

## **CA-2 Curriculum for Cardiac Anesthesia**

### **West Virginia University Department of Anesthesiology**

#### **Description of Rotation or Educational Experience**

The goal of this rotation is to teach the essential skills of cardiothoracic anesthesia necessary to provide a foundation on which to build further skills and knowledge in the subspecialty area; to provide a knowledge and skill base for successful anesthetic management of patients with significant cardiac and pulmonary disease undergoing non-cardiac surgery. During this clinical experience, the resident will have priority assignment for cardiac cases with or without cardiopulmonary bypass. A significant amount of thoracic cases will be assigned.

The residents will work at both WVU Ruby Memorial Hospital and Monongalia General Hospital under the supervision of departmental faculty.

Residents will have a thorough understanding of the following:

- Evaluation of the patient with a history of cardiovascular disease; risk assessment of the cardiac patient;
- The impact of the cardiac disease process and the underlying pathophysiology on the proposed cardiothoracic procedure;
- Selection of invasive monitoring devices, the- indications, relative contraindications and complications;
- Cardiovascular effects of anesthetic drugs; high dose narcotic anesthetic techniques
- Pharmacology, selection, use and complications of vasoactive drugs; selecting the drugs for the hemodynamically unstable patient;
- Understanding the principles of extracorporeal circulation / cardiopulmonary bypass (CPB) and circulatory assist devices; initiation of CPB, the CPB circuit, criteria for separation from CPB, failure to separate from CPB
- Understanding the principles of myocardial preservation;
- Understanding the principles of cerebral protection;
- Management of the emergency cardiac patient; complications related the cardiac catheterization
- Management of Off Pump Coronary Artery Bypass (OPCAB) cases;
- Understanding basic transesophageal echocardiography (TEE); conducting, achieving and correlating information from TEE
- Managing transfusion of blood products; indications, advantages vs disadvantages

Faculty members with significant teaching responsibilities in cardiothoracic anesthesia:

- Muhammad Abousamra, MD
- Brian Grose, MD
- E. Stuart Cornett, MD
- Eric Henrickson, MD
- George Ranier, MD

## **Patient Care**

### **Goals**

Residents must be able to provide patient care that is compassionate, appropriate and effective for the treatment of health problems and the promotion of health. Residents are expected to:

- Be able to evaluate patients for cardiac and thoracic procedures.
- Understand cardiac and thoracic pathology and their clinical implications.
- To develop skills to perform specific procedures, pertinent to the cardiothoracic patient.
- Manage the patient during a common cardiothoracic procedure.

### **Competencies**

- Evaluation of the patient with a history of cardiovascular disease; risk assessment of the cardiac patient.
- Setting up the cardiac OR. Selection of appropriate drugs for cardiothoracic anesthesia..
- Management of On Pump Coronary Artery Bypass cases.
- Management of Off Pump Coronary Artery Bypass (OPCAB) cases.
- Managing transfusion of blood products; indications, advantages vs. disadvantages.
- Understanding basic transesophageal echocardiography (TEE).

### **Objectives**

By the end of the rotation the resident will accomplish the following:

- Evaluate a minimum of 15 patients for cardiac surgery.
- Evaluate a minimum of 15 patients for thoracic non-cardiac cases.
- Develop anesthesia plans that are validated by the attending physician.
- Perform a minimum of 15 central line placements.
- Perform a minimum of 15 arterial line placements.
- Perform a minimum of 15 pulmonary artery catheter placement.
- Perform a minimum of 15 thoracic epidurals.
- Perform a minimum of 15 double lumen tube placement.

## **Medical Knowledge**

### **Goals**

Residents are expected to:

- Understand cardiovascular effects of anesthetic drugs; high dose narcotic anesthetic techniques.
- Explain pharmacology, selection, use and complications of vasoactive drugs; selecting the drugs for the hemodynamically unstable patient.

### **Competencies**

Residents will be able to achieve specific skills in the following areas:

- Preanesthetic evaluation of patients with significant cardiothoracic disease; understanding preoperative testing (catheterization, cardiac echo, stress testing, perfusion scans) and their value regarding conduction of anesthesia; ordering

preoperative medication.

- Preparation of the appropriate vasoactive infusions.
- Fluid and blood products management during cardiothoracic surgery; coagulation management during and after the cardiopulmonary bypass.
- Utilization of monitoring devices cardiothoracic anesthesia: invasive blood pressure monitoring, pulmonary artery catheter, TEE and BIS monitor.
- Anesthesia induction for the cardiac patient.
- Management of one-lung ventilation; use of double-lumen tubes.
- Post-op pain management for the cardiothoracic patient.
- Techniques for placement of: arterial lines, central lines, pulmonary artery catheters, thoracic epidurals.
- Use of flexible fiberoptic bronchoscope.
- Transporting cardiac surgical patients safely and efficiently to CTICU.
- Signing-out of the cardiac surgical patient to the ICU staff.

### **Objectives**

- During the last week of the rotation Pass an Oral Examination based upon the American board of Anesthesiology format and scored using ABA criteria Demonstrating appropriate knowledge in the area of cardiothoracic anesthesia.
- Pass a Written Examination during the last week of rotation
- Successful knowledge acquisition as assessed by faculty on Written Formative Evaluations.
- Complete Portfolio Assignment: Faculty assessment of knowledge exhibited in resident casework up of one patient with a cardiac or thoracic pathology. Assessment should include a summary of the pertinent evaluation of the patient and anesthesia plan demonstrating evidenced based medical practice as documented with pertinent literature references.

### **Practice- Based Learning and Improvement**

#### **Goals**

Residents must demonstrate the ability to investigate and evaluate their care of patients, to appraise and assimilate scientific evidence, and to continuously improve patient care based on constant self-evaluation and life long learning. Residents are expected to develop

skills and habits to be able to:

- To be able to identify and access appropriate references to solve cardiothoracic management problems.
- Independently seek answers clinical questions and incorporate this knowledge acquisitions into appropriate management and care plans
- Review the post-anesthetic hospital course of their patients receiving anesthesia for complications or suboptimal and devise alternative management plans that could have improved outcomes
- To be able to access “one –line “ reference sources pertinent to the anesthetic management of patients.

**Competencies**

- Identify personal strengths, deficiencies and limits in knowledge and expertise related to the field of cardiothoracic anesthesia.
- Set learning and improvement goals based on patient and colleague feedback
- Actively participate and seek educational opportunities.
- Systematically analyze anesthesia practice, perioperatively and through post-anesthetic assessment of patients and restructure anesthetic practice based on improved patient outcomes.
- Incorporate formative evaluation feedback into daily practice.
- Incorporate pertinent findings and conclusions of scientific studies to improve cardiac anesthesia outcomes.
- Use information technology to optimize learning.
- Disseminate knowledge acquired for the further education of patients, families, students, residents and other health professionals.

**Objectives**

- Portfolio: Case Management: Residents will identify one patient with a cardiothoracic related co-morbidity, perform a literature search, identify at least 2 references pertinent to the patient and produce a 1 page synopsis of the evaluation, alternatives, their proposed management of the patient, and anticipated possible complications. The resident will review the case with the attending physician and submit copies for inclusion in their portfolio.
- Portfolio: Post-Anesthetic Rounds: Residents will identify 2 patients on post-anesthetic rounds that they feel had suboptimal outcomes. Residents will summarize the anesthetic management of each patient in writing and submit a brief synopsis of alternative management techniques that might have produced more optimal outcome. Residents will review the plans with the attending physician and submit copies for their portfolio.
- During the last week of the rotation Pass an Oral Examination based upon the American Board of Anesthesiology format and scored using ABA criteria Demonstrating appropriate strategies for acquisition of additional skills and knowledge for care and management of the anesthetic of an cardiothoracic patient.
- Successful demonstration of adequate practice- based learning and improvement as assessed by faculty on Written Formative Evaluations

**Systems Based Practice****Goals**

Residents must demonstrate an awareness of and responsiveness to the larger context and system of health care, as well as the ability to call effectively on other resources in the system to provide optimal health care. Residents are expected to:

- Be able to prioritize the delivery of anesthesia and analgesia based on the particularities of the cardiothoracic patient.
- Function as a member of a cardiac team with nurses, surgeons, cardiologists and

perfusionists

**Competencies**

- Work effectively with nurses, surgeons, cardiologists and perfusionists to deliver timely and effective anesthetic care
- Coordinate patient care within the health care system relevant to cardiac anesthesia
- Incorporate considerations of risk-benefit analysis in patient care
- Participate as part of inter-professional team to enhance patient safety and improve patient care quality
- Participate in identifying systems errors and in implementing potential systems solutions

**Objectives**

- Overall satisfactory performance on a 360 evaluation demonstrating satisfactory performance as part of a cardiothoracic patient care team.
- Successful acquisition of patient information from hospital based systems as documented in the resident's Portfolio of patient case presentation.
- During the last week of the rotation Pass an Oral Examination based upon the American Board of Anesthesiology format and scored using ABA criteria Demonstrating appropriate utilization of hospital based resources in preparation and management of anesthetic.
- Successful demonstration of adequate systems based practice as assessed by faculty on Written Formative Evaluations

**Professionalism****Goals**

Residents must demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles. Residents are expected to:

- Provide the highest possible quality cardiothoracic anesthesia care
- Provide a role model to students and related practitioners as to commitment and professional conduct in the care of patients
- Discuss ethical challenges in the care of the cardiothoracic patient
- Express sensitivity to the particular needs of the cardiac patient and family

**Competencies**

- Demonstrates courtesy and respect for patients, nurses, physicians, and ancillary staff
- Demonstrates compassion and integrity for others
- Completes patient care tasks and provides appropriate follow-up and feedback to patient and staff
- Acts in the best interest of the patient
- Advocates quality and timely patient care

- Respects patient privacy and autonomy
- Accountable to patients, society, and the profession
- Sensitivity and responsiveness to a diverse patient population, including but not limited to diversity in age, culture, race, religion, disabilities, and sexual orientation

#### **Objectives**

- Demonstration of professionalism on 360 degree evaluation
- During the last week of the rotation Pass an Oral Examination based upon the American Board of Anesthesiology format and scored using ABA criteria Demonstrating appropriate interpersonal interaction strategies for dealing with anesthesia and thoracic faculty and residents, thoracic nursing staff, surgical technologists, secretarial staff or other support staff.
- Successful demonstration of adequate professionalism as assessed by faculty on Written Formative Evaluations

### **Interpersonal and Communication Skills**

#### **Goals**

Resident must demonstrate interpersonal and communication skills that result in the effective exchange of information and teaming with patients, their families and professional associates. Residents are expected to:

- Effectively obtain pertinent medical history from the cardiac patient.
- Effectively describe available anesthetic options at appropriate age and education specific levels.
- Obtain informed consent for general cardiothoracic anesthesia and regional anesthesia; explain related risks.
- Provide sensitive reassurance while performing regional anesthesia.

#### **Competencies**

- Communicate effectively with the patient and their families across a broad range of socioeconomic and cultural backgrounds
- Communicate effectively with physicians nurses, and ancillary staff.
- Work effectively as a member of the health care team
- Maintain comprehensive, timely, and legible medical records

#### **Objectives**

- Positive assessment of interpersonal and communication skills on 360 degrees evaluation
- During the last week of the rotation pass an oral examination based upon the ABA format and scored using ABA criteria demonstrating appropriate communication skills.
- Successful demonstration of adequate of interpersonal and communication skills as assessed by faculty on Written Formative Evaluations
- Demonstrate effective written communication skills on Portfolio entries

### **Teaching Methods**

- Didactic lectures

- Review and discussion of perioperative evaluations and anesthetic plans
- Intraoperative discussion of pertinent physiologic changes and case management
- Review and discussion of post-anesthetic evaluation
- Case scenario discussions
- Portfolio assignments
- Suggested readings.

### Assessment Method (residents)

- Global Rating Scale
- Chart Stimulated Recall (proposed)

	Patient Care	Med Knowledge	Practice Based Learning	System Based Practice	Professionalism	Communication
Global Rating Scale	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly
Chart Stimulated Recall	Monthly	Monthly	Monthly			

### Assessment Components

Frequent feedback throughout the rotation regarding, technical skills, constant vigilance, appropriateness of assessment of circulatory function and communication skills

- A written evaluation by the subspecialty faculty members assessing, knowledge, case management, judgment, technical and communication skills will be completed at the end of the rotation.
- This evaluation will take into account preoperative case presentation, preparation, discussion of subspecialty topics.

### Assessment Method (Program Evaluation)

How do you evaluate whether this educational experience is effective?

- Assessment of successful Patient Care Competency in oral examinations and faculty evaluations of observations of clinical practice.
- Performance of residents on written and oral examinations
- Performance on the Cardiac Anesthesia subset of In-Service Examinations administered by the American Board of Anesthesiology
- Performance on the Cardiac Anesthesia subset of Anesthesia Knowledge Test
- Performance of program graduates on the Cardiac Anesthesia subset of the written examination of the American Board of Anesthesiology
- Review of Resident Evaluations of Faculty Performance
- Review of Resident Program Evaluations
- Post-graduate assessments of adequacy of training

### Level of Supervision

During the first month of training in cardiothoracic anesthesia a close level of supervision is provided including: extensive discussions about preoperative evaluation and interpretation of hemodynamic data, physically presence of the staff anesthesiologist



from the beginning (i.e. line placement), throughout the case, until the patient is stabilized in the ICU; discussions of intraoperative events and follow-up report on postoperative status.

## **Educational Resources**

### **Recommended readings and references:**

- Handouts prepared by faculty members;
- A Practical Approach to Cardiac Anesthesia. Hensley, Martin and Gravlee; Lippincott Williams & Wilkins 2003 especially chapters 2 and 5-9;
- Anesthesia for Adult Cardiac Surgery by Nyhan and Johns chapter in 2005 Miller;
- Anesthesia for Thoracic Surgery by Wilson and Benumof chapter in 2005 Miller;
- Practical Perioperative Transesophageal Echocardiography (CD-Rom included) by Sidebotham, Merry and Legget, 2003 Elsevier;
- Transesophageal Echocardiography in the Operating Room CD-Rom, Acuson Educational Services.

### **Internet Resources**

- Practice Advisory for the Perioperative Management of Patients with Cardiac Rhythm Management Devices: Pacemakers and Implantable Cardioverter-Defibrillators from ASA website;  
<http://www.asahq.org/publicationsAndServices/CRMDAdvisory.pdf>
- Practice Guidelines for Perioperative Transesophageal Echocardiography from ASA website; <http://www.asahq.org/publicationsAndServices/standards/TEE.pdf>
- Practice Guidelines for Pulmonary Artery Catheterization from ASA website; <http://www.asahq.org/publicationsAndServices/standards/Intravascular.pdf>
- Practice Advisory for Intraoperative Awareness and Brain Function Monitoring from ASA website;  
<http://www.asahq.org/publicationsAndServices/AwareAdvisoryFinalOct05.pdf>

## **Social Justice**

West Virginia University is committed to social justice. We concur with that commitment and expect to maintain a positive learning environment based upon open communication, mutual respect, and non-discrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color, or national group. Any suggestions as to how to further such a positive and open environment in this rotation will be appreciated and given serious consideration.

## **Curriculum Timeline**

Written by Claudiu Bene, M.D., February 23, 2007

Approved by the Anesthesiology Education Committee on 2-26-2007

Revised by Richard Driver, June 2007