

## **Cardiovascular Intensive Care Unit Rotation Objectives**

This Cardiovascular Intensive Care Unit (CVICU) rotation is designed for fellows in Anesthesia Critical Care as well as Cardiothoracic Anesthesia. The population of patients admitted to the CVICU includes cardiac surgery patients, vascular surgery patients, as well as patients on extra-corporeal membrane oxygenation (ECMO) therapy. The **primary objectives** of the CVICU rotation include achieving competence in the management of postoperative care for patients undergoing coronary artery bypass grafting (CABG, including off-pump CABG), cardiac valve repair/replacement (including minimally invasive approaches), surgical treatment of arrhythmias, aortic reconstruction, thoraco-abdominal aortic aneurysm repair (invasive and non-invasive approaches), distal bypass grafting, carotid endarterectomy, as well as complex surgeries for patients with cardiovascular co-morbidities, in addition to achieving competence in management of patients requiring initiation of, therapy from, and weaning off of extra-corporeal membrane oxygenation (both veno-venous and veno-arterial ECMO) and other mechanical circulatory devices such as right- and left- ventricular assist devices.

### **Clinical Faculty Team Members**

- CVICU Intensivists
- Cardiac Surgeons and fellows
- Cardiothoracic Anesthesiologists and fellows
- Cardiac Surgery Physician Assistants and Nurse Practitioners
- CVICU nurses

### **Learning Objectives:**

#### **Patient Care**

Fellows must be able to provide patient care that is compassionate, appropriate, and effective for the treatment of critical care problems. They must demonstrate knowledge of established and evolving biomedical, clinical, epidemiological, and social-behavioral sciences, as well as the application of this knowledge to patient care.

#### **Medical Knowledge**

Fellows must demonstrate basic knowledge and clinical competence in managing the following conditions and topics commonly encountered in the peri-operative management of cardiac and vascular surgery patients:

1. Pathophysiology and clinical management of patients pre- and post-operative with unstable coronary artery disease, cardiomyopathy of multiple etiologies (ischemic,

- congenital, alcoholic, etc), congestive heart failure, cardiac tamponade, valvular heart disease, electrophysiologic disease/arrhythmias, aortic dissections/aneurysms.
2. Non-invasive and invasive cardiovascular evaluation including electrocardiography, transthoracic echocardiography, transesophageal echocardiography, pulmonary artery catheterization, stress testing, and cardiovascular imaging.
  3. Interpretation and understanding of invasive cardiovascular evaluation and therapy including cardiac catheterization, angioplasty and stenting.
  4. Non-invasive pulmonary evaluation including pulmonary function tests, blood gas and acid-base analysis and pulmonary imaging.
  5. Pharmacokinetics and pharmacodynamics of medications prescribed for medical management of adult cardiothoracic patients, including inotropes, chronotropes, vasoconstrictors and vasodilators.
  6. Invasive cardiovascular monitoring and interpretation: arterial, central venous, pulmonary artery, mixed venous saturation and cardiac output.
  7. Post-operative effects of cardio-pulmonary bypass on cardiac, respiratory, neurologic, metabolic, endocrine, hematological, renal systems.
  8. Recognize the parameters used to assess post-operative blood loss and bleeding, and develop understanding for rational use of reversal agents, blood products and transfusion goals and strategies.
  9. Insertion and management of patients with circulatory assist devices including intra-aortic counterpulsation devices; left, right and bi-ventricular assist devices, and extra-corporeal membrane oxygenation.
  10. Knowledge and peri-operative management of pacemaker devices including insertion and modes of action.
  11. Post-operative ventilator management and weaning for patients undergoing fast-track/routine cardiac surgery as well as those with complications and ventilator dependent respiratory failure, such as those patients with Acute Respiratory Distress Syndrome / Acute Lung Injury / Transfusion Related Acute Lung Injury (ARDS/ALI/TRALI).
  12. Post-operative pain management of adult cardiovascular surgery patients.

### **Practice-based Learning and Improvement**

Fellows must exhibit a commitment to investigation and evaluation of one's own patient care as well as appraisal and assimilation of scientific evidence and improvements in patient care. This can be accomplished through regular participation in fellow-level journal clubs and through Quality Improvement (QI) projects such as Root Cause Analysis of cases or participation in Critical Care Morbidity and Mortality conferences.

### **Interpersonal and Communication Skills**

Fellows must demonstrate interpersonal and communication skills that result in the effective exchange of information and collaboration with patients, their families, and health

professionals. This can be demonstrated in the ability to apply understanding of family dynamics in discussions with patients and families regarding complex medical situations and decision-making, to collaborate with team members from other services (as in the co-management of ECMO patients with the cardiology service) and to effectively supervise and manage the care of patients by nurses, physician assistants, and residents in an appropriate yet collegial manner. Fellows can also demonstrate strong interpersonal and communication skills through regular teaching, both informal and formal, of residents and other team members.

### **Professionalism**

Fellows must demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles. Specifically, they must skillfully address ethical issues for patients and families in an adult cardiovascular surgery unit such as goals of care and end-of-life discussions. Fellows must also exhibit professionalism in all aspects of interaction with colleagues and other team members, behaving in a manner befitting an advanced healthcare professional. This can be exhibited by setting a tone of respect and collegiality for the healthcare team members, willingly seeing patients and families to discuss a patient's care, protecting staff, family, and patient interests and confidentiality, and completing medical records punctually and with appropriate documentation.

### **Systems-based Practice**

Fellows must practice in a way that demonstrates an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimum value. In the CVICU, this can be demonstrated through an understanding of resource utilization both within the hospital (which cardiac testing is appropriate, or rational use of circulatory assist devices) as well as in a larger context such as in the evaluation of potential candidates for heart transplant.