

## Cardiac Surgery Training in Canada – Thoughts of a Resident

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Cardiac surgery is changing, new catheter based technology, minimally invasive and robotic coronary artery bypass grafting (CABG) and mitral valve surgery, expanding surgical treatment of heart failure with mechanical support and stem cell transplantation and percutaneous aortic valve and mitral valve surgery are just some of the future endeavours in cardiac surgery. Training in cardiac surgery during these times is difficult. Trying to decide on the direction of one's training is not easy, gone are the times when an extra year in off-pump CABG was all that was needed to obtain a job in cardiac surgery. Not only are there a paucity of jobs these days but the amount of basic training and extra subspecialty training the current trainees have to do is enormous. With the cardiac surgery specialty changing so much residency training must change in parallel. It is with the following that I think cardiac surgery training in Canada is excellent.

Years ago Canada began to train cardiac surgeons directly out of medical school, with two years of core general surgery training followed by focused training in cardiac surgery and its related subspecialties, like vascular surgery, thoracic surgery and pediatric cardiac surgery. This allowed the time for basic training to be completed in a shorter amount of time. It is with this in mind that many cardiac surgery programs in the USA are adopting a similar approach. This change was driven by the fact that it is not appropriate anymore to train cardio-vascular-thoracic surgeons. There is so much to learn that each division has branched out into its own entity. In my opinion the focused training in basic cardiac surgery and with it the earlier introduction of the trainees to the technical aspects of the specialty is the first strength of the cardiac surgery residency training in Canada.

The next change I believe will be training in a division of cardiac sciences. This would be the close partnership between cardiac surgery and cardiology. Cardiac surgery training in Canada is already adopting this idea in the fact that in Canada cardiac surgery residents already perform 9 months of cardiology rotations, including, general cardiology, coronary care unit, electrophysiology, diagnostic interventional cardiology, interventional cardiology, echocardiography and heart failure rotations. This has grown in the last 3-4 years with the realization that bridging the gap between cardiologist and cardiac surgeons will only enhance both

specialties. This is clearly illustrated by the new Mazankowski Heart Institute in Edmonton, Alberta, Canada in which cardiologist, cardiac surgeons and pediatric cardiac surgeons all work together in one state of the art institute. Working much closer together with our cardiology colleges is another strength of the cardiac surgery residency training in Canada.

Finally, the six year training program in cardiac surgery designates one year for enrichment training. This year can be academic or clinical in nature and is solely in the hands of the trainee to set up. This year is outstanding in that it allows for academic work if in the future the trainee sees him/herself as being a clinical scientist or clinical work in a highly specialized subspecialty in cardiac surgery if in the future the trainee sees him/herself as a pure clinician. Further this year is completely sponsored by the trainee's home program taking away the hassle of trying to find money to complete such away rotations. As mentioned before it is not enough to perform basic cardiac surgery training, trainees these days must find something that will make them more marketable, this involves a clinical forte. This enrichment year can be used as precursor to obtaining basic catheter skills or introducing oneself to the art of robotic surgery in an away rotation. These rotations done at a more junior level (usually post graduate year – 4) don't allow the trainee to be considered to be specialized in such a field but allow the trainee to be introduced to the future of cardiac surgery with the plan of completing an official fellowship in such subspecialties in the future.

I truly believe that the future of cardiac surgery is very bright and changes in the specialty and changes in the clinical training as mentioned above will allow trainees in cardiac surgery to be well prepared for what the future holds. I hope the changes that the Canadian cardiac surgery training program has introduced can be adapted to enhance the clinical and academic training of cardiac surgery in Poland, which I hope to be a part of in the very near future.

The following are the Canadian cardiac surgery objectives in training and cardiac surgery specialty training requirements as published by the Royal College of Physicians and Surgeons of Canada (RCPSC). I'd like to sincerely thank the RCPSC for their permission to publish the two documents.

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## OBJECTIVES OF TRAINING IN CARDIAC SURGERY

2005

(Please see also the "Policies and Procedures" booklet.)

### DEFINITION

Cardiac Surgery is that branch of surgery concerned with diseases of the pericardium, heart and great vessels. The resident who has completed training in Cardiac Surgery is expected to function as an independent consultant with respect to the diagnosis and management of patients with cardiovascular disease, including the provision of surgical intervention when indicated and postoperative care.

### GENERAL OBJECTIVES

On completion of the educational program, the graduate physician will be competent to function as a consultant in Cardiac Surgery. Residents must demonstrate the knowledge relating to gender, culture and ethnicity pertinent to cardiac surgery. In addition, all residents should demonstrate an ability to incorporate gender, cultural and ethnic perspectives in research methodology, data presentation and analysis. Appropriate roles for the cardiac surgeon include: medical expert and clinical decision maker, communicator, collaborator, manager, health advocate, scholar, and research scientist. As a dedicated professional, and consistent with the obligations of a physician, the cardiac surgeon must endeavour to deliver highest quality care with integrity, honesty and compassion, exhibit appropriate personal and interpersonal professional behaviours and practice medicine ethically giving priority to the needs of individual patients. Continuing education and evaluation are expected throughout the cardiac surgeon's professional life including an appreciation of the role of research and the need for critical analysis of current scientific and practice developments related to the specialty.

### SPECIFIC OBJECTIVES

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

#### Medical Expert/Clinical Decision-Maker

##### *General Requirements:*

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

##### *Specific Requirements:*

1. Acquire knowledge of the principles essential to care of cardiac surgical patients including:
  - 1.1 thoracic incisions and other relevant incisions for the surgical approach to conduit harvest and vascular access;
  - 1.2 wound complications and their management including sepsis: causes, prevention, presentation, treatment;
  - 1.3 surgical nutrition;
  - 1.4 anticoagulation: indications, complications, management of heparin induced thrombocytopenia;
  - 1.5 cardiac medications: inotropes, antiarrhythmics, vasoactive agents; use and complications;

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- 1.6 recognition and management of concomitant medical conditions including diabetes, renal failure, respiratory failure;
  - 1.7 principles of diagnosis and management of the trauma patient particularly thoracic injury;
  - 1.8 recognition and management of vascular, neurological and general surgical complications in cardiac patients including peptic ulcer disease, hepatobiliary disease, limb ischemia, etc;
  - 1.9 natural history, presentation, investigation and management of extracranial cerebral vascular disease, particularly when presenting with cardiac disease; and
  - 1.10 anesthetic management including the use of sedatives, analgesics and local anesthetic agents.
2. Acquire the following clinical skills:
- 2.1 Recommend appropriate surgical approach.
  - 2.2 Recognize and treat wound complications including infections, dehiscence, mediastinitis and prescribe appropriate prophylactic measures for infection prevention.
  - 2.3 Institute and monitor surgical nutrition via enteral or parenteral route.
  - 2.4 Recognize need for and appropriate use of cardiac medications.
  - 2.5 Manage patients with concomitant medical problems including control of diabetes and other endocrine imbalances, renal failure, respiratory insufficiency.
  - 2.6 Diagnose and institute appropriate management of trauma patients.
  - 2.7 Diagnose and institute appropriate management of gastrointestinal complications in cardiac patients.
  - 2.8 Diagnose and institute appropriate management of generalized atherogenesis.
  - 2.9 Recommend appropriate investigations and therapeutic interventions for patients with cerebrovascular disease, particularly when presenting with concomitant cardiac disease.
3. Acquire the following technical skills:
- 3.1 Perform sternotomy and thoracotomy incisions: understand and perform techniques for safe redo sternotomy.
  - 3.2 Perform wound debridement, resuturing of sternum.
  - 3.3 Insert central venous and arterial cannulas for parenteral nutrition, dialysis and hemodynamic monitoring.
  - 3.4 Insert chest tubes, resuscitate trauma patients.
  - 3.5 Perform repair of traumatic injuries to chest including thoracic aortic tears, cardiac lacerations, and lung lacerations.
  - 3.6 Implant appropriate devices including pacemaker and defibrillator systems, intraaortic balloon pumps and other cardiopulmonary support devices.
  - 3.7 Manage airway problems including performance of tracheostomy.

The following specific objectives describe the knowledge, clinical and technical skills required of a physician upon completion of the educational program in cardiac surgery. The list of operations included under technical skills is neither exclusive nor compulsory but rather is included as a guide.

**1. CARDIOPULMONARY BYPASS**

**1.1. Knowledge**

- 1.1.1. Use and pathophysiology of cardiopulmonary bypass including deleterious effects.
- 1.1.2. Design and function of components of cardiopulmonary bypass circuits including alternate types of pumps and oxygenators.
- 1.1.3. Catastrophic complications of cardiopulmonary bypass (CPB).
- 1.1.4. Effects of CPB on inflammatory, coagulation and hematological systems as well as end organ damage.

**1.2. Clinical Skills**

- 1.2.1. Recommend appropriate method of CPB including cannulation, temperature management.
- 1.2.2. Recognize and manage catastrophic complications including air embolism, mechanical failure of CPB equipment, clotting on CPB.
- 1.2.3. Recognize deleterious effects of CPB and recommend methods to minimize them.

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1.3. **Technical Skills**

- 1.3.1. Institute CPB using a variety of cannulation devices and techniques.
- 1.3.2. Conduct bypass appropriately including venting and cooling techniques.
- 1.3.3. Institute appropriate action for CPB accidents.

2. **MYOCARDIAL PROTECTION**

2.1. **Knowledge**

- 2.1.1. Mechanisms of myocardial injury and their prevention.
- 2.1.2. Myocardial metabolic pathways and their response to ischemia and reperfusion.
- 2.1.3. Cardioplegia composition, temperature, alternate delivery methods and assessment of myocardial protection.

2.2. **Clinical Skills**

- 2.2.1. Recognize the need for myocardial protection and recommend appropriate methods to achieve it.

2.3. **Technical Skills**

- 2.3.1. Institute effective myocardial protection using a variety of delivery methods.
- 2.3.2. Demonstrate ability to assess effectiveness of protection.

3. **ISCHEMIC HEART DISEASE**

3.1. **Knowledge**

- 3.1.1. Principles of management of patients with ischemic heart disease.
- 3.1.2. Anatomy and physiology of coronary circulation and effects of obstruction.
- 3.1.3. Pathophysiology of atherosclerosis and acute ischemic syndromes.
- 3.1.4. Principles and use of imaging techniques for myocardial ischemia including electrocardiography (EKG), stress tests, coronary angiography, nuclear medicine scans, stress echocardiography.
- 3.1.5. Medical and surgical management of chronic coronary insufficiency including indications, timing and outcomes for revascularization.
- 3.1.6. Management of unstable angina and acute myocardial infarction and its complications including ischemic ventricular septal defect (VSD), cardiac rupture and mitral insufficiency.
- 3.1.7. Role of primary and secondary prevention; current recommendations.

3.2. **Clinical Skills**

- 3.2.1. Use and interpret appropriately tests of myocardial ischemia.
- 3.2.2. Use and interpret appropriately tests of myocardial viability including differentiation of stunned/hibernating myocardium from necrotic/scar tissue.
- 3.2.3. Recognize and manage acute and chronic coronary ischemia.
- 3.2.4. Recommend appropriate timing of alternative treatment strategies including medical, interventional catheterization and surgical treatment.
- 3.2.5. Recognize and recommend treatment for complications of coronary ischemia including low cardiac output, ischemic VSD, mitral insufficiency.
- 3.2.6. Provide appropriate risk reduction recommendations and use appropriate drug therapy properly.

3.3. **Technical Skills**

- 3.3.1. Perform myocardial revascularization using a range of venous and arterial conduits and other relevant techniques.
- 3.3.2. Perform surgical repair of complications of ischemia: repair of VSD, mitral insufficiency, left ventricular aneurysm and ventricular remodelling.
- 3.3.3. Insert intraaortic balloon pumps and ventricular assist devices.

#### 4. VALVULAR HEART DISEASE

##### 4.1. **Knowledge**

- 4.1.1. Principles of medical and surgical management of patients with valvular heart disease.
- 4.1.2. Anatomy of the cardiac valves and relationships to adjacent structures.
- 4.1.3. Natural history of all forms valvular heart disease.
- 4.1.4. Principles and use of imaging techniques for valvular heart disease including cardiac auscultation, echocardiography including transesophageal echocardiography (TEE), cardiac catheterization and hemodynamic evaluation, magnetic resonance imaging (MRI).
- 4.1.5. Indications for medical and surgical intervention.
- 4.1.6. Alternative surgical approaches to cardiac valves.
- 4.1.7. Advantages and disadvantages of available valve repair methods/prostheses.
- 4.1.8. Techniques for valve surgery including methods of valve repair, aortic root enlargement, and management of complications of valve surgery.
- 4.1.9. Guidelines for reporting valve results including time-related multivariable analysis of morbidity/mortality.

##### 4.2. **Clinical Skills**

- 4.2.1. Use and interpret appropriately tests of valvular heart disease.
- 4.2.2. Recommend and institute appropriate medical therapy for valve patients including antifailure medication and anticoagulants.
- 4.2.3. Recommend appropriate timing of surgical intervention.
- 4.2.4. Recommend appropriate valve operation and prosthesis.
- 4.2.5. Recognize complications of valve surgery including residual obstruction / insufficiency, infection, thrombosis, degeneration and recommend treatment.

##### 4.3. **Technical Skills**

- 4.3.1. Perform valve replacements for aortic and mitral valve disease.
- 4.3.2. Perform complex valve operations including mitral valve reconstruction, aortic root enlargement, and stentless valve/homograft/autograft surgery.

#### 5. THORACIC AORTIC PATHOLOGY

##### 5.1. **Knowledge**

- 5.1.1. Principles of management of patients with thoracic aortic disease at an independent consultant level.
- 5.1.2. Anatomy of aorta including its intrathoracic branches and related intrathoracic structures.
- 5.1.3. Pathophysiology of aortic disease including atherosclerotic disease, Marfans, and cystic medial necrosis.
- 5.1.4. Pathophysiology of thoracic and thoracoabdominal aortic aneurysms and dissections.
- 5.1.5. Natural history of aortic disease.
- 5.1.6. Sensitivity and specificity of methods for diagnosing aortic disease including emergencies.
- 5.1.7. Indications for medical and surgical intervention.
- 5.1.8. Methods of surgical repair including choice of conduits, techniques for preventing brain and spinal cord damage, management of complications of aortic surgery.
- 5.1.9. Indications for postoperative surveillance of patients, and investigation of relatives.

##### 5.2. **Clinical Skills**

- 5.2.1. Recognize and diagnose thoracic and thoracoabdominal aortic disease including emergency presentations: use appropriate diagnostic tests.
- 5.2.2. Recommend and institute appropriate medical therapy for thoracic and thoracoabdominal aortic pathology including emergency dissections.
- 5.2.3. Recommend appropriate surgical intervention including strategies to minimize neurological and other complications.

##### 5.3. **Technical Skills**

- 5.3.1. Perform repair of thoracic aortic pathology including aneurysms and dissections, using appropriate techniques for distal aortic perfusion and prevention of complications.

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## 6. TRANSPLANTATION AND CARDIAC FAILURE

### 6.1. Knowledge

- 6.1.1. Principles of management of patients with end-stage heart failure.
- 6.1.2. Pathophysiology and endocrinology of heart failure.
- 6.1.3. Natural history of cardiac failure.
- 6.1.4. Indications for medical therapy and pharmacology of available agents.
- 6.1.5. Indications for surgical therapy for heart failure including conventional revascularization, valve surgery, transplantation as well as unconventional therapy including: cardiac resynchronization therapy, left ventricular reduction, and cardiomyoplasty.
- 6.1.6. Indications for alternative transplantation procedures including heart-lung or lung transplantation with repair of cardiac lesions in patients with primary or secondary pulmonary hypertension.
- 6.1.7. Indications for and complications of temporary/permanent mechanical cardiac support.
- 6.1.8. Pathophysiology of brain death, donor management including biochemistry and pharmacology of donor heart preservation.
- 6.1.9. Immunology of rejection, and management of immunosuppression.

### 6.2. Clinical Skills

- 6.2.1. Recognize end-stage cardiac failure.
- 6.2.2. Institute appropriate medical therapy for heart failure.
- 6.2.3. Recommend appropriate surgical therapy including instituting mechanical support, conventional surgery and transplantation.
- 6.2.4. Manage donor patient appropriately including criteria for brain death.
- 6.2.5. Manage immunosuppression and its complications.

### 6.3. Technical Skills

- 6.3.1. Institute mechanical cardiac support.
- 6.3.2. Perform donor heart procurement and cardiac transplantation.

## 7. ELECTROPHYSIOLOGY

### 7.1. Knowledge

- 7.1.1. Principles of management of patients with dysrhythmia.
- 7.1.2. Pathophysiology and electrophysiology of atrial and ventricular dysrhythmia.
- 7.1.3. Pharmacology, indications and results of medical management of dysrhythmia.
- 7.1.4. Indications for and results of medical and surgical treatment for dysrhythmia.
- 7.1.5. Indications for implantation of pacemakers including automatic implantable cardioverter (AICD) devices and management of their complications.

### 7.2. Clinical Skills

- 7.2.1. Recognize and treat patients with dysrhythmia.
- 7.2.2. Recommend appropriate pacemaker device for implantation.
- 7.2.3. Recognize and recommend appropriate treatment for complications of cardiac pacing including pacemaker syndrome and infections.

### 7.3. Technical Skills

- 7.3.1. Implant various types of pacemakers including single and dual chamber, AICD's; endocardial and epicardial leads.
- 7.3.2. Performs atrial and ventricular dysrhythmia surgery.

## 8. CARDIAC TUMOURS

### 8.1. Knowledge

- 8.1.1. Principles of management of patients with cardiac tumours.
- 8.1.2. Incidence, pathology, natural history and presentation of cardiac tumours.
- 8.1.3. Principles and use of imaging techniques for cardiac tumours including echocardiography, cardiac catheterization, computed tomography (CT) and MRI.

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- 8.1.4. Indications for surgical intervention for cardiac tumours.
- 8.1.5. Surgical techniques for resection of cardiac tumours.
- 8.2. **Clinical Skills**
  - 8.2.1. Use and interpret appropriately tests for cardiac tumours.
  - 8.2.2. Recommend appropriate surgical approach for cardiac tumours.
  - 8.2.3. Recommend appropriate follow-up for surgical patients following operation.
- 8.3. **Technical Skills**
  - 8.3.1. Perform surgical resection of appropriate cardiac tumours.

## 9. PERICARDIAL DISEASE

- 9.1. **Knowledge**
  - 9.1.1. Principles of management of patients with pericardial disease.
  - 9.1.2. Anatomy and physiology of the pericardium.
  - 9.1.3. Pathophysiology of the pericardium including congenital and acquired pericardial diseases.
  - 9.1.4. Pathophysiology of acute cardiac tamponade and chronic pericardial constriction.
  - 9.1.5. Principles and use of diagnostic techniques for pericardial pathology including physical examination, echocardiography, CT and MRI.
  - 9.1.6. Role and interpretation of cardiac catheterization and hemodynamic studies as they pertain to pericardial disease.
  - 9.1.7. Indications for medical and surgical intervention for pericardial disease.
  - 9.1.8. Surgical techniques for pericardial disease including relief of cardiac tamponade, pericardectomy.
  - 9.1.9. Principles of postoperative care of patients with pericardial disease.
- 9.2. **Clinical Skills**
  - 9.2.1. Use and interpret appropriately tests of pericardial disease, and recognize cardiac tamponade.
  - 9.2.2. Recommend appropriate medical and surgical intervention for cardiac tamponade and pericardial disease.
  - 9.2.3. Recognize and treat appropriately patients with postpericardotomy syndrome.
- 9.3. **Technical Skills**
  - 9.3.1. Perform pericardial aspiration, biopsy, pericardial window and pericardectomy.

## 10. CONGENITAL CARDIAC SURGERY

- 10.1. **Knowledge**
  - 10.1.1. Principles essential to care of neonatal, infants, pediatric, and adult congenital cardiac patients including:
    - 10.1.1.1. Embryology and nomenclature of congenital cardiac defects.
    - 10.1.1.2. Physiology and pathophysiology of fetal, neonatal and pediatric circulations.
    - 10.1.1.3. Principles of intensive care management of pediatric cardiac patients including ventilator management, inotropes, treatment of pediatric dysrhythmia and the manipulation of the pulmonary and systemic circulations.
    - 10.1.1.4. Design and functional requirements of CPB circuits for pediatric patients.
    - 10.1.1.5. Principles of CPB management for pediatric cases: myocardial protection strategies, use of profound hypothermia and circulatory arrest.
    - 10.1.1.6. Principles and use of techniques for support of failing circulation in pediatric population.
    - 10.1.1.7. Principles and use of imaging techniques in congenital cardiac disease including auscultation, echocardiography, cardiac angiography and hemodynamic assessment, as well as MRI.
    - 10.1.1.8. Pathophysiology, indications and techniques for repair of simple and complex congenital cardiac defects.

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- 10.1.1.9. Principles of management of adults with congenital cardiac defects including pathophysiology and evaluation of pulmonary vascular disease; indications and contraindications for repair.

**10.2. Clinical Skills**

- 10.2.1. Classify and describe accurately congenital cardiac defects.  
10.2.2. Recognize and recommend appropriate treatment for ill neonates and children including maintenance of ductal patency, and control of pulmonary vascular resistance problems support of systemic circulation.  
10.2.3. Recommend appropriate size of circuit components, and techniques for safe conduct of CPB in all ages of children.  
10.2.4. Recognize signs of cardiac failure in children and recommends appropriate support including inotropes, pacing and use of mechanical support.  
10.2.5. Use and interpret correctly tests for congenital cardiac defects for common congenital defects.  
10.2.6. Recommend appropriate timing of surgery and choice of operation for specific congenital cardiac defects in both children and adults.

**10.3. Technical Skills**

- 10.3.1. Establish cardiopulmonary bypass for most pediatric cases including extracorporeal membrane oxygenation or ventricular assist device where appropriate.  
10.3.2. Repair selected pediatric cases including: coarctation of aorta, patent ductus arteriosus (PDA), vascular rings, epicardial pacemakers, atrial septal defect (ASD), Partial atrioventricular septal defect (AVSD), VSD, and non-neonatal tetralogy.  
10.3.3. Repair most adult congenital lesions including pulmonary valve replacement, hypertrophic cardiomyopathy coarctation of aorta and ASD.

**11. OTHER**

Residents should have the knowledge, clinical skills and technical skills pertinent to cardiac surgery from General Surgery, Thoracic Surgery, Vascular Surgery and Cardiology.

**Communicator**

*General Requirements:*

1. Establish therapeutic relationships with patients and families.
2. Obtain and synthesize relevant history from patients and families, and their communities.
3. Listen effectively.
4. Discuss appropriate information with patients and families, and the health care team.

*Specific Requirements:*

1. In order to achieve these objectives the resident must develop the ability to: Obtain and synthesize relevant history from patients and family.
  - 1.1. Inform patients and families about their condition at an appropriate and understandable level.
  - 1.2. Be sensitive and respond appropriately to issues of gender, culture and ethnicity in dealing with patients and families.
  - 1.3. Write a preliminary report on operations on chart.
  - 1.4. Dictate concise, clear description of operation.
  - 1.5. Write clear consultation note/discharge summary/clinic note.
  - 1.6. Prepare and present ward and intensive care unit (ICU) rounds in an organized manner.
  - 1.7. Participate actively in scheduled rounds.

**Collaborator**

*General Requirements:*

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

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*Specific Requirements:*

1. In order to achieve these objectives the resident must develop the ability to:
  - 1.1. Work with ward, ICU, operating room and expanded role nurses to manage patients appropriately.
  - 1.2. Identify social, rehabilitative, dietetic concerns with patients and consult appropriate allied health professionals.
  - 1.3. Consult and work with medical specialists appropriately.
  - 1.4. Assist allied health professionals through active participation in their training and educational rounds..

**Manager**

*General Requirements:*

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

*Specific Requirements:*

1. In order to achieve these objectives the resident must develop the ability to:
  - 1.1. Understand the importance of and mechanisms to safely utilize resources in a cost-effective manner to benefit all patients.
  - 1.2. Recommend practices to effectively utilize resources including undertaking studies to assess effectiveness of standard care procedures.

**Health Advocate**

*General Requirements:*

1. Identify the important determinants of health affecting patients.
2. Contribute effectively to improved health of patients and communities.
3. Recognize and respond to those issues where advocacy is appropriate.

*Specific Requirements:*

1. In order to achieve these objectives the resident must understand the:
  - 1.1. principles and data supporting primary and secondary prevention of coronary artery disease;
  - 1.2. triage system for the surgical wait list; its rationale, and how patients are added or upgraded; and the
  - 1.3. value of outcomes research for surgical procedures.
2. In order to achieve these objectives the resident must develop the ability to:
  - 2.1. Assess all patients for risk factors for cardiovascular disease and advise appropriate interventions.
  - 2.2. Utilize appropriate lipid lowering agents correctly.
  - 2.3. Participate in outcomes research and assist in disseminating resulting information.
  - 2.4. Develop and support constructive relationships with hospital administrators; Regional, Provincial and Federal Government Agencies and Representatives.
  - 2.5. Support the activity of local and national organizations promoting health advocacy.

**Scholar**

*General Requirements:*

1. Develop, implement and monitor a personal continuing education strategy.
2. Critically appraise sources of medical information.

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3. Facilitate learning of patients, housestaff/students and other health professionals.
4. Contribute to development of new knowledge.

*Specific Requirements:*

1. In order to achieve these objectives the resident must:
  - 1.1. Recognize gaps in knowledge and develop strategies to correct this by self-directed reading, and consulting with other professionals.
  - 1.2. Contribute knowledge learned to service rounds.
  - 1.3. Understand principles and practice of basic and applied research including the scientific method, design and conduct of clinical trails, critical appraisal of literature and the use of statistics.
  - 1.4. Understand need to incorporate gender, cultural and ethnic perspectives in research methodology.
  - 1.5. Prepare and present scheduled rounds.
  - 1.6. Participate actively in scheduled morbidity and mortality conferences.
  - 1.7. Actively participate in journal club.
  - 1.8. Prepare and present clinical research papers at peer-reviewed meetings / publish in medical literature.
  - 1.9. Participate effectively in teaching fellow professionals including junior house staff.

**Professional**

*General Requirements:*

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

*Specific Requirements:*

1. In order to achieve these objectives the resident must develop the ability to:
  - 1.1. Deliver care with integrity, honesty and compassion.
  - 1.2. Understand the professional, legal, and ethical codes to which physicians are bound.
  - 1.3. Recognize self limitations and seek outside assistance where appropriate.
  - 1.4. At all times function professionally at an independent consultant level.
  - 1.5. Be sensitive to and respond appropriately to patients of different social status, ethnic groups, age and gender.

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## **SPECIALTY TRAINING REQUIREMENTS** **IN CARDIAC SURGERY**

*These specialty requirements apply to those who began creditable training on or after 1 June 2000.*

Acceptance to write the Royal College Certification Examination in Cardiac Surgery will require:

### **Pathway 1. Six years of approved residency training. This period must include:**

- 1.1. Twenty-four months of core surgery (see Objectives of Core Surgery)
- 1.2. Six months of approved residency training in Cardiac Surgery
- 1.3. One year of approved senior residency in or under the aegis of accredited programs in some combination of General Surgery, Vascular Surgery or Thoracic Surgery, with up to six months in any one of these disciplines
- 1.4. Six months of approved senior residency training on a dedicated congenital Cardiac Surgery service with a minimum of 3 months on a pediatric cardiac surgery service.
- 1.5. Twelve months of approved senior residency training in adult Cardiac Surgery
- 1.6. Twelve months of academic/clinical enrichment

This year is flexible both in terms of its content and its location within the six years of residency training. For those individuals entering a clinician investigator program, the academic enrichment period could serve as the initial phase of a two or three year program leading to qualifications for a Masters degree or PhD. For other residents, the year, or part of it, might be spent in clinical situations to obtain further training in Vascular Surgery or one of the subspecialty areas within Cardiac Surgery.

*A period of focused training could include:*

- 1.6.1. basic science research and study related to cardiovascular sciences;
- 1.6.2. clinical science research and study related to cardiovascular sciences
- 1.6.3. six months of cardiovascular sciences subspecialty / didactic training including some or all of: Perfusion Science; Cardiology (CCU / consultation, Echo, Cath Lab); Cardiac Pathology; Chest and Vascular Radiology to include tomography, CT scanning, MRI, noninvasive and invasive vascular studies; pacemaker service including pacemaker and defibrillator implantation and clinic-follow-up; cardiac sciences basic research laboratory introductory experience, and / or database management including the concepts and mechanisms of reliability audit, quality appraisal and improvement, risk adjustment and systematic late follow-up. This period of training would provide broad exposure to important subjects that were otherwise not covered during the regular Cardiac Surgery rotations or the core years;
- 1.6.4. highly focused clinical training, for example in transplantation, critical care medicine, great vessel surgery, additional accredited pediatric Cardiac Surgery, new or less common techniques and evolving technologies including: stentless valves, pulmonary autographs, atrial and ventricular dysrhythmia surgery, biventricular assist devices / out-patient ventricular assist programs, and / or alternative surgical approaches for end-stage heart disease which may include cardiomyoplasty, ventriculoplasty, transmymocardial revascularization, multisite / multi chamber pacing, artificial organ development, and clinical / applied research programs related to any of the preceding;
- 1.6.5. surgical education in a specialized program approved for postgraduate qualification in education;
- 1.6.6. combinations of the above.



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Office of Education

Bureau de l'éducation

*Notes regarding Pathway 1:*

The sequence of the requirements listed above does not imply that they must be met in the same order. However, the senior residency training required under Section 1.3., 1.4. and 1.6. should ordinarily be undertaken during the final years of residency.

Senior residency is defined as a period during which the resident is regularly entrusted with the responsibility for pre-operative, operative, and post-operative care. This must include the most difficult problems in adult Cardiac Surgery. No other resident shall intervene between the senior resident and the attending staff surgeon.

OR

**Pathway 2. Full residency training in General Surgery in a Royal College accredited program plus:**

- 2.1. Six months of approved senior residency training on a dedicated congenital Cardiac Surgery service with a minimum of 3 months on a pediatric cardiac surgery service.
- 2.2. Six months of approved Cardiac Surgery residency training if not completed under the aegis of an accredited Cardiac Surgery program during the course of training for General Surgery
- 2.3. Six months of approved senior residency training in Thoracic and / or Vascular Surgery if not completed under the aegis of an accredited Thoracic or Vascular Surgery program during the course of training for General Surgery
- 2.4. Twelve months of academic enrichment as under 1.6. if not completed during General Surgery training,
- 2.5. Twelve months of Senior Residency in Cardiac Surgery.

OR

**Pathway 3. Full training in Thoracic Surgery in a Royal College approved program plus:**

- 3.1. Six months of approved senior residency training on a dedicated congenital Cardiac Surgery service with a minimum of 3 months on a pediatric cardiac surgery service.
- 3.2. Twelve months academic enrichment as under 1.5. if not completed during Thoracic Surgery training (it is recommended that this period include three to six months of senior vascular surgery experience)
- 3.3. Twelve months of Senior Residency in adult Cardiac Surgery.

*Note regarding Pathways 2 and 3:*

All approved Canadian Cardiac Surgery training programs are required to demonstrate adequate resources for the six year pathway. The alternative entry pathways (2 and 3) are detailed to give more advanced candidates a general ideal of the range of additional training that may be required. Partial training in a Royal College approved program may also be recognized at the discretion of the Credentials Committee. It is very important to understand that the specific additional training required by a candidate, under any of the alternate pathways, cannot be assumed by either potential trainees or program directors. For each candidate, request for assessment of prior postgraduate training and for determination of additional training requirements must be submitted to the Office of Education - Credentials of the Royal College. It is prudent to seek approval prior to entering one of the alternative pathways.

Approved: 2000