Cardiac Surgery Recovery Unit Rotation Objectives

Residents completing the Cardiac Surgery Recovery Unit (CSRU) should achieve competence in the management of routine postoperative care for Coronary Bypass Graft patients, Valve replacement and/or repair (aortic, mitral), aortic valve procedures and heart transplantation. In addition they should gain familiarity with complex cardiac cases involving patients with multiple comorbidities.

Clinical Faculty:

- Cardiac Anesthesiologists
- CSRU Intensivists
- Cardiac Surgeons

Organization of the Rotation:

There is a one-month rotation during the PGY-1 year, a one-month rotation in the PGY-2, PGY-3, or PGY-4 year and a one-month rotation during the PGY-4,5 year. Only during the senior rotation, will in house call be included as a component of the rotation.

Resident Rotation -Teaching Techniques:

Teaching will be through direct clinical experience with consultant guidance during clinical workload. In addition, residents will be expected to attend didactic teaching sessions on Thursday mornings focusing on the clinical approach and management of topics related to cardiac surgery.

Clinical Decision Maker/Medical Expert:

Demonstrate knowledge of the basic sciences as applied to the critical postoperative period following cardiac surgery:

A. Physiology and Anatomy

The resident is expected to:

- Describe the normal coronary anatomy and variants, and normal cardiac physiology and the effects of disease states on the normal physiology.
- Describe the anatomy and physiology of cardiac valves, left ventricle, right ventricle, atria, major cardiac vessels, and circulatory system
- Describe the normal conduction pathways of the heart and its clinical significance in disease.
- Describe the embryologic circulation, development of the heart and fetal physiology as it applies to adult congenital heart disease.
- Describe the altered respiratory physiology of the immediately postoperative ventilated patient with significant surgical incisions and pain (sternotomy, large abdominal incision).

- Describe common physiological changes occurring in the postoperative period and the impact these have on end organ function. (neurologic, renal, cardiac, hepatic, gastro-intestinal).

B. Pharmacology

The resident should know:

- Commonly used cardiac anesthetics and dosages for fast track cardiac anesthesia.
- Heparin, thrombolytics, antiplatelet agents dosages and anesthetic implications
- Protamine for heparin reversal , along with side effects and complications
- Anti-fibrinolytic agents, mechanisms of action and indications.
- The use of blood products (PRBC, FFP, platelets, cryoprecipitate) and blood alternatives (albumin, pentastarch) as well as transfusion reactions and complications.
- Coagulation drugs currently available (DDAVP, activated factor 7a) their indications, contraindications, dosages and complications
- Commonly used vasodilators, vasoconstrictors, inotropic and lusitropic agents, their indications, dosages, and side effects.
- Anti-arrhythmic agents (Procainamide, Amiodarone, Sotalol) for prophylaxis and treatment of post operative atrial fibrillation, SVT and ventricular arrhythmias.
- The use of neuromuscular blockage reversal agents in conjunction with anticholinergic drugs, and their complications (neostigmine, edrophonium, glycopyrrolate, atropine).
- The appropriate use of pain medications, non steroidal anti-inflammatory drugs and regional anesthetic techniques in cardiac surgical patients
- Pharmacology of perioperative risk reduction strategies (lipid lowering agents, B-blocker's, aspirin).

C. Monitoring

The resident will be able to:

- Interpret EKG for ischemia, infarction, arrhythmias and paced rhythms. They will recognize the limitations, and the sensitivity/specificity of EKG as an ischemia monitor.
- Demonstrate principals of non-invasive and invasive BP monitoring and its pitfalls.
- Acquire skills of arterial and central venous cannulation, peripheral venous cannulation, rewiring central venous access, PA catheterization; interpret CVP and data from PA catheter (PAP, PCWP, Cardiac output) and know its indications, complications and management.
- Know basics of introductory TEE, including techniques of probe insertion and several basic views and its implication and application to the critical care patient

- Laboratory monitoring of the coagulation system (PTT, INR, Fibrinogen) as applied to the postoperative cardiac patient.
- Ability to assess the adequacy of mechanical ventilation using clinical parameters (pt size & weight, peak & plateau ventilatory pressures, mode of ventilation in conjunction with patient LOC, tidal volume, rate) and laboratory arterial blood gas analysis including the determination of patients ability to wean from mechanical ventilation.
- Recognize the parameters used to assess postoperative blood loss, and options to treat blood loss including medical and surgical alternatives.
- Know the significance of temperature management in the postoperative period
- Appreciate the indicators of volume status in the special circumstances of postoperative cardiac patients including the findings from invasive monitors, TEE and clinical indicators (urine volume).
- Utilize appropriate ICU bloodwork for the management of patient care.
- Awareness of new monitoring devices (non invasive CO, BIS, NIRS) and potential applications in the CSRU.

D. Clinical Assessment & Management

The resident will be able to:

- Complete a detailed history, physical exam, order appropriate laboratory and ancillary investigations and provide a management plan for a patient admitted to the CSRU.
- Know current indications and recommendations for SBE prophylaxis
- Manage the medical and the first stages of surgical postoperative bleeding
- Identify criteria for intubation, extubation. Be able to wean patients from the ventilator adjusting the modes of ventilatory support.
- Correct common derangements in metabolic and electrolyte disturbances in the postoperative cardiac patient.
- Know the basic principals of cardiac support devices including IABP and extracorporeal membrane oxygenation.
- Know the common pathophysiology and management of patients admitted to a cardiac critical care setting with complications of:
    1) Coronary artery disease, acute myocardial ischemia and infarction, complications of myocardial infarction and thrombolytic therapy
    2) Valvular heart disease and valve replacement or repair
    3) Aortic Dissection, Thoracic and Thoraco-Abdominal Aortic Aneurysm
    4) Shock and the use of volume resuscitation, venodilators/constrictors, ionotropes and luisiotropes
    5) Emergencies requiring ACLS
    6) Cardiac tamponade, constrictive pericarditis
    7) Dilated , restrictive and obstructive cardiomyopathy (IHSS), CHF, and diastolic dysfunction
    8) Aberrant conduction, dysrhythmia, sudden acute and sub-acute ventricular and supra-ventricular arrhythmia
    9) Pacemakers & the indications for and applications of the various modes of temporary pacing

10) Pneumo/hemothorax
11) Pulmonary edema, Pneumonia, CHF
12) COPD, asthma, sleep apnea in the ventilated patient
13) Heparin induced thrombocytopenia and heparin resistance
14) Neurologic sequelae post CPB procedures
15) Gastrointestinal complications
16) Renal failure and its management
17) Diabetes and endocrine control

Communicator:

At the senior level resident will be encouraged to develop their communication skills
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Effective skills will be taught and encouraged at several levels:

- Between Resident Physician and Patient and his/her family
    - Obtaining accurate and relevant history and perform a detailed physical examination using effective listening skills
    - Explain the status of the patient and expected progress to his/her family
    - Effectively communicate to a ventilated patient or a sedated patient
- Between Resident and the CSRU Attending
    - Communicate patient information and outline a management plan to the attending in a professional manner
- Between Resident and Critical Care Team (ICU nurse, RT)
    - Communicate management plan effectively in both routine and emergency situations
- Between Resident and the Surgeon or Specialist
    - Discuss the clinical parameters of possible surgical re-exploration in a calm and intelligent manner
    - Receptive to differing opinions on management decisions
- Between resident and other residents fellows
    - Discuss management issues of patients and planned treatment course during morning hand over rounds.

Collaborator:

Recognize the need to utilize other specialists for the care and management of the critical patient:

- Differentiate the critical differences between medical and surgical postoperative bleeding and collaborate with the surgical specialty
- Consultations with nephrology regarding common complications of post cardiac patients ARF/CRF and other subspecialists
- Foster healthy team relationships

Manager:

Residents are taught:

- Collaborative Care Plans and Fast-track cardiac anesthesiology and surgery in resource optimization
- Time management in coordinating discharge with scheduled surgical admissions and the impact of cancellations of the surgical patient due to limited resources on the patient and family, waiting list, human resource allocations
- To anticipate post CSRU needs of the patient and arranging for it (telemetry)
- To gain knowledge of the resources required to operate a cardiac surgery program, and the implications of patient factors and complications on these required resources.

Health Advocate:

Health Advocacy requires clinical experience at an advanced level. Senior residents will learn from staff in action in this area. Resident will learn:

- The integration of scholarly activities, especially through evidence based best practice, to guide the care of the cardiac surgical patient from pre-operative assessment, intraoperative care and postoperative management, to provide for the best possible outcomes.
- The importance of the cardiac team approach, with involvement of nursing, perfusion, surgery and anesthesia to allow for consultation in patient management.
- To provide a consistent and standard high level of care through continuous quality review with attention focusing on errors within the cardiac care system.

Scholar:

Residents will be encouraged to develop scholarship in several areas:

- Identify important determinants during the cardiac anesthetic that impact the health and success of the fast-track cardiac patient.
- Identify areas of controversy in the management of cardiac patients using clinical observations, literature searches and seek to practice evidence-based medicine using the best available evidence.
- Contribute to the medical education of other health professionals (clerks, medical students, nurses, RTs etc.)
- Develop an educational pattern of self study and critical appraisal of ones own performance and knowledge.
- Participate through attendance, interaction and presentation at rounds including departmental, echocardiographic and cardiac didactic teaching.

Professional:

Residents must:

- Always demonstrate respectful, and compassionate behavior toward patients, their families and other health care providers.
- Demonstrate an appropriate sense of responsibility to themselves and their patients.
- Strive to maintain insight and self-assessment regarding their behavior, learning objectives and achieved goals.
- Remain calm and organized in stressful, or emergency situations.
- Demonstrate appropriate interactions with colleges and staff.

Evaluation:

A one to one interview with the block coordinator at the end of the rotation. Resident feedback is used to improve teaching techniques and rotation specific objectives.