

**2010**

**EDITORIAL REVISION – MAY 2017  
VERSION 1.2**

*This document applies to those who begin training on or after July 1<sup>st</sup>, 2010.*

**NOTE:** *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.*

## **DEFINITION**

Cardiology is the medical subspecialty concerned with the prevention, diagnosis, management, and rehabilitation of patients with diseases of the cardiovascular system. A Cardiologist is a specialist who is an expert in the diagnosis and management of all aspects of cardiovascular disease.

## **GOALS**

Upon completion of training, a resident is expected to be a competent specialist in Cardiology 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.

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

## **CARDIOLOGY 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*, Cardiologists integrate all of the CanMEDS Roles, applying medical knowledge, clinical skills, and professional attitudes in their provision of patient-centred care. *Medical Expert* is the central physician Role in the CanMEDS framework.

### **Key and Enabling Competencies: Cardiologists are able to...**

- 1. Function effectively as consultants, integrating all of the CanMEDS Roles to provide optimal, ethical and patient-centred medical care**
  - 1.1. Perform a consultation, including the presentation of well-documented assessments and recommendations in written and/or verbal form in response to a request from another health care professional
  - 1.2. Demonstrate use of all CanMEDS competencies relevant to Cardiology
  - 1.3. Identify and appropriately respond to relevant ethical issues arising in patient care
  - 1.4. Demonstrate the ability to prioritize professional duties when faced with multiple patients and problems
  - 1.5. Demonstrate compassionate and patient-centred care
  - 1.6. Recognize and respond to the ethical dimensions in medical decision-making
  - 1.7. Demonstrate medical expertise in situations other than patient care, such as providing expert legal testimony or advising governments, as needed
  
- 2. Establish and maintain clinical knowledge, skills and behaviours appropriate to Cardiology**
  - 2.1. Apply knowledge of the clinical, socio-behavioural, and fundamental biomedical sciences relevant to Cardiology, including:
    - 2.1.1. Coronary Artery Disease
      - 2.1.1.1. Normal coronary anatomy
      - 2.1.1.2. Physiology of normal and abnormal coronary blood flow
      - 2.1.1.3. Normal and abnormal endothelial function
      - 2.1.1.4. Pathogenesis of atherosclerosis
      - 2.1.1.5. Risk factors for atherosclerosis and their management
      - 2.1.1.6. Pathophysiology of acute coronary syndromes
      - 2.1.1.7. Non-atherosclerotic causes of ischemia and infarction
      - 2.1.1.8. Diagnostic techniques for coronary disease, including their sensitivity and specificity

## OBJECTIVES OF TRAINING IN ADULT CARDIOLOGY (2010)

- 2.1.1.9. Pharmacology<sup>1</sup> of anti-ischemic, antiplatelet, anticoagulant, thrombolytic and lipid-lowering agents
- 2.1.1.10. Revascularization procedures: percutaneous coronary intervention (PCI) and coronary artery bypass graft (CABG), their indications, contraindications and benefits
- 2.1.1.11. Non-pharmacologic management of end-stage coronary artery disease
- 2.1.1.12. Sex differences important in the presentation, diagnosis and management of coronary artery disease
- 2.1.1.13. Ethnic differences important in the incidence of coronary artery disease
  
- 2.1.2. Valvular Heart Disease
  - 2.1.2.1. Normal valve structure and function
  - 2.1.2.2. Pathology of valvular disease
  - 2.1.2.3. Pathophysiology and hemodynamics of valvular stenosis and regurgitation
  - 2.1.2.4. Diagnostic techniques
  - 2.1.2.5. Valve interventions: indications, including medical management, timing, contraindications, benefits and outcomes
  - 2.1.2.6. Prosthetic valves: types, complications, natural history
  
- 2.1.3. Congenital Heart Disease
  - 2.1.3.1. Basic cardiac embryology
  - 2.1.3.2. Intracardiac shunting: hemodynamics, pathophysiologic effects
  - 2.1.3.3. Congenital lesions in which natural survival to adulthood is likely and their potential complications
  - 2.1.3.4. Congenital lesions in which post-operative survival to adulthood is likely and their potential complications
  
- 2.1.4. Congestive Heart Failure and Cardiomyopathies
  - 2.1.4.1. Physiology of normal and abnormal ventricular systolic and diastolic function
  - 2.1.4.2. Hemodynamic abnormalities in heart failure
  - 2.1.4.3. Neurohormonal abnormalities in congestive heart failure
  - 2.1.4.4. Ventricular remodeling

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<sup>1</sup> Pharmacology refers to mechanisms of action, clinically relevant pharmacokinetics, indications, contraindications, and adverse effects.

## *OBJECTIVES OF TRAINING IN ADULT CARDIOLOGY (2010)*

- 2.1.4.5. Etiology, prognosis, and natural history of congestive heart failure
- 2.1.4.6. Pharmacology of medications commonly used in patients with congestive heart failure
- 2.1.4.7. Non-pharmacologic management options (e.g. resynchronization, surgery, devices)
- 2.1.4.8. Principles of transplantation
  
- 2.1.5. Hypertension
  - 2.1.5.1. Definition of hypertension
  - 2.1.5.2. Diagnosis of hypertension
  - 2.1.5.3. Effect of hypertension on target organs
  - 2.1.5.4. Effect of treatment on mortality and complications
  - 2.1.5.5. Secondary causes: screening, diagnosis, and management
  - 2.1.5.6. Pharmacology of antihypertensive agents
  
- 2.1.6. Pulmonary Vascular Disease
  - 2.1.6.1. Normal pulmonary vascular physiology
  - 2.1.6.2. Hemodynamics of pulmonary hypertension
  - 2.1.6.3. Pharmacology of pulmonary vasodilator agents
  
- 2.1.7. Pericardial Disease
  - 2.1.7.1. Normal pericardial anatomy and function
  - 2.1.7.2. Effect of pericardial disease on cardiac hemodynamics and function
  - 2.1.7.3. Pathology and etiology of pericardial diseases
  
- 2.1.8. Vascular Medicine
  - 2.1.8.1. Cerebrovascular disease: etiology and risk factors, presentations, cardiac causes of stroke and transient ischemic attack (TIA), treatment options
  - 2.1.8.2. Pathology and etiology of aortic disease
  - 2.1.8.3. Peripheral vascular disease: risk factors, clinical presentations, treatment options
  
- 2.1.9. Acute Cardiac Care
  - 2.1.9.1. Hemodynamics: normal and abnormal systemic and pulmonary flows, pressures, and resistances

## OBJECTIVES OF TRAINING IN ADULT CARDIOLOGY (2010)

- 2.1.9.2. Ventilation in patients with primary cardiac disease: indications, principles of management
  - 2.1.9.3. Pharmacology of inotropes, vasopressors, vasodilators
  - 2.1.9.4. Systemic and non-cardiac complications in the critically ill patient
  - 2.1.9.5. Non-pharmacologic, mechanical support devices
  - 2.1.9.6. Infections of the heart and cardiac vessels and devices
  
  - 2.1.10. Electrophysiology
    - 2.1.10.1. Normal cellular electrophysiology
    - 2.1.10.2. Normal sinoatrial (SA) node, atrioventricular (AV) node, and conducting system function
    - 2.1.10.3. Mechanisms of arrhythmogenesis
    - 2.1.10.4. Mechanisms of conduction abnormalities
    - 2.1.10.5. Pharmacology of antiarrhythmic agents
    - 2.1.10.6. Implantable cardiac devices: techniques, indications, complications, and follow-up
    - 2.1.10.7. Syncope
    - 2.1.10.8. Invasive electrophysiology studies: indications, techniques, complications
    - 2.1.10.9. Invasive ablative techniques for tachyarrhythmias: indications, complications
  
  - 2.1.11. Pregnancy in Patients with Cardiovascular Disease
    - 2.1.11.1. Normal cardiovascular physiologic changes in pregnancy and their effect in patients with heart disease
    - 2.1.11.2. Use of cardiovascular drugs in pregnancy and the peripartum period
    - 2.1.11.3. Assessment of the cardiac risks of pregnancy
    - 2.1.11.4. Preconception genetic counseling with respect to cardiac disease
  
  - 2.2. Describe the CanMEDS framework of competencies relevant to Cardiology
  - 2.3. Apply lifelong learning skills of the Scholar Role to implement a personal program to keep up to date, and enhance areas of professional competence
  - 2.4. Integrate the available best evidence and best practices to enhance the quality of care and patient safety in Cardiology
  
  - 3. Perform a complete and appropriate assessment of a cardiac patient**
    - 3.1. Identify and effectively explore issues to be addressed in a patient encounter, including the patient's context and preferences
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- 3.2. Elicit a history that is relevant, concise, and accurate to context and preferences, for the purposes of diagnosis, management, health promotion, and disease prevention
- 3.3. Perform a focused physical examination that is relevant and accurate, for the purposes of diagnosis, management, health promotion, and disease prevention
- 3.4. Select medically appropriate investigative methods in a resource-effective and ethical manner
- 3.5. Demonstrate effective clinical problem solving and judgment to address patient problems, including interpreting available data and integrating information to generate differential diagnoses and management plans
- 3.6. Assess patients for cardiac manifestations of non-cardiac disease
- 3.7. Perform cardiac assessment of patients undergoing non cardiac surgery

**4. Use preventive and therapeutic interventions effectively**

- 4.1. Implement a management plan in collaboration with a patient and the patient's family
- 4.2. Demonstrate appropriate and timely application of preventive and therapeutic interventions relevant to Cardiology
- 4.3. Obtain appropriate informed consent for therapies
- 4.4. Ensure patients receive appropriate end-of-life care

**5. Demonstrate proficient and appropriate use of procedural skills, both diagnostic and therapeutic**

- 5.1. Demonstrate effective, appropriate, and timely interpretation, application of results and technical performance of the following diagnostic and therapeutic procedures:
  - 5.1.1. Clinical Electrophysiology
    - 5.1.1.1. Electrocardiography
    - 5.1.1.2. Exercise (stress) testing
    - 5.1.1.3. Ambulatory monitors (Holter and loop recorders)
  - 5.1.2. Echocardiography (M-mode, 2D, and Doppler)
    - 5.1.2.1. Transthoracic
  - 5.1.3. Cardiac Catheterization
    - 5.1.3.1. Right heart catheterization and hemodynamics
  - 5.1.4. Therapeutic Procedures
    - 5.1.4.1. Temporary transvenous pacemakers
    - 5.1.4.2. DC cardioversion and defibrillation

*OBJECTIVES OF TRAINING IN ADULT CARDIOLOGY (2010)*

- 5.1.4.3. Pericardiocentesis
- 5.2. Demonstrate effective, appropriate, and timely interpretation and application of results of the following diagnostic and therapeutic procedures:
  - 5.2.1. Clinical Electrophysiology
    - 5.2.1.1. Permanent pacemakers and implanted devices
  - 5.2.2. Echocardiography
    - 5.2.2.1. Transesophageal
    - 5.2.2.2. Stress
  - 5.2.3. Nuclear Cardiology Imaging
    - 5.2.3.1. Rest and stress perfusion imaging and radionuclide angiography
  - 5.2.4. Cardiac Catheterization
    - 5.2.4.1. Left heart catheterization and hemodynamics
    - 5.2.4.2. Angiography and coronary arteriography
  - 5.2.5. Other Cardiac Imaging Modalities
    - 5.2.5.1. Chest X-ray
  - 5.2.6. Therapeutic Procedures
    - 5.2.6.1. Intra-aortic balloon counterpulsation
- 5.3. Demonstrate effective, appropriate and timely application of results of the following diagnostic and therapeutic procedures:
  - 5.3.1. Other Cardiac Imaging Modalities
    - 5.3.1.1. Positron Emission Tomography (PET)
    - 5.3.1.2. Computed Tomography (CT)
    - 5.3.1.3. Magnetic Resonance Imaging (MRI)
  - 5.3.2. Therapeutic Procedures
    - 5.3.2.1. Percutaneous cardiac interventions
    - 5.3.2.2. Invasive electrophysiology studies
- 5.4. Obtain appropriate informed consent for procedures
- 5.5. Document and disseminate information related to procedures performed and their outcomes

5.6. Ensure adequate followup is arranged for procedures performed

**6. Seek appropriate consultation from other health professionals, recognizing the limits of their expertise**

6.1. Demonstrate insight into their own limitations of expertise

6.2. Demonstrate effective, appropriate, and timely consultation of another health professional as needed for optimal patient care

6.3. Arrange appropriate followup care services for patients and their families/caregivers

**Communicator**

***Definition:***

As *Communicators*, Cardiologists effectively facilitate the doctor-patient relationship and the dynamic exchanges that occur before, during, and after the medical encounter.

***Key and Enabling Competencies: Cardiologists are able to...***

**1. Develop rapport, trust, and ethical therapeutic relationships with patients and families**

1.1. Recognize that being a good communicator is a core clinical skill for physicians, and that effective physician-patient communication can foster patient satisfaction, physician satisfaction, adherence, and improved clinical outcomes

1.2. Establish positive therapeutic relationships with patients and their families that are characterized by understanding, trust, respect, honesty, and empathy

1.3. Respect patient privacy, confidentiality, and autonomy

1.4. Listen effectively

1.5. Be aware of and responsive to nonverbal cues

1.6. Facilitate a structured clinical encounter effectively

**2. Accurately elicit and synthesize relevant information and perspectives of patients and families, colleagues, and other professionals**

2.1. Gather information about a disease and about a patient's beliefs, concerns, expectations, and illness experience

2.2. Seek out and synthesize relevant information from other sources, such as a patient's family, caregivers and other professionals, while respecting individual privacy and confidentiality



**3. Convey relevant information and explanations accurately to patients and families, colleagues, and other professionals**

- 3.1. Deliver information to a patient and family, colleagues, and other professionals in a humane manner and in such a way that it is understandable and encourages discussion and participation in decision-making

**4. Develop a common understanding on issues, problems, and plans with patients, families, and other professionals to develop a shared plan of care**

- 4.1. Identify and effectively explore problems to be addressed from a patient encounter, including the patient's context, responses, concerns, and preferences
- 4.2. Respect diversity and differences, including but not limited to the impact of gender, religion, and cultural beliefs on decision-making and ability to comply with a therapeutic program
- 4.3. Encourage discussion, questions, and interaction in the encounter
- 4.4. Engage patients, families, and relevant health professionals in shared decision-making to develop a plan of care
- 4.5. Address challenging communication issues effectively, including but not limited to obtaining informed consent, delivering bad news, and addressing anger, confusion and misunderstanding

**5. Convey effective oral and written information about a medical encounter**

- 5.1. Maintain clear, concise, accurate, and appropriate records of clinical encounters and plans
- 5.2. Present oral reports of clinical encounters and plans
- 5.3. Convey medical information appropriately to ensure safe transfer of care

**6. Present medical information to the public or media about a Cardiology-related medical issue**

**Collaborator**

***Definition:***

As *Collaborators*, Cardiologists effectively work within a health care team to achieve optimal patient care.

***Key and Enabling Competencies: Cardiologists are able to...***

**1. Participate effectively and appropriately in an interprofessional health care team**

- 1.1. Describe the specialist's roles and responsibilities to other professionals

- 1.2. Describe the roles and responsibilities of other professionals within the health care team
  - 1.3. Recognize and respect the diverse roles, responsibilities, and competencies of other professionals in relation to their own
  - 1.4. Work with others to assess, plan, provide, and integrate care for individuals and groups of patients
  - 1.5. Work collaboratively in other activities and tasks; examples are research, educational work, program review, and/or administrative responsibilities
  - 1.6. Participate in interprofessional team meetings
  - 1.7. Enter into interdependent relationships with other professions for the provision of quality care
  - 1.8. Describe the principles of team dynamics
  - 1.9. Respect team ethics, including confidentiality, resource allocation, and professionalism
  - 1.10. Demonstrate leadership in a health care team, as appropriate
- 2. Work with other health professionals effectively to prevent, negotiate, and resolve interprofessional conflict**
- 2.1. Demonstrate a respectful attitude towards other colleagues and members of an interprofessional team
  - 2.2. Work with other professionals to prevent conflicts
  - 2.3. Respect differences and the scopes of practice of other professions
  - 2.4. Reflect on their own differences, misunderstandings, and limitations that may contribute to interprofessional tension
  - 2.5. Reflect on interprofessional team function
  - 2.6. Employ collaborative negotiation to resolve conflicts and address misunderstandings

## **Manager**

### ***Definition:***

As *Managers*, Cardiologists are integral participants in health care organizations, organizing sustainable practices, making decisions about allocating resources, and contributing to the effectiveness of the health care system.

### ***Key and Enabling Competencies: Cardiologists are able to...***

- 1. Participate in activities that contribute to the effectiveness of their health care organizations and systems**
    - 1.1. Work collaboratively with others in their organizations
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## OBJECTIVES OF TRAINING IN ADULT CARDIOLOGY (2010)

- 1.2. Participate in systemic quality process evaluation and improvement, including patient safety initiatives
- 1.3. Describe the structure and function of the health care system as it relates to Cardiology, including the roles of physicians
  - 1.3.1. Describe the advantages and disadvantages of cardiac care in a variety of settings, including hospitals, ambulatory care clinics, offices, homecare, and chronic care and rehabilitation facilities
- 1.4. Describe principles of health care financing as it relates to Cardiology, including physician remuneration, budgeting, and organizational funding

### **2. Manage their practice and career effectively**

- 2.1. Set priorities and manage time to balance patient care, practice requirements, outside activities, and personal life
- 2.2. Manage a Cardiology practice, including finances and human resources
- 2.3. Implement processes to ensure personal practice improvement
- 2.4. Employ information technology appropriately for patient care

### **3. Allocate finite cardiac care resources appropriately**

- 3.1. Demonstrate an understanding of the importance of just allocation of health care resources, balancing effectiveness, efficiency, and access with optimal patient care
- 3.2. Apply evidence and management processes for cost-appropriate care

### **4. Serve in administration and leadership roles**

- 4.1. Chair or participate effectively in committees and meetings
- 4.2. Lead or implement change in health care
- 4.3. Plan relevant elements of health care delivery (e.g., work schedules)

## **Health Advocate**

### ***Definition:***

As *Health Advocates*, Cardiologists responsibly use their expertise and influence to advance the health and well-being of individual patients, communities, and populations.

### ***Key and Enabling Competencies: Cardiologists are able to...***

#### **1. Respond to individual patient health needs and issues as part of patient care**

- 1.1. Identify the health needs of an individual patient

- 1.2. Identify opportunities for advocacy, health promotion, and disease prevention with individuals to whom they provide care
- 1.3. Demonstrate an appreciation of the possibility of competing interests between individual advocacy issues and the community at large

**2. Respond to the health needs of the communities that they serve**

- 2.1. Describe the practice communities that they serve
- 2.2. Identify opportunities for advocacy, health promotion, and disease prevention in the communities that are at risk for cardiovascular disease and its complications
  - 2.2.1. Apply knowledge of primary and secondary prevention of cardiovascular disease
- 2.3. Demonstrate an appreciation of the possibility of competing interests between the communities served and other populations

**3. Identify the determinants of health for the populations that they serve**

- 3.1. Identify the biologic, psychosocial, environmental, and economic determinants of health of the population, including barriers to access to care and resources
  - 3.1.1. Utilize this information in a management and prevention plan, and ensure access to appropriate health and social services in the management of individual patients
- 3.2. Identify vulnerable or marginalized populations within those served and respond appropriately

**4. Promote the health of individual patients, communities, and populations**

- 4.1. Describe an approach to implementing a change in a determinant of health of the populations they serve
- 4.2. Describe how public policy impacts on the cardiovascular health of the populations served
- 4.3. Identify points of influence in the health care system and its structure
- 4.4. Describe the ethical and professional issues inherent in health advocacy, including altruism, social justice, autonomy, integrity, and idealism
- 4.5. Demonstrate an appreciation of the possibility of conflict inherent in their role as a health advocate for a patient or community with that of manager or gatekeeper
- 4.6. Describe the role of the medical profession in advocating collectively for health and patient safety

## Scholar

### **Definition:**

As *Scholars*, Cardiologists demonstrate a lifelong commitment to reflective learning, as well as the creation, dissemination, application and translation of medical knowledge.

### **Key and Enabling Competencies: Cardiologists are able to...**

- 1. Maintain and enhance professional activities through ongoing learning**
  - 1.1. Describe the principles of maintenance of competence
  - 1.2. Describe the principles and strategies for implementing a personal knowledge management system
  - 1.3. Recognize and reflect on learning issues in practice
  - 1.4. Conduct personal practice audits
  - 1.5. Pose an appropriate learning question
  - 1.6. Access and interpret the relevant evidence
  - 1.7. Integrate new learning into practice
  - 1.8. Evaluate the impact of any change in practice
  - 1.9. Document the learning process
  
- 2. Critically evaluate medical information and its sources and apply this appropriately to practice decisions**
  - 2.1. Describe the principles of critical appraisal
  - 2.2. Critically appraise retrieved evidence in order to address a clinical question
  - 2.3. Integrate critical appraisal conclusions into clinical care
  
- 3. Facilitate the learning of patients, families, students, residents, other health professionals, the public, and others, as appropriate**
  - 3.1. Describe principles of learning relevant to medical education
  - 3.2. Identify collaboratively the learning needs and desired learning outcomes of others
  - 3.3. Select effective teaching strategies and content to facilitate others' learning
  - 3.4. Deliver effective lectures or presentations
  - 3.5. Assess and reflect on a teaching encounter
  - 3.6. Provide effective feedback
  - 3.7. Describe the principles of ethics with respect to teaching

**4. Contribute to the development, dissemination, and translation of new knowledge and practices**

- 4.1. Describe the principles of research and scholarly inquiry
- 4.2. Describe the principles of research ethics
- 4.3. Pose a scholarly question
- 4.4. Conduct a systematic search for evidence
- 4.5. Select and apply appropriate methods to address the question
- 4.6. Disseminate the findings of a study by presentation or publication

**Professional**

***Definition:***

As *Professionals*, Cardiologists are committed to the health and well-being of individuals and society through ethical practice, profession-led regulation, and high personal standards of behaviour.

***Key and Enabling Competencies: Cardiologists are able to...***

**1. Demonstrate a commitment to their patients, profession, and society through ethical practice**

- 1.1. Exhibit appropriate professional behaviors in practice, including honesty, integrity, commitment, compassion, respect, and altruism
  - 1.1.1. Understand the nature of professional interpersonal relationships and boundaries with patients, co-workers, and students
- 1.2. Demonstrate a commitment to delivering the highest quality care and maintenance of competence
- 1.3. Recognize and appropriately respond to ethical issues encountered in practice
- 1.4. Identify, declare, and manage perceived, potential, and actual conflicts of interest
- 1.5. Recognize the principles and limits of patient privacy and confidentiality, as defined by the law and professional practice standards
- 1.6. Maintain appropriate boundaries with patients

**2. Demonstrate a commitment to their patients, profession, and society through participation in profession-led regulation**

- 2.1. Demonstrate knowledge and understanding of professional, legal, and ethical codes of practice
- 2.2. Fulfil the regulatory and legal obligations required of current practice
- 2.3. Demonstrate accountability to professional regulatory bodies

*OBJECTIVES OF TRAINING IN ADULT CARDIOLOGY (2010)*

- 2.4. Recognize and respond to others' unprofessional behaviours in practice
- 2.5. Participate in peer review

**3. Demonstrate a commitment to physician health and sustainable practice**

- 3.1. Balance personal and professional priorities to ensure personal health and a sustainable practice
- 3.2. Strive to heighten personal and professional awareness and insight
- 3.3. Recognize other professionals in need and respond appropriately

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