communicate effectively using a written health record, electronic medical record, or other digital technology
- 5.3. Share information with patients and others in a manner that respects patient privacy and confidentiality and enhances understanding

Collaborator

Definition:

As *Collaborators*, Medical Microbiologists work effectively with other health care professionals to provide safe, high quality, patient-centred care. This collaboration is critical to providing optimal microbiology diagnostic services and patient care.

Key and Enabling Competencies: Medical Microbiologists are able to...

1. Work effectively with physicians and other colleagues in the health care professions

- 1.1. Establish and maintain positive relationships with physicians and other colleagues in the health care professions to support relationship-centred collaborative care
 - 1.1.1. Develop a network of colleagues and resources to facilitate decision making
 - 1.1.2. Enter into cooperative relationships with other professionals for the provision of quality patient care
- 1.2. Negotiate overlapping and shared responsibilities with physicians and other colleagues in the health care professions in episodic and ongoing care
 - 1.2.1. Describe the medical microbiologist's roles and responsibilities to other professions
 - 1.2.2. Describe the roles and responsibilities of laboratory technologists, infection prevention and control practitioners, public health officials, and other professionals within the health care team
 - 1.2.3. Recognize and respect the diversity of roles, responsibilities, and competencies of other professionals and organizations in relation to their own and delegate appropriately
- 1.3. Engage in respectful shared decision-making with physicians and other colleagues in the health care professions
 - 1.3.1. Work with others to assess, plan, implement, complete, and review tasks related to microbiology laboratory diagnostic testing, patient care infection prevention and control, antimicrobial stewardship, research, educational work, program review, and administration
 - 1.3.2. Identify and explore concerns from health care providers and provide follow-up to ensure that the laboratory is meeting client needs and optimally benefiting patient care

- 1.3.3. Provide clinical and laboratory advice on management of patient cases or issues related to population health
- 1.3.4. Participate in interprofessional team meetings and jointly address tasks, where applicable

2. Work with physicians and other colleagues in the health care professions to promote understanding, manage differences and resolve conflicts

- 2.1. Show respect toward collaborators
- 2.2. Implement strategies to promote understanding, manage differences, and resolve conflicts in a manner that supports a collaborative culture
 - 2.2.1. Work with other professionals to prevent or resolve conflicts
 - 2.2.2. Respect differences and be situationally aware of team dynamics
 - 2.2.3. Recognize one's own differences, misunderstanding, and limitations that may contribute to interprofessional tension

3. Hand over the care of a patient to another health care professional to facilitate continuity of safe patient care

- 3.1. Determine when care should be transferred to another physician or health care professional
- 3.2. Demonstrate safe handover of care, using both verbal and written communication, during a patient transition to a different health care professional, setting, or stage of care

Leader

Definition:

As *Leaders*, Medical Microbiologists engage with others to contribute to a vision of a high-quality health care system and take responsibility for the delivery of excellent patient care through their activities as clinicians, administrators, scholars, or teachers.

Key Competency: Medical Microbiologists are able to:

1. Contribute to the improvement of health care delivery in teams, organizations, and systems

- 1.1. Apply the science of quality improvement to contribute to improving systems of patient care
 - 1.1.1. Identify opportunities for improvement based on a continuous quality improvement initiative
 - 1.1.2. Identify patient safety quality indicators in microbiology
 - 1.1.3. Describe an approach to corrective action when errors are identified

- 1.1.4. Perform and interpret quality control/assurance testing of media, reagents, laboratory instrumentation, and other materials used in a microbiology laboratory
- 1.1.5. Describe assessment, accreditation, and audit processes as applied to microbiology
- 1.1.6. Provide guidance on how to establish and sustain a quality management system in a microbiology laboratory
- 1.1.7. Recognize the importance of an error reporting/risk management policy and promote its advancement
- 1.1.8. Define and describe an occurrence management process; root cause analysis; and preventive, remedial, and corrective actions as tools to ensure patient and staff safety
- 1.1.9. Advocate for methodologies, technologies, and strategies that maximize patient and staff safety and reduce possibility of errors or adverse effects

- 1.2. Contribute to a culture that promotes patient safety
 - 1.2.1. Provide guidance on adherence to the legislative regulations relevant to the microbiology and/or any clinical laboratory
 - 1.2.2. Develop infection prevention and control policies that improve patient safety
 - 1.2.3. Develop antimicrobial stewardship policies that improve patient safety

- 1.3. Analyze patient safety incidents to enhance systems of care
 - 1.3.1. Follow-up on patient safety issues to address root causes and prevent recurrence

- 1.4. Use health informatics to improve the quality of patient care and optimize patient safety
 - 1.4.1. Demonstrate an understanding of the principles of extraction of information from the laboratory information system to generate cumulative susceptibility testing data
 - 1.4.2. Demonstrate an understanding of how laboratory information systems contribute to big data analyses of health care systems processes

2. Engage in stewardship of health care resources

- 2.1. Allocate health care resources for optimal patient care
 - 2.1.1. Contribute to the development of microbiology testing algorithms and gatekeeping strategies
 - 2.1.2. Identify opportunities for antimicrobial stewardship
 - 2.1.3. Apply evidence based laboratory best practices to microbiology utilization

- 2.1.4. Follow evidence based microbiology and infectious disease practices for patients and communities
- 2.1.5. Justify introduction of new technology on the basis of improving patient care
- 2.2. Apply evidence and management processes to achieve cost-appropriate care
 - 2.2.1. Describe the principles of process improvement tools, such as Lean Six Sigma, and PDSA
 - 2.2.2. Apply strategies to improve processes in microbiology or in the delivery of infectious disease consultation

3. Demonstrate leadership in health care systems

- 3.1. Demonstrate leadership skills to enhance health care
 - 3.1.1. Describe the structure and function of the health care system as it relates to laboratory medicine and Medical Microbiology, including the role and structure of community and hospital based clinical microbiology laboratories, provincial/public health microbiology laboratories, and reference microbiology laboratories
 - 3.1.2. Communicate effectively with laboratory staff by actively listening to their concerns, and eliciting relevant information and by providing recommendations that are clear and concise and include evidence for decisions, where possible
 - 3.1.3. Participate in a medically-relevant committee in a meaningful way
- 3.2. Facilitate change in health care to enhance services and outcomes

4. Manage career planning, finances, and health human resources in personal practice(s)

- 4.1. Set priorities and manage time to integrate practice and personal life
 - 4.1.1. Describe and prioritize the many roles that are encountered in practice and in personal life
- 4.2. Manage personal professional practice(s) and career
 - 4.2.1. Engage with mentors to discuss career and practice advancement
- 4.3. Implement processes to ensure personal practice improvement
 - 4.3.1. Describe possible mechanisms or tools and metrics to ensure practice improvement

Health Advocate

Definition:

As *Health Advocates*, Medical Microbiologists contribute their expertise and influence as they work with communities or patient populations to improve health. They work with those they serve to determine and understand needs, speak on behalf of others when required, and support the mobilization of resources to effect change.

Key and Enabling Competencies: Medical Microbiologists are able to...

1. Respond to an individual patient's health needs by advocating with the patient within and beyond the clinical environment

- 1.1. Work with patients to address determinants of health that affect them and their access to needed health services or resources
 - 1.1.1. Describe the determinants of health, including psychological, biological, social, cultural, environmental, educational, and economical, as well as barriers to access to care and resources at the level of the individual patient
 - 1.1.2. Identify the health needs of an individual patient, including appropriate and timely access to: laboratory services, antimicrobial therapies, safe housing or work environment, outpatient IV antibiotic therapy, vaccines, and other relevant issues
 - 1.1.3. Advocate for addressing identified needs and mobilize available resources, working in partnership with the patient and family
 - 1.1.4. Address patient and family safety concerns that affect their access to testing
 - 1.2. Work with patients and their families to increase opportunities to adopt healthy behaviours
 - 1.2.1. Identify opportunities for advocacy, health promotion, and disease prevention in partnership with individuals to whom they provide care, their families, or personal support networks
 - 1.2.2. Work with patients to increase their health system literacy and raise awareness of important health issues
 - 1.2.3. Mobilize available resources (financial, material, or human) to support and encourage individual healthy behaviours
 - 1.3. Incorporate disease prevention, health promotion, and health surveillance into interactions with individual patients
 - 1.3.1. Advocate for vaccination against communicable infections
 - 1.3.2. Advocate for appropriate test selection and equitable access to laboratory services
 - 1.3.3. Recognize cases of child/spousal abuse and sexual violence, and respond appropriately
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2. Respond to the needs of the communities or populations they serve by advocating with them for system-level change in a socially accountable manner

- 2.1. Work with a community or population to identify the determinants of health that affect them
 - 2.1.1. Identify the determinants of health of the population as well as opportunities for advocacy, including barriers to access to care and resources, as they relate to the burden of illness from infectious diseases
 - 2.1.2. Identify vulnerable or marginalized populations within those served and respond appropriately
 - 2.1.3. Demonstrate an understanding of the patient groups at risk for particular infectious diseases in order to target primary and secondary prevention strategies, including HIV, sexually transmitted infections, tuberculosis, and vaccine preventable diseases, and infections in intravenous drug users
 - 2.1.4. Identify opportunities to advocate for antimicrobial stewardship and appropriate infection control, reporting of communicable diseases, and management of outbreaks, health education, and public safety
 - 2.1.5. Describe an approach to implementing a change in a determinant of health of the populations they serve, as they relate to infectious diseases
 - 2.1.6. Respond appropriately to service demands of hospitals and communities, including the need for screening, detection and control of infectious diseases, and outbreak investigation and management
 - 2.1.7. Recognize and respond to situations where health advocacy driven resources are needed to improve hospital or community health care, such as new or improved methodology or equipment, and new policies or procedures
 - 2.1.8. Demonstrate an understanding of the role of public health and social services in the prevention and management of particular infectious diseases, including HIV, sexually transmitted infections, tuberculosis, and vaccine preventable diseases
 - 2.1.9. Demonstrate understanding of ongoing health surveillance and trend analysis for early identification and prevention of communicable diseases outbreaks and the ability to apply epidemiological analysis for advocacy purposes
- 2.2. Improve clinical practice by applying a process of continuous quality improvement to disease prevention, health promotion, and health surveillance activities
 - 2.2.1. Identify the role of laboratories in maintaining and promoting health and health equity for patients, families, and communities
 - 2.2.2. Implement a process to report patient results accurately, in a timely manner, and communicate critical results safely

OBJECTIVES OF TRAINING IN MEDICAL MICROBIOLOGY (2018)

- 2.2.3. Advocate for appropriate Infection Prevention and Control measures, including hand hygiene, to prevent disease transmission
 - 2.2.4. Identify points of influence in the health care system and its structure
 - 2.2.5. Describe the ethical and professional issues inherent in health advocacy, including altruism, social justice, autonomy, integrity, and idealism
 - 2.2.6. Describe the possibility of conflict between the roles of health advocate and gatekeeper
 - 2.2.7. Demonstrate an understanding of the issues and opportunities to reduce morbidity and mortality from infectious diseases in the community and institutions
 - 2.2.8. Advocate for timely and appropriate implementation of new laboratory methodologies, technologies, and equipment to increase operational efficiencies and diagnostic accuracy
 - 2.2.9. Implement processes and procedures for addressing patients and other stakeholder's input, including concerns about laboratory services
- 2.3. Contribute to a process to improve health in the community or population they serve
- 2.3.1. Employ the principles of public health in the detection, surveillance, and prevention of infectious diseases of public health importance, and in required communication and collaboration
 - 2.3.2. Describe the role contact tracing plays in the management of infectious diseases of public health importance
 - 2.3.3. Demonstrate an appreciation for the value of sharing antibiograms and local epidemiology information to support hospital and public health programs such as antibiotic stewardship, infection prevention and control, communicable disease control, and outbreak investigation
 - 2.3.4. Describe how public policy impacts on the health of the populations served, particularly as applied to infectious diseases, and how such policy is developed
 - 2.3.5. Demonstrate an understanding of current policies that affect health, such as immunization programs, infection control, disease surveillance, outbreak management, and antimicrobial stewardship

Scholar

Definition:

As *Scholars*, Medical Microbiologists demonstrate a lifelong commitment to excellence in practice through continuous learning and by teaching others, evaluating evidence, and contributing to scholarship.

Key and Enabling Competencies: Medical Microbiologists are able to...

- 1. Engage in the continuous enhancement of their professional activities through ongoing learning**
 - 1.1. Develop, implement, monitor, and revise a personal learning plan to enhance professional practice
 - 1.1.1. Reflect on personal performance and identify areas for improvement
 - 1.1.2. Identify personally successful learning strategies
 - 1.1.3. Conduct personal practice audits, peer-review audits, or audits of practice in the laboratory, antimicrobial stewardship, or infection prevention and control
 - 1.1.4. Describe the principles of maintenance of competence
 - 1.2. Identify opportunities for learning and improvement by regularly reflecting on and assessing their performance using various internal and external data sources
 - 1.2.1. Integrate new learning into practice through different modalities such as clinical rounds, reviews of literature, and participation in relevant conferences
 - 1.2.2. Evaluate the impact of any change in practice
 - 1.2.3. Document the learning process
 - 1.3. Engage in collaborative learning to continuously improve personal practice and contribute to collective improvements in practice
 - 1.3.1. Participate in rounds to discuss issues relevant to Medical Microbiology

- 2. Teach students, residents, the public, and other health care professionals**
 - 2.1. Recognize the influence of role-modelling and the impact of the formal, informal, and hidden curriculum on learners
 - 2.2. Promote a safe learning environment
 - 2.2.1. Describe the principles of ethics with respect to teaching
 - 2.2.2. Ensure occupational safety and biosafety for residents in their professional environment

OBJECTIVES OF TRAINING IN MEDICAL MICROBIOLOGY (2018)

- 2.3. Ensure patient safety is maintained when learners are involved
 - 2.3.1. Provide an appropriate level of supervision for learners depending on their level of training to ensure patient safety
 - 2.4. Plan and deliver learning activities
 - 2.4.1. Describe principles of learning relevant to medical education
 - 2.4.2. Identify, collaboratively, the learning needs and desired learning outcomes of others
 - 2.4.3. Select effective teaching strategies and content at the appropriate level to facilitate others' learning and promote a safe and respectful learning environment within and outside of the laboratory
 - 2.4.4. Prepare and deliver an effective lecture or presentation, or lead clinically integrated teaching activities, such as an interactive or problem based learning activity, or an experiential learning encounter through bedside and/or bench teaching sessions
 - 2.4.5. Demonstrate an understanding of the Medical Microbiologist's role in communication with the public and media on relevant medical issues and events, and appreciate the formal processes and policies for public communications
 - 2.4.5.1. Communicate effectively and provide education to patients regarding changes to laboratory testing, and pre-analytic, analytic, and post-analytic factors which improve laboratory utilization and cost reduction strategies
 - 2.4.5.2. Communicate effectively with patients about emerging pathogens, transmission of infections, and how it relates to population health, the implications of antibiotic resistant organisms, the importance of appropriate antibiotic use, and other factors to decrease antimicrobial resistance, as well as prevention and control of communicable diseases and health promotion
 - 2.5. Provide feedback to enhance learning and performance
 - 2.5.1. Provide timely and constructive feedback to enhance learning and performance in the laboratory and clinical environment
 - 2.6. Assess and evaluate learners, teachers, and programs in an educationally appropriate manner
 - 2.6.1. Review and provide feedback to all appropriate participants in a teaching encounter
- 3. Integrate best available evidence into practice**
- 3.1. Recognize practice uncertainty and knowledge gaps in clinical and other professional encounters and generate focused questions that address them
 - 3.2. Identify, select, and navigate pre-appraised resources
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- 3.3. Critically evaluate the integrity, reliability, and applicability of health-related research and literature
 - 3.3.1. Describe the principles of critical appraisal
 - 3.3.2. Pose an appropriate learning question
 - 3.3.3. Conduct a systematic search for evidence
 - 3.3.4. Access and interpret the relevant evidence and results to clinical and laboratory practice
- 3.4. Integrate evidence into decision-making in their practice
 - 3.4.1. Critically appraise retrieved evidence in order to address a clinical question
 - 3.4.2. Integrate critical appraisal conclusions into clinical care and laboratory practices

4. Contribute to the creation and dissemination of knowledge and practices applicable to health

- 4.1. Demonstrate an understanding of the scientific principles of research and scholarly inquiry and the role of research evidence in health care
- 4.2. Identify ethical principles for research and incorporate them into obtaining informed consent, considering potential harms and benefits, and considering vulnerable populations
 - 4.2.1. Integrate the principles of research ethics into the development of research questions
- 4.3. Contribute to the work of a research program
- 4.4. Pose questions amenable to scholarly inquiry and select appropriate methods to address them
 - 4.4.1. Complete a scholarly research or quality improvement project, participating in study design, data collection, and analysis that results in a peer-reviewed presentation or publication
- 4.5. Summarize and communicate to professional and lay audiences, including patients and their families, the findings of relevant research and scholarly inquiry

Professional

Definition:

As *Professionals*, Medical Microbiologists are committed to the health and well-being of individual patients and society through ethical practice, high personal standards of behaviour, accountability to the profession and society, physician-led regulation, and maintenance of personal health.

Key and Enabling Competencies: Medical Microbiologists are able to...

1. Demonstrate a commitment to patients by applying best practices and adhering to high ethical standards

- 1.1. Exhibit appropriate professional behaviours and relationships in all aspects of practice, demonstrating honesty, integrity, humility, commitment, compassion, respect, altruism, respect for diversity, and maintenance of confidentiality
 - 1.1.1. Serve as an example of safe laboratory practice at all times
 - 1.1.2. Demonstrate responsibility in timely communication and respect for deadlines
 - 1.1.3. Maintain professional relationships with patients, clinical and laboratory staff
 - 1.1.4. Demonstrate insight into their own limits of expertise
 - 1.1.5. Dispose of patient records in a confidential manner
 - 1.1.6. Ensure consent is obtained, as required, and patient identifiers are removed when presenting or publishing patient information
- 1.2. Demonstrate a commitment to excellence in all aspects of practice
 - 1.2.1. Demonstrate a commitment to delivering the highest quality of patient care and maintenance of competence
 - 1.2.2. Adhere to laboratory standards and best practice guidelines
- 1.3. Recognize and respond to ethical issues encountered in practice
 - 1.3.1. Adhere to the principles of biomedical ethics
 - 1.3.2. Adhere to research ethics guidelines
 - 1.3.3. Recognize and appropriately respond to ethical issues encountered in Medical Microbiology, including issues related to disclosure of adverse events and public health issues such as isolation and quarantine and reportable diseases
- 1.4. Recognize and manage conflicts of interest
 - 1.4.1. Manage conflicts of interest, including relationships with the pharmaceutical industry and manufacturers of laboratory equipment and diagnostic tests
 - 1.4.2. Balance the responsibility of ensuring optimal resource utilization while maintaining quality patient care
- 1.5. Exhibit professional behaviours in the use of technology-enabled communication
 - 1.5.1. Demonstrate professional behaviour on social media, emails, and texting
 - 1.5.2. Adhere to privacy legislation in all forms of communication

- 1.5.3. Obtain consent prior to photographing patients and avoid storing patient images on personal devices
- 1.5.4. Ensure security of personal information when sharing laboratory results electronically or by fax
- 1.5.5. Maintain confidentiality of access codes

2. Demonstrate a commitment to society by recognizing and responding to societal expectations in health care

- 2.1. Demonstrate accountability to patients, society, and the profession by responding to societal expectations of physicians
 - 2.1.1. Recognize the principles and limits of patient confidentiality as defined by professional practice standards, law, and regulation
 - 2.1.2. Adhere to privacy legislation to ensure that personal information is protected
 - 2.1.3. Demonstrate support for antimicrobial stewardship, infection prevention and control, and public health programs
- 2.2. Demonstrate a commitment to patient safety and quality improvement

3. Demonstrate a commitment to the profession by adhering to standards and participating in physician-led regulation

- 3.1. Fulfil and adhere to the professional and ethical codes, standards of practice, and laws governing practice
 - 3.1.1. Fulfil the regulatory and legal obligations required of current practice, including laws and regulations regarding transportation of dangerous goods, human pathogens, and toxins
 - 3.1.2. Demonstrate accountability to professional regulatory bodies
 - 3.1.3. Adhere to regulated prescribing standards
 - 3.1.4. Provide timely, clear, and accurate reporting of outbreaks, reportable pathogens, nosocomial infections, or biosafety issues to public health, occupational health and safety, and/or IPAC teams
- 3.2. Recognize and respond to unprofessional and unethical behaviours in physicians and other colleagues in the health care professions
- 3.3. Participate in peer assessment and standard-setting
 - 3.3.1. Participate in peer review assessment
 - 3.3.2. Participate in audits to assess laboratory practices

4. Demonstrate a commitment to physician health and well-being to foster optimal patient care

- 4.1. Exhibit self-awareness and manage influences on personal well-being and professional performance
 - 4.1.1. Balance personal and professional priorities to ensure personal health and a sustainable practice
 - 4.1.2. Strive to heighten personal and professional awareness and insight
- 4.2. Manage personal and professional demands for a sustainable practice throughout the physician life cycle
- 4.3. Promote a culture that recognizes, supports, and responds effectively to colleagues in need
 - 4.3.1. Recognize other professionals in need and respond appropriately
 - 4.3.2. Demonstrate a commitment to physician health and sustainable practice

This document is to be reviewed by the Specialty Committee in Medical Microbiology by December 2019.

APPROVED – Specialty Standards Review Committee – June 2012

APPROVED – Specialty Standards Review Committee – April 2018