

This document is to be used in conjunction with the *Pathway to Competence User Guide*, which is available on the Royal College’s web site.

This document applies to residents who have not yet entered the stage containing revised EPAs.

MEDICAL EXPERT MILESTONES: RESIDENCY				
	Transition to discipline	Foundations of discipline	Core of discipline	Transition to practice
1. Practise medicine within their defined scope of practice and expertise				
1.1. Demonstrate a commitment to high-quality care for their patients		Demonstrate compassion for patients	Demonstrate commitment and accountability for patients in their care <i>C7</i> Demonstrate responsibility and accountability for decisions regarding patient care <i>C8</i>	Demonstrate a commitment to high-quality care of their patients <i>TTP3</i>
1.2. Integrate the CanMEDS Intrinsic Roles into their practice of Cardiac Surgery	Explain how the Intrinsic Roles need to be integrated in practice of Cardiac Surgery to deliver optimal patient care			Integrate the CanMEDS Intrinsic Roles into their practice of Cardiac Surgery
1.3 Demonstrate the competencies of Surgical Foundations		Apply the competencies of Surgical Foundations	Consolidate the competencies of Surgical Foundations <i>C10</i>	
1.4. Apply knowledge of the clinical and biomedical sciences	Apply knowledge of surface and cardiothoracic anatomy	Apply clinical and biomedical sciences to manage core patient presentations in Cardiac Surgery <i>F1b F2 F4 F7</i>	Apply a broad base and depth of knowledge in clinical and biomedical sciences to manage the breadth of patient	

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relevant to Cardiac Surgery

- Cardiac embryology
- Anatomy and physiology of the cardiovascular system F2 F4
 - Coronary circulation
 - Cardiac valves and relationships to adjacent structures
 - Endocardium
 - Cardiac conduction system
 - Thoracic aorta, including its intrathoracic branches and related intrathoracic structures
 - Pulmonary circulation
 - Pericardium
 - Peripheral vasculature
- Physiology and pathophysiology of the fetal, neonatal and pediatric circulation
- Electrophysiology as relevant to the normal cardiac rhythm and cardiac arrhythmias
- **Pathology and pathophysiology as relevant to cardiovascular diseases and conditions** F1b F2 F4
- Pharmacology of medications used for coronary insufficiency,

presentations in Cardiac Surgery C3 C7 C10 TTP7

- Pathophysiology of brain death and management of the organ donor including biochemistry and pharmacology of donor heart preservation
- Immunology of rejection C3
- Pharmacology of immunosuppression C3

Apply knowledge of the principles of diagnosis, natural history, and medical and surgical management of cardiac presentations C2 C3 C4 C5

anticoagulation, arrhythmia management and inotropic support ^{F2}

Apply knowledge of the principles of diagnosis, natural history, and medical and surgical management of common cardiac presentations

^{F2 F3}

- Ischemic heart disease
- Arrhythmia
- Valvular heart disease
- Thoracic aortic disease
- Pericardial disease
- Simple wound complications including sepsis
- Abnormalities in coagulation including heparin induced thrombocytopenia

Apply knowledge of the principles of imaging and diagnostic techniques relevant to Cardiac Surgery

- Electrocardiography (ECG)
- Echocardiography, including transthoracic (TTE), transesophageal (TEE), point-of-care, epiaortic, and epicardial echocardiography
- Stress tests
- Cardiac catheterization
- Hemodynamic evaluation
- Fluoroscopy
- Nuclear medicine imaging, including PET
- Magnetic resonance imaging (MRI)

- Cardiac tumours
- **Congenital cardiac defects** ^{c2}
- Heart failure, including end-stage heart failure ^{c3}
- Pulmonary vascular disease
- Trauma with emphasis on thoracic injury
- Concomitant medical conditions in the cardiac surgery patient, including but not limited to diabetes, renal failure, and respiratory failure
- Cerebrovascular disease, particularly when presenting with concomitant cardiac disease
- Vascular, neurological, and general surgical complications in patients with cardiac disease
- Complex wound complications

Apply knowledge of the principles of therapeutic modalities relevant to Cardiac Surgery ^{c5}

- Myocardial protection
 - Mechanisms of myocardial injury and their prevention
 - Myocardial metabolic pathways and their response to ischemia and reperfusion

- Computed tomography (CT)

Apply knowledge of the principles of foundational therapeutic modalities relevant to Cardiac Surgery ^{F7}

- Parenteral nutrition
- Pharmacology
- Anesthetic management including the use of sedative, analgesics, and local anesthetic agents
- Cardiac medications, including but not limited to: inotropes, antiarrhythmics, vasoactive agents, antihypertensive agents, statins, and heart failure therapies
- Antimicrobials
- Anticoagulation and antiplatelet therapy, and reversal agents
- Thrombolytic therapies
- Blood products and recombinant factors

Apply knowledge of the principles of use of Cardiopulmonary Bypass (CPB) ^{F8 C10 C30}

- Use and pathophysiology of CPB ^{F8 C10 C30}
- Design and function of components of CPB circuits including alternate types of pumps and oxygenators ^{F8 C10 C30}
- Complications of CPB ^{F8 C10 C30}
- Effects of CPB on inflammatory, coagulation and hematological systems

- Cardioplegia composition, temperature, alternative delivery methods and assessment of myocardial protection

- Support of failing cardiopulmonary circulation
- Intensive care management of adult and pediatric patients including but not limited to ventilator management, inotropes, treatment of arrhythmias, and the manipulation of the pulmonary and systemic circulations ^{C5}

Apply knowledge of the adaptation of CPB principles to the pediatric patient

Apply knowledge of the indications, techniques, and complications for core surgical procedures ^{C1b C2 C3}

- Mechanical circulatory support, including IABP, ECMO and VAD ^{C3}
- Coronary revascularization
- Surgical management of the complications of myocardial ischemia
- Valve surgery including methods of valve repair, prostheses, and aortic

as well as end organ damage F8 C10 C30

- Use of profound hypothermia and circulatory arrest

Apply knowledge of the indications and techniques for foundational surgical procedures

- Thoracic incisions and other relevant incisions for the surgical approach to conduit harvest and vascular access

Understands steps of procedure, potential risks, and means to avoid/overcome them TTD1 TTD2 F9 F10 C6b C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24 C25 C26 C27 C28 C29 C35 TTP4

root enlargement and management of complications

- Transcatheter valvular therapies, including Transcatheter Aortic-Valve Implantation (TAVI)
- Methods of surgical aortic repair, including choice of conduits (including Thoracic Endovascular Aortic Repair (TEVAR/EVAR)), and techniques for preventing brain and spinal cord damage
- Resection of cardiac tumours
- Relief of cardiac tamponade
- Pericardial window and pericardectomy
- Repair of simple and complex congenital cardiac defects C2
- Surgical management of pulmonary vascular disease
- Implantation of pacemaker devices including automatic implantable cardioverter (AICD) devices and management of their complications including techniques of lead extraction
- Surgical therapy for heart failure including valve surgery, ventricular reconstruction, VAD insertion and transplantation C3

			<ul style="list-style-type: none"> Alternate transplantation procedures, including heart-lung or lung transplantation with repair of cardiac lesions in patients with primary or secondary pulmonary hypertension <p>Apply knowledge of Intermacs classification (Interagency Registry for Mechanically Assisted criteria in Canada) <small>C3</small></p> <p>Apply knowledge of the Canadian Cardiac Transplant Network: Eligibility and listing criteria in Canada <small>C3</small></p> <p>Apply a broad base and depth of knowledge in clinical and biomedical sciences to health services delivery in cardiac surgery</p>	
1.5. Perform appropriately timed clinical assessments with recommendations that are presented in an organized manner		<p>Perform focused clinical assessments <small>F3 F6 F7 F8</small></p> <p>Recognize urgent problems that may need the involvement of more experienced colleagues and seek their assistance <small>F2 F6</small></p>	<p>Perform clinical assessments that address the breadth of issues <small>C1a C2</small></p> <p><small>C4 C6a C7</small></p>	<p>Perform appropriately-timed clinical assessments addressing the breadth of Cardiac Surgery with recommendations that are well-organized and properly documented in written and/or oral form</p> <p>Perform appropriately timed clinical assessments <small>TTP1a TTP1b</small></p>
1.6. Carry out professional duties in the face of multiple, competing demands		<p>On the basis of patient-centered priorities, seek assistance to prioritize multiple competing tasks that need to be addressed</p>	<p>Carry out professional duties in the face of multiple, competing demands <small>C8</small></p>	<p>Prioritize referrals on the basis of clinical urgency</p> <p><small>TTP5</small></p>

			<p>Maintain a duty of care and patient safety while balancing multiple responsibilities</p> <p>Prioritize patients on the basis of clinical presentations _{C8}</p>	
<p>1.7. Recognize and respond to the complexity, uncertainty, and ambiguity inherent in surgical practice</p>	<p>Identify clinical situations in which complexity, uncertainty, and ambiguity may play a role in decision-making</p>	<p>Develop a plan that considers the current complexity, uncertainty, and ambiguity in a clinical situation</p>	<p>Adapt care as the complexity, uncertainty, and ambiguity of the patient's clinical situation evolves _{C30}</p> <p>Seek assistance in situations that are complex or new _{C6a}</p>	<p>Recognize and respond to the complexity, uncertainty, and ambiguity inherent in surgical practice</p>

MEDICAL EXPERT MILESTONES: RESIDENCY

Transition to discipline

Foundations of discipline

Core of discipline

Transition to practice

2. Perform a patient-centred clinical assessment and establish a management plan

<p>2.1. Prioritize issues to be addressed in a patient encounter</p>		<p>Identify medical emergencies and prioritize response F2</p> <p>Iteratively establish priorities, considering the perspective of the patient and family (including values and preferences) as the patient’s situation evolves</p> <p>Identify factors which place patients at risk for disease recurrence and/or adverse outcomes F7</p>	<p>Recognize instability and medical acuity C30</p> <p>Identify patients in need of resuscitation and initiate appropriate measures C5</p> <p>Apply ATLS protocols</p> <p>Concurrently diagnose and manage life threatening emergencies C5</p> <p>Adapt management plans as the clinical situation evolves C5</p> <p>Consider clinical urgency, feasibility, availability of resources, and comorbidities in determining priorities to be addressed C31</p>	<p>Prioritize which issues need to be addressed during future visits or with other health care practitioners</p>
<p>2.2. Elicit a history, perform a physical exam, select appropriate investigations, and interpret their results for the purpose of diagnosis and management,</p>		<p>Elicit a history pertinent to the clinical presentation, without omitting key features F1a F4</p> <p>Perform and interpret findings of a physical exam relevant to the cardiovascular system F1a F4</p>	<p>Elicit a history, perform a physical exam, select appropriate investigations, and interpret their results C3</p> <p>Select and interpret appropriate</p>	<p>Elicit a history, perform a physical exam, select appropriate investigations, and interpret their results for the purpose of diagnosis and management, disease prevention, and health promotion</p>

<p>disease prevention, and health promotion</p>		<p>Select and interpret appropriate investigations and imaging techniques F1b F2 F3</p> <ul style="list-style-type: none"> • ECG F1b • Coronary angiography/CT angiogram F1b • Non-invasive testing F1b • Viability – Nuclear, PET, MRI F1b • Echo/Stress Echo F1b • Radiography (CXR) F1b • Pulmonary function tests F1b • MRI <p>Interpret the results of diagnostic tests F4</p> <p>Recognize clinically significant findings in a transthoracic 2D-echocardiogram F5</p> <p>Develop a differential diagnosis relevant to the patient’s presentation F1b F2 F6 F8</p> <p>Apply patient risk scores to determine perioperative risk F1b</p>	<p>investigations C1a C2 C3 C4 C6a C7</p> <p>Synthesize patient information to determine diagnosis C2 C4</p> <p>Synthesize patient information to assess indications and risk of surgery C1a C6a</p> <p>Focus the clinical encounter, performing it in a time-effective manner, without excluding key elements C5</p>	<p>Interpret clinical information gathered by another health professional, along with the results of investigations, for the purposes of diagnosis and management TTP2</p> <p>Select investigations to facilitate timely patient assessment and triage TTP5</p> <p>Synthesize and interpret the clinical information TTP1a</p>
<p>2.3. Establish goals of care in collaboration with patients and their</p>		<p>Work with patients and their families to understand relevant options for care</p> <p>Address with the patient and family their ideas about the</p>	<p>Address the impact of the medical condition on the patient’s ability to pursue life goals and purposes C1a C3</p>	<p>Establish goals of care in collaboration with the patient and family, which may include slowing disease progression, achieving cure,</p>

<p>families*, which may include slowing disease progression, treating symptoms, achieving cure, improving function, and palliation</p>		<p>nature and cause of the health problem, fears, and concerns, and expectations of health care professionals</p>	<p>Share concerns, in a constructive and respectful manner, about goals of care when they are not felt to be achievable C1ab</p>	<p>improving function, and palliation</p> <p>Provide information to the family about the expectation of benefit and risks of ECMO, and align with the goals of care</p> <p>TTP1a TTP1b</p>
<p>2.4. Establish a patient-centred management plan</p>		<p>Develop and implement initial management plans F2 F4</p> <p>Integrate clinical assessment, results of investigations and risk assessment to recommend a medical and/or surgical management plan for common problems in Cardiac Surgery F1b</p> <p>Develop and implement plans for perioperative optimization of the patient who is a candidate for cardiac surgery F1b</p> <p>Develop a plan for cardiac surgery, including, as appropriate, strategies for myocardial protection, coronary revascularization, and conduit selection F1b</p> <p>Prescribe appropriate prophylactic measures for infection prevention</p>	<p>Develop and implement management plans C8</p> <p>Recommend an appropriate surgical approach, as relevant C4</p> <p>Recommend an appropriate surgical medical, or percutaneous approach, or appropriate combination of approaches C2</p> <p>Recognize and treat wound complications including but not limited to infections, dehiscence, and mediastinitis C6a</p> <p>Develop and implement management plans for weaning sedative, vasoactive, and/or inotropic agents as well as mechanical ventilation C31</p> <p>Develop and implement management plans that</p>	<p>Establish a patient-centred plan for management and/or patient disposition TTP2</p> <p>Manage the course of therapy with ECMO, including access, anticoagulation/hemostasis and any complications TTP1b</p> <p>Determine the timing and procedure for weaning from ECMO TTP1b</p>

*Throughout this document, phrases such as “patients and their families” 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 guardian, and substitute decision-makers.

Develop medical management plans including but not limited to medication, dietary, and lifestyle modifications as appropriate F3 F7

Apply primary and secondary prevention of ischemic heart disease, including current guidelines

Develop and implement plans to troubleshoot problems and/or complications in patients on cardiopulmonary bypass F8

Develop and implement management plans for complications in cardiac surgery patients F6

Institute and monitor nutrition via enteral or parenteral routes

Ensure that the patient and family are informed about the risks and benefits of each treatment option in the context of best evidence and guidelines

Discuss with the patient and family the degree of uncertainty inherent in all clinical situations

consider all of the patient's health problems and context in collaboration with the interprofessional team C4

Monitor clinical response, identifying the appropriateness of continuing, modifying, or discontinuing treatment C5

Develop, in collaboration with a patient and his or her family, a plan to deal with clinical uncertainty

MEDICAL EXPERT MILESTONES: RESIDENCY

	Transition to discipline	Foundations of discipline	Core of discipline	Transition to practice
3. Plan and perform procedures and therapies for the purpose of assessment and/or management				
3.1. Determine the most appropriate procedures or therapies	Describe the contraindications and, risks for a sternotomy	<p>Describe the indications, contraindications, risks, and alternatives for a given procedure or therapy F1b</p> <p>Gather/assess required information to reach diagnosis and determine correct procedure required F9 F10 C6b C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24 C25 C26 C27 C35 TTP4</p>	<p>Integrate all sources of information to develop a procedural or therapeutic plan that is safe, patient-centred, and considers the risks and benefits of all approaches including, as appropriate, surgical or other therapeutic procedures and myocardial protection C1a C3 C6a C30</p> <p>Integrate planned procedures or therapies into global assessment and management plans</p> <p>Review and revise as appropriate, the plan for surgical approach, conduit vessel and/or myocardial protection C10</p> <p>Select appropriate procedure and/or device for heart failure patients C3</p> <p>Continually monitor the appropriateness of continuing or varying therapies, including discontinuing therapies</p>	<p>Determine the most appropriate procedures or therapies for the purpose of assessment and/or management</p> <p>Select appropriate materials and equipment TTP3</p> <p>Determine the patient's eligibility and suitability for ECMO TTP1a</p>
3.2. Obtain and document informed consent, explaining		Obtain informed consent for commonly performed procedures and therapies, under supervision	Explain the risks and benefits of, and the	Obtain and document informed consent, explaining the risks and

<p>the risks and benefits of, and the rationale for, a proposed procedure or therapy</p>			<p>rationale for a proposed procedure c1b</p> <p>Use shared decision-making in the consent process</p>	<p>benefits of, and the rationale for, a proposed procedure or therapy</p>
<p>3.3. Prioritize procedures or therapies, taking into account clinical urgency and available resources</p>	<p>Recognize and discuss the importance of the triaging and timing of a procedure or therapy</p>	<p>Consider urgency and potential for deterioration, in advocating for the timely execution of a procedure or therapy F1b F4</p>	<p>Triage a procedure or therapy, taking into account clinical urgency, potential for deterioration, and available resources C1a C4 C6a</p> <p>Advocate for a patient’s procedure or therapy on the basis of urgency and available resources TTP7</p>	<p>Prioritize a procedure or therapy, taking into account clinical urgency, potential for deterioration, and available resources</p> <p>Determine the appropriate timing and type of ECMO TTP1a</p>
<p>3.4. Perform procedures in a skilful and safe manner, adapting to unanticipated findings or changing clinical circumstances</p>	<p>Demonstrate effective procedure preparation, including the use of a pre-procedure time-out or safety checklist as appropriate c10</p> <p>Set up and position the patient for a procedure</p> <p>Perform pre-procedural tasks in a timely, skilful, and safe manner</p> <ul style="list-style-type: none"> • Ensure maintenance of sterility • Maintain universal precautions • Ensure safe handling of sharps • Hand-cleanse, gown and glove <p>Perform procedural tasks in a timely skilful and safe manner</p>	<p>Perform pre-procedural tasks in a timely, skilful, and safe manner</p> <ul style="list-style-type: none"> • Apply the aseptic technique as it is used for all procedures • Gather and manage the availability of appropriate instruments and materials for minor procedures • Obtain appropriate assistance • Position the patient appropriately • Mark appropriate side/site • Prepare the operative site • Cleanse the operative site • Demonstrate appropriate draping of the patient • Deliver pre-procedural anesthesia if appropriate <p>Identify procedural landmarks using clinical assessment or imaging as appropriate</p>	<p>Competently perform discipline-specific procedures</p> <ul style="list-style-type: none"> • Axillary/femoral artery exposure and cannulation • Institution of effective myocardial protection using a variety of delivery methods • Coronary artery bypass grafting using a range of arterial and venous conduits • Aortic root replacement using a variety of prosthetic devices • Aortic valve replacement • Replacement of ascending aorta • Mitral valve replacement • Tricuspid valve replacement • Tricuspid annuloplasty • Repair of traumatic injuries to the chest including thoracic aortic tears, cardiac lacerations, 	<p>Perform procedures in a skilful and safe manner, adapting to unanticipated findings or changing clinical circumstances TTP3</p> <ul style="list-style-type: none"> • Redo sternotomy • Reconstruction of sternum • Repair of elective thoracic aortic aneurysms • Complex aortic valve surgery • Simple CABG • Pericardial window • Resection of atrial myxoma • Mitral annuloplasty <p>Participate in discipline specific procedures in a safe manner</p> <ul style="list-style-type: none"> • Repair of emergent aortic dissections • Aortic root replacement using a

Perform common procedures in a skilful, fluid, and safe manner with minimal assistance c10

- Resuscitation of a patient with trauma
- Management of airway problems, including performance of a tracheostomy
- **Sternotomy** c10
- Thoracotomy
- Central venous and arterial cannula insertion for parenteral nutrition, dialysis and hemodynamic monitoring
- Chest tube insertion
- Femoral artery access and sheath insertion
- Harvest of venous and arterial conduits for coronary artery bypass grafting
 - Saphenous vein harvest and leg closure
 - Radial artery harvest
 - Internal thoracic artery harvest
- **Institution of CPB using a variety of cannulation techniques and devices** c10
- **Appropriate conduct of CPB** c10
 - Pericardial aspiration
 - Pericardial window/biopsy
 - Exposure of large arteries: femoral; external iliac; carotid
 - Small vessel anastomosis (i.e. AV fistula)
 - Fasciotomy

Provide operative assistance

- great vessel injury, and lung lacerations
- Implantation of various types of pacemakers: single/dual chamber, epicardial/endocardial leads, automatic implantable cardiac defibrillators (AICDs)
- Resection of cardiac tumours
- Pericardial aspiration
- Pericardiectomy
- Non-redo thoracoabdominal incision
- Insertion of intraaortic balloon pumps
- Institution of extracorporeal membrane oxygenation (ECMO)
- Large vessel anastomosis
- Thrombectomy/embolectomy
- Prosthetic graft-graft anastomosis
- Atrial septal defect repair
- Management of complications of coronary artery disease (CAD): VSD, mitral insufficiency, LV aneurysm repair
- Wound debridement

Demonstrate skills of minimally invasive cardiothoracic surgery

Recognize CPB related complications at initiation c10

Initiate algorithms for weaning from CPB c30

- variety of prosthetic devices
- cardiac reoperations
- Emergency CABG
- Mitral valve repair
- pericardiectomy

Institute CPB TTP3

Institute appropriate myocardial protection TTP3

Assess adequacy of perfusion and cannula placement TTP1b

Wean CPB TTP3

- Demonstrate how to provide operative assistance as necessary for the safe and effective performance of operative procedures
- Take direction from a lead surgeon

Use operative assistance appropriately

- Recognize when to use operative assistance as necessary for the safe and effective performance of operative procedures
- Demonstrate an understanding of personal technical limitations
- Direct assistants

Demonstrate effective manipulation of wires in large vessels for diagnostic and therapeutic purposes

- Diagnostic coronary angiogram
- Left ventriculogram
- Right heart catheterization

Perform bedside cardiac echocardiography skilfully, obtaining images needed for clinical care

Perform echocardiographic guidance of pericardiocentesis F5

Perform a limited transthoracic 2D-echocardiogram

Obtain standard echocardiographic parasternal, apical, and subcostal views F5

Adapt weaning protocols to patient status, including but not limited to hemostasis related issues C30 TTP3

Document procedures accurately C6a

Establish and implement a plan for post-procedure care C31

Adjust echocardiographic instrument settings appropriately to optimize image quality F5

Assess left and right ventricular size, ascending aorta diameter, and inferior vena cava size by echocardiogram F5

Evaluate central filling pressures using the inferior vena cava F5

Patient correctly prepared and positioned, understands approach and required instruments, prepared to deal with probable complications

TTD1 TTD2 F9 F10 C6b C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24 C25 C26 C27 C28 C29 C35 TTP4

Efficiently performs steps, avoiding pitfalls and respecting soft tissues

TTD1 TTD2 F9 F10 C6b C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24 C25 C26 C27 C28 C29 C35 TTP4

3D spatial orientation and able to position instruments/hardware where intended

F9 F10 C6b C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24 C25 C26 C27 C28 C29 C35 TTP4

Appropriate complete post procedure plan

F9 F10 C6b C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24 C25 C26 C27 C28 C29 C35 TTP4

Obvious planned course of procedure with economy of movement and flow

F9 F10 C6b C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24 C25 C26 C27 C28 C29 C35 TTP4

		Seek assistance as needed when unanticipated findings or changing clinical circumstances are encountered		
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MEDICAL EXPERT MILESTONES: RESIDENCY

Transition to discipline

Foundations of discipline

Core of discipline

Transition to practice

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

4.1. Implement a patient-centred care plan that supports ongoing care, follow-up on investigations, response to treatment, and further consultation

Provide appropriate post-procedural care, including surveillance for complications

Ensure follow-up on results of investigation and response to treatment
F3

Identify patients that would benefit from referral to other specialists F6

Identify patients that would benefit from coronary revascularization and consult with senior colleagues for timely referral F2

Coordinate investigation, treatment, and follow-up plans when multiple physicians and healthcare professionals are involved
F6

Establish plans for ongoing care C7 C30

Determine the necessity and appropriate timing of referral to other healthcare professionals C1a C5 C7

Arrange for post-operative surveillance of patients, as appropriate, including aortic pathology, valvular disease, and long-term mechanical support devices

Implement a patient-centred care plan that supports ongoing care, follow-up on investigations, response to treatment, and further consultation

Establish a plan for ongoing monitoring and care TTP1a

MEDICAL EXPERT MILESTONES: RESIDENCY

	Transition to discipline	Foundations of discipline	Core of discipline	Transition to practice
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	<p>Recognize the occurrence of a patient safety incident</p> <p>Differentiate outcomes of medical conditions and diseases from complications related to the inherent risks of treatments and from patient safety incidents</p>	<p>Prioritize the initial medical response to adverse events to mitigate further injury</p> <p>Incorporate, as appropriate, into a differential diagnosis, harm from health care delivery</p>	<p>Identify patient safety or near miss incidents C34</p> <p>Report patient safety incidents to appropriate institutional representatives</p> <p>Recognize near-misses in real time and respond to correct them, preventing them from reaching the patient</p> <p>Identify potential improvement opportunities arising from harmful patient safety incidents and near misses C34</p> <p>Participate in an analysis of patient safety incidents</p>	<p>Recognize and respond to harm from health care delivery, including patient safety incidents</p> <p>Identify potential improvement opportunities arising from performance data TTP6</p>
5.2. Adopt strategies that promote patient safety and address human and system factors	<p>Describe common types of cognitive and affective bias</p> <p>Describe the principles of situational awareness and their implications for medical practice</p>	<p>Use cognitive aids such as procedural checklists, structured communication tools, or care paths, to enhance patient safety F8</p> <p>Describe strategies to address human and system factors on clinical practice</p>	<p>Apply the principles of situational awareness to clinical practice C10</p> <p>Consider system factors in the analysis of the safety event C34</p>	<p>Adopt strategies that address human and system factors in clinical practice TTP6</p>

COMMUNICATOR MILESTONES: RESIDENCY

	Transition to discipline	Foundations of discipline	Core of discipline	Transition to practice
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	Communicate using a patient-centred approach that facilitates patient trust and autonomy and is characterized by empathy, respect, and compassion F6			
1.2. Optimize the physical environment for patient comfort, dignity, privacy, engagement, and safety	Mitigate physical barriers to communication to optimize patient comfort, privacy, engagement, and safety	Optimize the physical environment for patient comfort, privacy, engagement, and safety F1a		
1.3. Recognize when the perspectives, values, or biases, of patients, physicians, or other health care professionals may have an impact on the quality of care, and modify the approach to the patient accordingly			Recognize when the values, biases, or perspectives of patients, physicians, or other health care professionals may have an impact on the quality of care, and modify the approach to the patient accordingly	

<p>1.4. Respond to a patient's non-verbal behaviours to enhance communication</p>	<p>Identify, verify and validate non-verbal cues on the part of patients and their families</p> <p>Use appropriate non-verbal communication to demonstrate attentiveness, interest, and responsiveness to the patient and family</p>		<p>Respond to patients' non-verbal communication and use appropriate non-verbal behaviours to enhance communication with patients</p>	
<p>1.5. Manage disagreements and emotionally charged conversations</p>		<p>Recognize when personal feelings in an encounter are valuable clues to the patient's emotional state</p>	<p>Recognize when strong emotions (such as anger, fear, anxiety, or sadness) are impacting an interaction and respond appropriately</p> <p>Establish boundaries as needed in emotional situations</p>	<p>Manage disagreements and emotionally charged conversations</p>
<p>1.6. Adapt to the unique needs and preferences of each patient and to his or her clinical condition and circumstances</p>		<p>Assess a patient's decision-making capacity</p>	<p>Tailor approaches to decision-making to patient (or family) capacity, values, and preferences <small>C2</small></p>	<p>Adapt to the unique needs and preferences of each patient and to his or her clinical condition and circumstances</p>

2. Elicit and synthesize accurate and relevant information, incorporating the perspectives of patients and their families

<p>2.1. Use patient-centred interviewing skills to effectively gather relevant biomedical and psychosocial information</p>		<p>Conduct a patient-centred interview, gathering all relevant biomedical and psychosocial information for any clinical presentation</p> <p>Integrate and synthesize information about the patient's beliefs, values, preferences, context, and expectations with biomedical</p>	<p>Actively listen and respond to patient cues <small>C1b</small></p> <p>Integrate biopsychosocial information obtained from a patient-centred interview <small>C1a</small></p>	<p>Use patient-centred interviewing skills to effectively gather relevant biomedical and psychosocial information</p>
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		and psychosocial information F7		
2.2. Provide a clear structure for and manage the flow of an entire patient encounter		Conduct a focused and efficient patient interview, managing the flow of the encounter while being attentive to the patient's cues and responses F1a	Manage the flow of challenging patient encounters, including those with angry, distressed, or excessively talkative individuals	Provide a clear structure for and manage the flow of an entire patient encounter
2.3. Seek and synthesize relevant information from other sources, including the patient's family, with the patient's consent		Seek and synthesize relevant information from other sources, including the patient's family, with the patient's consent F4 C3		

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 assessing patient and family understanding	Communicate the diagnosis, prognosis and plan of care in a clear, compassionate, respectful, and accurate manner to the patient and family Recognize when to seek help in providing clear explanations to the patient and family	Use strategies to verify and validate the understanding of the patient and family with regard to the diagnosis, prognosis, and management plan F3 F6 F7	Provide information on diagnosis, prognosis, and plan of care in a clear and compassionate manner C1b C2 C3 Convey information related to the patient's health status, care, and needs in a timely, honest, and transparent manner C1a C6a C7	Communicate clearly with patients and others in the setting of ethical dilemmas
3.2. Disclose poor outcomes or harmful patient safety incidents to patients and their families accurately and appropriately	Describe the steps in providing disclosure after a patient safety incident		Communicate the reasons for unanticipated clinical outcomes to patients and disclose patient safety incidents C6a	Disclose patient safety incidents to the patient and family accurately and appropriately Plan and document follow-up to harmful patient safety incident

Apologize appropriately for a harmful patient safety incident

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

<p>4.1. Facilitate discussions with patients and their families in a way that is respectful, non-judgmental, and culturally safe</p>	<p>Conduct an interview, demonstrating cultural awareness</p>	<p>Explore the perspectives of the patient and others when developing care plans ^{F7}</p> <p>Communicate with cultural awareness and sensitivity</p>		<p>Facilitate discussions with the patient and family in a way that is respectful, non-judgmental, and culturally safe</p>
<p>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</p>				<p>Assist the patient and family to identify, access, and make use of information and communication technologies to support care and manage health</p>
<p>4.3. Use communication skills and strategies that help patients and their families make informed decisions regarding their health</p>	<p>Demonstrate steps to obtaining informed consent</p>	<p>Answer questions from the patient and family about next steps ^{F6 F7}</p>	<p>Use effective communication skills and strategies, such as body posture, language at the appropriate level, and periodic checks for understanding ^{C1b}</p> <p>Answer questions from the patient and family ^{C1b} ^{C2 C7}</p>	<p>Use communication skills and strategies that help the patient and family make informed decisions regarding their health</p>

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

<p>5.1. Document clinical encounters in an accurate, complete, timely, and accessible manner, in compliance with regulatory and legal requirements</p>	<p>Organize information in appropriate sections C1c</p> <p>Maintain accurate and up-to-date problem lists and medication lists</p>	<p>Document information about patients and their medical conditions in a manner that enhances intra- and interprofessional care</p> <p>Document clinical encounters to adequately convey clinical reasoning and the rationale for decisions F1b F2 F3 F6 C3</p> <p>Write and/or dictate a clear consultation, discharge summary, or clinic note</p>	<p>Adapt record keeping to the specific guidelines of their discipline and the clinical context C6a</p> <p>Identify and correct vague or ambiguous documentation</p> <p>Dictate a concise, clear description of a surgical procedure</p> <p>Document the consent discussion in an accurate and complete manner C1b</p> <p>Document all relevant findings and investigations C1c</p> <p>Convey clinical reasoning and the rationale for decisions C1c</p> <p>Document the plan for ongoing management C1c</p> <p>Complete clinical documentation in a timely manner C1c</p>	<p>Document clinical encounters in an accurate, complete, timely and accessible manner, and in compliance with legal and privacy requirements</p> <p>Document surgical procedures in an accurate, complete, timely and accessible manner, and in compliance with legal and privacy requirements</p>
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<p>5.2. Communicate effectively using a written health record, electronic medical record, or other digital technology</p>		<p>Demonstrate reflective listening, open-ended inquiry, empathy, and effective eye contact while using a written or electronic medical record</p>	<p>Adapt use of the health record to the patient’s health literacy and the clinical context</p>	<p>Communicate effectively using a written health record, electronic medical record, or other digital technology</p>
<p>5.3. Share information with patients and others in a manner that respects patient privacy and confidentiality and enhances understanding</p>	<p>Assess patients’ needs and preferences with respect to methods of information sharing</p>		<p>Adapt written and electronic communication to the specificity of the discipline and to the expectations of patients</p>	<p>Share information with patients and others in a manner that respects patient privacy and confidentiality and enhances understanding</p>

COLLABORATOR MILESTONES: RESIDENCY

	Transition to discipline	Foundations of discipline	Core of discipline	Transition to practice
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-centered collaborative care	Compare and contrast enablers of and barriers to collaboration in health care	<p>Respect established rules of their team ^{F8}</p> <p>Establish positive relationships with ICU, ward, operating room and advanced practice nurses, and other members of the health care team</p> <p>Receive and appropriately respond to input from other health care professionals ^{F1b F8}</p> <p>Differentiate between task and relationship issues among health care professionals</p>	<p>Anticipate, identify, and respond to patient safety issues related to the function of a team</p> <p>Apply a team approach to patient care ^{C5}</p>	<p>Establish and maintain healthy relationships with physicians and other colleagues in the health care professions to support relationship-centered collaborative care</p> <p>Establish positive relationships with other members of the health care team ^{TTP7}</p>
1.2. Negotiate overlapping and shared responsibilities with physicians and other colleagues in the health care professions in episodic and ongoing care	Discuss the role and responsibilities of a specialist in Cardiac Surgery	<p>Describe the roles and scopes of practice of other health care providers related to Cardiac Surgery</p> <p>Work effectively with other physicians and health professionals ^{F8}</p>	<p>Consult as needed with other health care professionals, including other physicians ^{C4 C6a}</p> <p>Delegate responsibilities to members of the health care team appropriate to their scope of practice and level of expertise ^{C8 C31}</p>	<p>Negotiate overlapping and shared care responsibilities with physicians and other colleagues in the health care professions ^{TTP2}</p> <p>Make effective use of the scope and expertise of other health care professionals ^{TTP5}</p>
1.3. Engage in respectful shared decision-making with physicians and	Discuss with the patient and family any plan for involving	Integrate the patient's perspective and context	Communicate effectively with physicians and other	Engage in respectful shared decision-making

<p>other colleagues in the health care professions</p>	<p>other health care professionals, including other physicians, in the patient's care</p>	<p>into the collaborative care plan F1b F4 F6</p> <p>Consult other health professionals appropriately with regard to patients' social, rehabilitative, and nutritional concerns F7</p> <p>Professional and effective communication/utilization of staff TTD1 TTD2 F9 F10 C6b C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24 C25 C26 C27 C28 C29 C35 TTP4</p>	<p>health care professionals C5 C6a C7 C8 C10 C30 C31 TTP7</p> <p>Provide timely and necessary written information to colleagues to enable effective relationship-centered care</p> <p>Convey plan for surgical approach to the operating team C10</p>	<p>with physician and other colleagues in the health care professions TTP1a TTP1b</p> <p>Use referral and consultation as opportunities to improve quality of care and patient safety by sharing expertise</p> <p>Address the questions and concerns of the referring/primary care physician when acting in the consultant role TTP5</p> <p>Provide accurate, timely, and relevant written information to the referring/primary care physician TTP5</p>
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2. Work with physicians other colleagues in the health care professions to promote understanding, manage differences, and resolve conflicts

<p>2.1. Show respect toward collaborators</p>	<p>Convey information thoughtfully</p> <p>Respond to requests and feedback in a respectful and timely manner</p>	<p>Actively listen to and engage in interactions with collaborators</p>	<p>Delegate tasks and responsibilities in an appropriate and respectful manner C9b TTP3 TTP5</p>	<p>Show respect toward collaborators</p> <p>Develop and support constructive relationships with hospital administrators and/or regional, provincial and federal government agencies and representatives</p>
<p>2.2. Implement strategies to promote understanding, manage differences, and resolve conflict in a manner that supports a collaborative culture</p>		<p>Identify communication barriers between health care professionals</p> <p>Communicate clearly and directly to promote understanding, manage</p>	<p>Gather the information and resources needed to manage differences and resolve conflicts among collaborators</p> <p>Analyze team dynamics</p>	<p>Implement strategies to promote understanding, manage differences, and resolve conflicts in a manner that supports a collaborative culture</p>

		<p>differences, and resolve conflicts</p> <p>Listen to understand and find common ground with collaborators</p>	<p>Gain consensus among colleagues in resolving conflicts</p>	<p>Achieve consensus when there are differences in recommendations provided by other health care professionals TTP7</p>
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3. Hand over the care of a patient to another health care professional to facilitate continuity of safe patient care

<p>3.1. Determine the necessity and timing of when care should be transferred to another physician or health care professional</p>		<p>Identify patients requiring handover to another physician or health care setting F2 F6</p>	<p>Determine if/when care should be transferred back to the referring/primary care physician C7</p> <p>Identify patients requiring handover to other physicians or health care professionals C4</p>	<p>Determine when a patient should be transferred to ensure optimal patient care TTP2</p>
<p>3.2. Demonstrate safe handover of care, using both oral and written communication, during a patient transition to a different health care professional, setting, or stage of care</p>	<p>Describe specific information required for safe and effective handover during transitions in care</p> <p>Provide clear reports at occasions of transfer of care</p>	<p>Communicate with the receiving physicians or health care professionals during transitions in care, clarifying issues after transfer as needed F2</p> <p>Communicate with the patient's primary health care professional about the patient's care F7</p> <p>Summarize the patient's issues in the transfer summary, including plans to deal with the ongoing issues C31</p>	<p>Organize the handover of care to the most appropriate physician or health care professional C4</p> <p>Analyze gaps in communication between health care professionals during transitions in care</p> <p>Recognize and act on patient safety issues in the transfer of care C31</p>	<p>Demonstrate safe transfer of care, both verbal and written, during patient transitions to a different healthcare professional, setting, or stage in care</p> <p>Provide appropriate advice for immediate management, and in preparation for transfer, as relevant TTP2</p>

LEADER MILESTONES: RESIDENCY

Transition to discipline

Foundations of discipline

Core of discipline

Transition to practice

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

<p>1.1. Apply the science of quality improvement to contribute to improving systems of patient care</p>	<p>Describe quality improvement methodologies</p>	<p>Compare and contrast the traditional methods of research design with those of improvement science</p> <p>Compare and contrast systems of theory with traditional approaches to quality improvement</p> <p>Seek data to inform practice and engage in an iterative process of improvement</p>	<p>Analyze and provide feedback on processes seen in one's own practice, team, organization, or system</p> <p>Participate in a patient safety and/or quality improvement initiative</p> <p>Demonstrate awareness of guidelines for reporting valve surgery results</p>	<p>Apply the science of quality improvement to contribute to improving systems of patient care</p> <p>Perform a root cause analysis</p>
<p>1.2. Contribute to a culture that promotes patient safety</p>		<p>Participate actively in scheduled quality assurance rounds</p>	<p>Actively encourage all involved in health care, regardless of their role, to report and respond to unsafe situations</p> <p>Engage patients and their families in the continuous improvement of patient safety</p> <p>Model a just culture to promote openness and increased reporting</p>	<p>Contribute to a culture that promotes patient safety</p>
<p>1.3. Analyze patient safety incidents to enhance systems of care</p>	<p>Describe the available supports for patients and health care professionals when patient safety incidents occur</p>		<p>Analyze harmful patient safety incidents and near misses to enhance systems of care <small>C34</small></p>	

<p>1.4. Use health informatics to improve the quality of patient care and optimize patient safety</p>	<p>Describe the data available from health information systems in their discipline to optimize patient care</p>		<p>Map the flow of information in the care of their patients and suggest changes for quality improvement and patient safety</p> <p>Use data on measures of clinical performance during team discussions and to support team decision-making</p>	<p>Use health informatics to improve the quality of patient care and optimize patient safety</p>
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2. Engage in the stewardship of health care resources

<p>2.1. Allocate health care resources for optimal patient care</p>	<p>Describe the costs of common diagnostic and therapeutic interventions relevant to their discipline</p>	<p>Describe models for resource stewardship in health care used at the institutional level</p> <p>Consider costs when choosing care options _{F2}</p> <p>Describe triage for the surgical wait list, including rationale, and the additional or upgrading of patients</p>	<p>Use clinical judgment to minimize wasteful practices</p> <p>Develop practice-based and system-based rules for resource allocation</p> <p>Allocate health care resources for optimal patient care _{C8 TTP1a TTP3 TTP5 TTP7}</p> <p>Allocate limited resources among individual patients considering utility and efficacy _{C3}</p>	<p>Apply knowledge of the available local health care resources _{TTP2}</p>
<p>2.2. Apply evidence and management processes to achieve cost-appropriate care</p>		<p>Apply evidence and guidelines with respect to resource utilization in common clinical scenarios</p>	<p>Determine cost discrepancies between best practice and their current practice</p>	<p>Apply evidence and management processes to achieve cost-appropriate care</p>

			Optimize practice patterns for cost-effectiveness and cost control	
3. Demonstrate leadership in professional practice				
3.1. Demonstrate leadership skills to enhance healthcare	Analyze their own leadership styles, including strengths, weaknesses, and biases		Contribute to a health care change initiative	
3.2. Facilitate change in health care to enhance services and outcomes		Analyze patient feedback to help improve patient experiences and clinical outcomes Describe key health policy and organizational issues in their discipline	Develop a strategy for implementing change in health care with patients, physicians, and other health care professionals Analyze ongoing changes occurring in health care delivery	Facilitate change in health care to enhance services and outcomes
4. Manage career planning, finances, and health human resources in a practice				
4.1. Set priorities and manage time to integrate practice and personal life	Align priorities with expectations for professional practice	Build relationships with mentors Organize work using strategies that address strengths and identify areas to improve in personal effectiveness	Integrate supervisory and teaching responsibilities into the overall management of the clinical service ^{c8} Organize work to manage clinical, scholarly, and other responsibilities ^{c33}	Set priorities and manage time to integrate practice and personal life Manage time effectively in the ambulatory clinic TTP5 Review and act on test results in a timely manner TTP5
4.2. Manage a career and practice	Review opportunities for practice preparation, including choices available for further training	Examine personal interests and seek career mentorship and counselling	Reconcile expectations for practice with job opportunities and workforce needs	Manage a career and a practice Manage OR booking and

	<p>Maintain a portfolio and reflect professional development</p>		<p>Adjust educational experiences to gain competencies necessary for future independent practice</p> <p>Describe remuneration models as they pertain to their discipline</p> <p>Plan practice finances, considering short- and long-term goals</p> <p>Assume a leadership role in the management of complex cases <small>c5</small></p> <p>Apply leadership skills to enhance patient care in the operating room <small>c10</small></p> <p>Run the service efficiently, safely, and effectively <small>c8</small></p>	<p>scheduling <small>TTP5</small></p> <p>Demonstrate leadership skills in surgical practice <small>TTP3</small></p>
<p>4.3. Implement processes to ensure personal practice improvement</p>	<p>Describe how practice standardization can improve quality of health care</p>		<p>Improve personal practice by evaluating a problem, setting priorities, executing a plan, and analyzing the results</p>	<p>Implement processes to ensure personal practice improvement</p>

HEALTH ADVOCATE MILESTONES: RESIDENCY

Transition to discipline

Foundations of discipline

Core of discipline

Transition to practice

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

<p>1.1. Work with patients to address determinants of health that affect them, and their access to needed health services and resources</p>	<p>Analyze a given patient’s needs for health services or resources related to the scope of Cardiac Surgery</p>	<p>Demonstrate an approach to working with patients to advocate for health services or resources</p> <p>Assess patients for risk factors for cardiovascular disease and advise appropriate interventions F7</p>	<p>Facilitate timely patient access to services and resources C2 C8</p>	<p>Work with patients to address the determinants of health that affect them and their access to needed health services or resources</p>
<p>1.2. Work with patients and their families to increase opportunities to adopt healthy behaviours</p>	<p>Identify resources or agencies that address the health needs of patients</p>	<p>Select patient education resources related to Cardiac Surgery F7</p> <p>Educate the patient and family about information and communication technologies to improve health F7</p>	<p>Apply the principles of behaviour change during conversations with patients about adopting healthy behaviours</p>	<p>Work with the patient and family to increase opportunities to adopt healthy behaviours</p>
<p>1.3. Incorporate disease prevention, health promotion, and health surveillance into interactions with individual patients</p>		<p>Work with the patient and family to identify opportunities for disease prevention, health promotion, and health protection F7</p> <p>Apply appropriate secondary prevention strategies for cardiac vascular diseases, according to current</p>	<p>Evaluate with the patient the potential benefits and harms of health screening</p> <p>Recommend screening for relatives of patients with identified genetic associations, such as Marfan’s and DiGeorge syndromes</p>	<p>Incorporate disease prevention, health promotion, and health surveillance activities into interactions with individual patients</p>

guidelines F3 F4 F7

2. Respond to the needs of communities or populations they serve by advocating with them for system-level change in a socially accountable manner

<p>2.1. Work with a community or population to identify the determinants of health that affect them</p>		<p>Identify communities or populations they serve who are experiencing health inequities</p>	<p>Analyze current policy or policy developments that affect the communities or populations they serve</p>	<p>Work with a community or population to identify the determinants of health that affect them</p>
<p>2.2. Improve clinical practice by applying a process of continuous quality improvement to disease prevention, health promotion, and health surveillance activities</p>	<p>Participate in health promotion and disease prevention programs relevant to their practice</p>	<p>Identify patients or populations that are not being served optimally in their clinical practice</p>	<p>Report epidemics or clusters of unusual cases seen in practice, balancing patient confidentiality with the duty to protect the public's health</p>	<p>Improve clinical practice by applying a process of continuous quality improvement to disease prevention, health promotion, and health surveillance activities</p>
<p>2.3. Contribute to a process to improve health in the community or population they serve</p>		<p>Partner with others to identify the health needs of a community or population they serve</p>	<p>Appraise available resources to support the health needs of communities or populations they serve</p> <p>Distinguish between potentially competing health interests of the individuals, communities, and populations they serve</p> <p>C3</p>	<p>Contribute to a process to improve health in the communities or populations they serve</p> <p>Support the activity of local and national organizations promoting health advocacy</p>

SCHOLAR MILESTONES: RESIDENCY

	Transition to discipline	Foundations of discipline	Core of discipline	Transition to practice
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	Describe physicians' obligations for lifelong learning and ongoing enhancement of competence	<p>Create a learning plan in collaboration with a designated supervisor identifying learning needs related to Cardiac Surgery and career goals</p> <p>Use technology to develop, record, monitor, revise, and report on learning in medicine</p> <p>Demonstrate a structured approach to monitoring progress of learning in the clinical setting</p>	Review and update earlier learning plan(s) with input from others, identifying learning needs related to all CanMEDS Roles to generate immediate and longer-term career goals	Develop, implement, monitor, and revise a personal learning plan to enhance professional practice
1.2. Identify opportunities for learning and improvement by regularly reflecting on and assessing their performance using various internal and external data sources	Maintain a surgical procedural log	<p>Identify, record, prioritize and answer learning needs that arise in daily work, scanning the literature or attending formal or informal education sessions</p> <p>Apply knowledge learned to service rounds</p>	Seek and interpret multiple sources of performance data and feedback, with guidance, to continually improve performance	<p>Identify opportunities for learning and improvement by regularly reflecting on and assessing their performance using various internal and external data sources</p> <p>Seek and interpret multiple sources of performance data to continuously improve performance <small>TTP6</small></p>
1.3. Engage in collaborative learning to continuously improve personal practice and contribute		Identify the learning needs of a health care team		Engage in collaborative learning to continuously improve personal practice and contribute to collective

to collective improvements in practice				improvements in practice
2. Teach students, residents, the public, and other health care professionals				
2.1. Recognize the influence of role-modeling and the impact of the formal, informal, and hidden curriculum on learners		Identify behaviours associated with positive and negative role-modelling	Use strategies for deliberate, positive role-modelling Is a positive role model c9b	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		Explain how power differentials between learners and teachers can affect the learning environment	Create a positive learning environment c9b Ensure a safe learning environment for all members of the team c9a	
2.3. Ensure patient safety is maintained when learners are involved		Identify unsafe clinical situations involving learners and manage them appropriately	Balance supervision and graduated responsibility, ensuring the safety of patients and learners Is available and accessible to junior learners c9b Provide opportunities for appropriate clinical responsibility c9b Supervise learners to ensure they work within their limitations c9a	Ensure patient safety is maintained when learners are involved
2.4. Plan and deliver learning activities		Demonstrate basic skills in teaching others, including peers	Describe how to formally plan a medical education session	Plan and deliver a learning activity

			<p>Describe sources of information used to assess learning needs</p> <p>Define specific learning objectives for a teaching activity</p> <p>Describe clinical teaching strategies relevant to their discipline</p> <p>Present the information in an organized manner to facilitate understanding C32</p> <p>Provide clinical teaching and/or other informal learning activities C9a</p> <p>Use audio aids effectively C32</p>	
2.5. Provide feedback to enhance learning and performance		Provide written or verbal feedback to other learners, faculty and other members of the team	Provide feedback to enhance learning and performance C9a C9b	Role-model regular self-assessment and feedback-seeking behaviour
2.6. Assess and evaluate learners, teachers, and programs in an educationally appropriate manner			Appropriately assess junior learners	Assess and evaluate learners, teachers, and programs in an educationally appropriate manner

3. Integrate best available evidence into practice

3.1. Recognize practice uncertainty and knowledge gaps in clinical and other		Recognize uncertainty and knowledge gaps in clinical and other professional	Generate focused questions that address practice uncertainty and knowledge gaps C32	
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<p>professional encounters and generate focused questions that can address them</p>		<p>encounters relevant to Cardiac Surgery</p>		
<p>3.2. Identify, select, and navigate pre-appraised resources</p>		<p>Contrast the various study designs used in medicine and the quality of various pre-appraised resources</p>	<p>Identify, select, and navigate pre-appraised resources C32</p>	
<p>3.3. Critically evaluate the integrity, reliability, and applicability of health-related research and literature</p>		<p>Critically evaluate the integrity, reliability, and applicability of health-related research and literature F11 C33</p> <p>Interpret study findings, including a critique of their relevance to their practice C32</p> <p>Determine the validity and risk of bias in a source of evidence F11 C32</p>	<p>Evaluate the applicability (external validity or generalizability) of evidence from a resource C34</p> <p>Describe study results in both quantitative and qualitative terms</p>	
<p>3.4. Integrate evidence into decision-making in their practice</p>		<p>Discuss the barriers to and facilitators of applying evidence into practice</p> <p>Describe how various sources of information, including studies, expert opinion, and practice audits, contribute to the evidence base of medical practice</p>	<p>Identify new evidence appropriate to their scope of professional practice through quality-appraised evidence-alerting services C32</p> <p>Integrate best evidence and clinical expertise C32</p> <p>Integrate best evidence and clinical expertise into decision-making C8 TTP2 TTP7</p>	<p>Integrate best evidence and clinical expertise into decision-making in their practice</p>

			Incorporate evidence and guideline recommendations into clinical decision making C3	
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 healthcare			Contribute to a scholarly investigation or the dissemination of research findings in their discipline	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		Discuss and provide examples of the ethical principles applicable to research and scholarly inquiry relevant to Cardiac Surgery Identify ethical principles in research F11 C33	Incorporate gender, cultural and ethnic perspectives in research methodology	Identify ethical principles for research and incorporate them into obtaining informed consent, considering harm and benefits, and considering vulnerable populations
4.3. Contribute to the work of a research program relevant to cardiac surgery practice		Compare and contrast the roles and responsibilities of members of a research team and describe how they differ from clinical and other practice roles and responsibilities F11 Secure a supervisor's commitment for a scholarly project F11	Actively participate as a research team member, balancing the roles and responsibilities of a researcher with the clinical roles and responsibilities of a physician C33	Contribute to the work of a research program
4.4. Pose questions amenable to scholarly		Describe and compare the common methodologies used	Collect data for a scholarly project C33	Pose medically and scientifically relevant and

<p>investigation and select appropriate methods to address them</p>		<p>for scholarly inquiry in Cardiac Surgery F11</p> <p>Generate focused questions for scholarly investigation F11 C33</p> <p>Select appropriate methods of addressing a given scholarly question F11 C33</p>	<p>Perform data analysis C33</p> <p>Identify, consult, and collaborate with content experts and others in the conduct of scholarly work C33</p> <p>Integrate existing literature and findings of data collection C33</p> <p>Identify areas for further investigation C33</p>	<p>appropriately constructed questions amenable to scholarly investigation</p>
<p>4.5. Summarize and communicate to professional and lay audiences, including patients and their families, the findings of relevant research and scholarly inquiry</p>		<p>Summarize and communicate to peers the findings of applicable research and scholarship</p> <p>Summarize the findings of a literature review F11 C33</p>	<p>Communicate relevance of literature in clinical practice through presentations, including but not limited to journal clubs</p> <p>Summarize and communicate the findings of research and scholarly inquiry C33</p>	<p>Summarize and communicate to professional and lay audiences, including patients and their families, the findings of applicable research and scholarly inquiry</p> <p>Prepare a manuscript suitable for publication in a peer-reviewed journal</p>

PROFESSIONAL MILESTONES: RESIDENCY

	Transition to discipline	Foundations of discipline	Core of discipline	Transition to practice
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	<p>Consistently prioritize the needs of patients and others to ensure a patient's legitimate needs are met</p> <p>Demonstrate punctuality</p> <p>Complete assigned responsibilities</p>	Independently manage specialty-specific issues surrounding confidentiality, intervening when confidentiality is breached	<p>Manage complex issues while preserving confidentiality</p> <p>Intervene when behaviours toward colleagues and learners undermine a respectful environment</p> <p>Exhibit appropriate professional behaviours C4 C10 C30 C31 TTP3 TTP5 TTP7</p>	<p>Exhibit appropriate professional behaviours and relationships in all aspects of practice, reflecting honesty, integrity, humility, dedication, compassion, respect, altruism, respect for diversity, and maintenance of confidentiality</p> <p>Respond punctually to requests from patients or other health care providers TTP2 TTP5</p>
1.2. Demonstrate a commitment to excellence in all aspects of practice			Analyze how the system of care supports or jeopardizes excellence	<p>Demonstrate a commitment to excellence in all aspects of practice</p> <p>Maintain a log of procedures and their outcomes TTP6</p>
1.3. Recognize and respond to ethical issues encountered in practice			Manage ethical issues encountered in the clinical and academic setting	Recognize and respond to ethical issues encountered in independent practice
1.4. Recognize and manage conflicts of interest			Proactively resolve real, potential, or perceived conflicts of interest transparently and in accordance with ethical, legal, and moral obligations	Recognize and manage conflicts of interest in independent practice

<p>1.5. Exhibit professional behaviours in the use of technology-enabled communication</p>			<p>Intervene when aware of breaches of professionalism involving technology-enabled communication</p>	<p>Exhibit professional behaviours in the use of technology-enabled communication</p>
<p>2. Demonstrate a commitment to society by recognizing and responding to societal expectations in health care</p>				
<p>2.1. Demonstrate accountability to patients, society, and the profession by responding to societal expectations of physicians</p>		<p>Manage tensions between societal and physician's expectations</p> <p>Describe the tension between the physician's role as advocate for individual patients and the need to manage scarce resources</p>	<p>Demonstrate a commitment to the promotion of the public good in health care, including stewardship of resources</p> <p>Demonstrate a commitment to maintaining and enhancing competence C32 TTP6</p>	<p>Demonstrate accountability to patients, society, and the profession by recognizing and responding to societal expectations of the profession</p>
<p>2.2. Demonstrate a commitment to patient safety and quality improvement</p>		<p>Demonstrate a commitment to patient safety and quality improvement through adherence to institutional policies and procedures F2</p> <p>Monitor institutional and clinical environments and respond to issues that can harm patients or the delivery of health care</p>	<p>Demonstrate a commitment to patient safety and quality improvement initiatives within their own practice environment C34</p>	

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

<p>3.1. Fulfil and adhere to the professional and ethical codes, standards of practice, and laws governing practice</p>			<p>Describe how to respond to, cope with, and constructively learn from a complaint or legal action</p> <p>Demonstrate accountability to the profession and society with regard to the impact of decisions that are made</p> <p>Describe the relevant codes, policies, standards, and laws governing physicians and the profession including standard-setting and disciplinary and credentialing procedures</p>	<p>Fulfill and adhere to the professional and ethical codes, standards of practice, and laws governing practice</p>
<p>3.2. Recognize and respond to unprofessional and unethical behaviours in physicians and other colleagues in the health care profession</p>	<p>Respond to peer-group lapses in professional conduct</p>		<p>Describe and identify regulatory codes and procedures relevant to involving a regulatory body in a case of serious unprofessional behaviour or practice</p>	<p>Recognize and respond to unprofessional and unethical behaviours in physicians and other colleagues in the health care professions</p>
<p>3.3. Participate in peer assessment and standard-setting</p>			<p>Participate in the review of practice, standard setting and quality improvement activities</p> <p>Participate in the assessment of junior learners</p> <p>Prepare a morbidity and mortality report or chart review <small>c34</small></p>	<p>Participate in peer assessment and standard-setting</p>

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

<p>4.1. Exhibit self-awareness and effectively manage influences on personal wellbeing and professional performance</p>		<p>Manage the impact of physical and environmental factors on performance</p> <p>Maintain capacity for professional clinical performance in stressful situations <small>F2 F8 C4 C5</small></p>	<p>Demonstrate knowledge of occupational hazards for cardiac surgeons, and implement measures to minimize those risks</p>	<p>Exhibit self-awareness and effectively manage influences on personal wellbeing and professional performance <small>TTP3</small></p>
<p>4.2. Manage personal and professional demands for a sustainable practice throughout the physician life cycle</p>	<p>Recognize evolving professional identity transitions and manage inherent stresses</p>	<p>Describe the influence of personal and environmental factors on the development of a career plan</p>	<p>Manage competing personal and professional priorities</p>	<p>Manage personal and professional demands for a sustainable practice throughout the physician life cycle</p>
<p>4.3. Promote a culture that recognizes, supports, and responds effectively to colleagues in need</p>		<p>Use strategies to mitigate the impact of patient safety incidents</p>	<p>Support others in their professional transitions</p>	<p>Promote a culture that recognizes, supports, and responds effectively to colleagues in need</p> <p>Provide mentorship to colleagues</p>