CURRICULUM FOR CARDIOLOGY INPATIENT SERVICE
UC Davis Internal Medicine Residency Program

Faculty Representative: Garrett Wong, MD

Program Director Reviewer: Craig Keenan, MD

Resident Reviewer: Sharon Wang, MD

Creation Date: January 25, 2008

I. Educational Purpose:

Ischemic heart disease remains the number one cause of mortality in our society and it frequently manifests itself in the form of an acute coronary syndrome (ST elevation MI, non ST elevation MI, unstable angina). All other forms of heart disease can also manifest themselves as acute processes with hemodynamic dysfunction, (heart failure or shock) and/or serious arrhythmias (ventricular or supraventricular), as well as symptoms of chest pain and/or dyspnea. The cardiac intensive care unit (CICU) is the hospital’s center for the management of patients with acute manifestations of cardiac disease. Fellows and residents rotate through the Cardiology Inpatient Service (CIS) in order to educate them in diagnostic methods and treatment options, and the indications for these approaches. A cost effective, accurate and safe approach to the utilization of resources is emphasized to educate fellows and residents in optimal patient care and cost effectiveness.

II. Teaching Methods:

A. Direct Supervised Patient Care Activities:

Teaching methods encompass the spectrum from direct supervision at the bedside by the attending physician in history taking and physical examination to interpretation of electrocardiography and echocardiography.

Interns and Residents evaluate patients independently and develop their initial impressions and treatment plan. The patients are then presented to the cardiology fellow and attending and the treatment plan is finalized. Electrocardiograms and echocardiograms on the Cardiology Inpatient Service patients are reviewed with the residents and fellow. CCU echocardiograms may also be reviewed by the inpatient echo service. Nuclear studies and cardiac catheterization data are also reviewed with the fellow by the cardiology attending physician. Physical examination is emphasized and normal and abnormal findings are demonstrated on CIS patients by the cardiology attending physician at the bedside. Each patient is seen and examined on a daily basis by the cardiology attending physician with the fellow and residents and management plans for diagnosis, treatment, and disposition are reviewed.

All procedures and data obtained are interpreted by the resident or fellow under supervision of the cardiology attending faculty. Fellows and residents are trained in the indications for these procedures and in utilization of the clinical history, physical examination and non-invasive methods in selecting patients for coronary angiography. Evidence based medicine is emphasized. Attending physician rounds by the cardiology faculty individual are made with the fellow and residents 7 days per week. Rounds include presentation of all new patients by the resident with bedside examination of the patient by the attending cardiologist with the fellow and resident, and separate didactic teaching rounds in which a basic curriculum is covered as well as review of pertinent, recent articles from the literature.

Integration of medical problems, health promotion, and cultural, socioeconomic, ethical, occupational, environmental, and behavioral issues: Comprehensive care of each patient requires an understanding of cultural, socioeconomic, emotional, and occupational factors in each patient. This component of health care is emphasized to fellows as essential aspects of their interaction with patients for whom they will be offering short
and long term care that includes diagnostic and therapeutic methods with significant impact on the patient’s lifestyle. These will differ in each patient and in each subculture of which we see a wide variety (Caucasian, African-American, Native American, Asian, Pacific, African, Middle Eastern, Western European, Eastern European). The faculty also educate in regard to promotion of favorable health practices such as coronary risk factor modification and compliance with medication, diet and follow-up.

**Emphasize the importance of humanistic qualities:** Respect for patients and their families will be a cornerstone of the approach to patient management transmitted to the fellows. This will be discussed in rounds away from the patients and demonstrated when the patient is seen by the fellow and residents with the faculty member. This approach will be based on sensitivity, courtesy, respect, and empathy for patients and their families.

**B. Didactic teaching conferences:** Didactic teaching is presented at one or more of the cardiology teaching conferences.

   a. Cardiology noon conference: There is a weekly conference every Monday at noon covering a variety of basic cardiovascular topics from general cardiology, electrophysiology, echocardiography, cardiac catheterization, and basic and clinical research topics.

**III. Educational Content**

**A. Mix of diseases:** The mix of diseases cared for by the Cardiology Inpatient Service is diverse and includes acute and chronic cardiac conditions. The more common conditions encountered include coronary artery disease, acute myocardial infarction, acute coronary syndromes, decompensated and compensated systolic and diastolic heart failure, endocarditis, pericarditis, myocarditis, aortic stenosis, mitral regurgitation, aortic insufficiency, atrial fibrillation, ventricular tachyarrhythmias, conduction abnormalities, supraventricular tachyarrhythmias, cardiac pacers and ICDs, syncope, peripheral vascular disease, hyperlipidemia, ischemic and nonischemic cardiomyopathy, and pulmonary embolism.

**B. Patient characteristics, types of clinical encounters, procedures, and services:** The patient population is generally elderly with average age of approximately 60 but with a range from 20 to 100 years old. Males comprise 60-70% of patients seen on the CIS. Socioeconomic status ranges from indigent to professional with no health care coverage to full coverage. Average stay of patients in the CICU itself is 2-3 days, but this ranges from 1 day to several weeks depending on the severity of the underlying illness. Residents and cardiology fellows evaluate patients with acute coronary syndrome for non-invasive management and selection of patients for interventional procedures when indicated (under the supervision and guidance of the cardiology attending faculty). Patients with acute cardiac failure including pulmonary edema, are seen and stabilized with assessment of primary underlying disease and left ventricular (and right ventricular) function, functional capacity by exercise testing is assessed and evidence based medical management is applied for short and long term therapy.

**C. Clinical Venues:** All patients on the CIS are at the University of California Davis Medical Center. They are either in the CICU or on the cardiac floor (Davis 6). Selected cases with severe cardiac dysfunction are referred after stabilization, to our heart failure clinic and referral is also available directly from our CICU to cardiac transplantation at the University of California, San Francisco or Stanford Medical Center for patients with severe, terminal cardiac failure who cannot be stabilized.

**D. Procedures:** Residents may perform the following procedures under direct supervision from cardiology fellows and/or faculty: central venous catheter placement, Swan-Ganz catheter placement, temporary venous pacemaker placement, pericardiocentesis, and arterial line placement.

**E. Ancillary Services:** A full spectrum of ancillary services are utilized in patient care, including nursing, physical and occupational therapy, dietary, social service, pharmacy, pastoral counseling, and consultation readily available from all medical and surgical subspecialties as well as psychiatry.
IV. Educational Goals and Objectives

A. Rotation specific competencies. Residents rotate through the CIS during each of the 3 PGY years. PGY-year specific competencies are outlined below. The competencies are progressive, e.g. PGY 2 should add to PGY 1 competencies. The following areas will be evaluated to determine the progress of residents at the end of the rotation.

B. PGY 1 YEAR

- Patient Care
  - Interns should be able to obtain an accurate and complete history, appropriate for cardiovascular disease, through medical interviews of the patient and family and thorough medical records review (from inside and outside of UCD); perform procedures safely and considerately.
  - Interns should be able to demonstrate an appropriate, focused cardiac physical examination
    - Demonstrate appropriate technique of palpation and auscultation
    - Should be able to assess JVP on the majority of patients seen
    - Should be able to describe and hear murmurs, including aortic stenosis and mitral regurgitation, and common heart sounds, S3 and S4
    - Should be able to recognize pulmonary edema
  - Patient management skills
    - Should be able to read CXR to assess cardiac silhouette, cardiomegaly, and pulmonary edema
    - Will be able to develop an appropriate differential diagnosis for common cardiac complaints and findings, especially for CHF, chest pain, shortness of breath, edema, and elevated troponin I

- Medical Knowledge
  - Must demonstrate appropriate knowledge for diagnosis and treatment of common cardiac conditions, including ACS, CHF, chest pain, SOB, pulmonary edema, endocarditis
  - Interns should have knowledge of use of ACE inhibitors, ARBs, beta-blockers, statins, diuretics, calcium channel blockers, and digoxin in the care of common cardiac conditions
  - Interest in learning and the mechanism of disease
  - Applies an open-minded and analytical approach to acquiring knowledge
  - Will be able to identify the following conditions on ECG: normal, limb-lead reversal, early repolarization, sinus bradycardia and tachycardia, PACs, PVCs, multifocal atrial tachycardia, atrial flutter, atrial fibrillation, AV junctional rhythm, ventricular tachycardia, ventricular fibrillation, torsades de pointes, AV block (1-3rd degree), RBBB, LBBB, LAE, RAE, LVH, RVH, LAD, RAD, myocardial infarction (STEMI and NSTEMI), ST and T wave abnormalities, pericarditis, hyperkalemia

- Practice-Based Learning and Teaching
  - Critiques own performance, receptive to constructive criticism, learns from errors
  - Uses errors to improve patient care on both a personal and system-wide level
  - Uses information sources effectively to support patient care decisions and to educate self, patients and other physicians

- Interpersonal and Communication Skills
  - Develops a good working relationship and rapport and communicates clearly with other physicians, health professionals and patients
  - Interns should be able to present cardiac cases precisely and efficiently, including presenting important test information
  - Maintains comprehensive, timely and legible medical records

- Professionalism
  - Demonstrates respect, compassion and integrity in working with patients, families, colleagues and other health professionals regardless of their background
Adheres to principles of confidentiality, scientific and academic integrity and informed consent
Recognizes and identifies deficiencies in peer performance in a constructive manner
Takes responsibility for patient care; acknowledges mistakes

- **System-Based Practice**
  - Able to work with and within the local and regional medical system to deliver optimal patient care
  - Participates actively in improving the health systems to optimize patient care
  - Will be active in any quality improvement initiatives in place on the CIS service and UCD Medical Center

C. **PGY 2 and PGY 3 Years:**

- **Patient Care**
  - R2 and R3 residents will supervise interns in direct patient care, reviewing all data personally, particularly ECGs.
  - R2 residents will continually demonstrate appropriate treatment of typical cases of common cardiac conditions, including CHF, ACS, Acute MI, elevated troponin, atrial fibrillation with RVR, ventricular tachycardia. R3 residents will demonstrate appropriate treatment even in atypical, more severe cases of the above conditions.

- **Medical Knowledge**
  - R2 and R3 residents will be able to describe basic pathophysiology of CHF, AMI, ACS
  - By end of R3 rotation, residents will understand scientific evidence behind medical and procedural treatment of common cardiac conditions, including CHF, ACS, atrial fibrillation, and CAD
  - By end of R2 year, residents will be able to describe the best practices in cardiac risk reduction
  - R2 residents understand appropriate use of cardiac imaging or procedures, notably indications, risks, and benefits of echocardiography, ETT testing, stress scintigraphy, cardiac catheterization, Swan-Ganz catheterization
  - By end of R3 year, residents will be able to identify the following conditions on ECG: ectopic atrial tachycardia, ectopic atrial focus, AVNRT, AVRT, wandering atrial pacemaker, accelerated AV junctional rhythm, WPW pattern, ventricular bigeminy/trigeminy, AIVR, variable AV Block, short PR interval (not WPW), electrical alternans, LAFB, LPFB, Bifascicular block, SVT with aberrancy, ST or T changes suggesting ventricular aneurysm, ST and/or T changes from LVH or IVCD, evolution of pericarditis, ventricular escape rhythms, hypokalemia, hypercalcemia, ASD, hypothermia
  - Interest in learning and the mechanism of disease
  - Applies an open-minded and analytical approach to acquiring knowledge
  - Accesses and critically evaluates current medical information and scientific evidence

- **Practice-Based Learning and Teaching**
  - R2 and R3 residents will demonstrate self-initiative and efficacy in the use of information sources to access and retrieve materials to support patient care decisions and to educate self, patients and other physicians.

- **Interpersonal and Communication Skills**
  - R2 and R3 residents will ensure appropriate communication to patients, families, fellows, attendings, nurses, and other ancillary staff occurs in a timely manner.
  - R2 and R3 residents will contact fellow or attending physician at any time that they have unanswered questions regarding the treatment of patients.

V. **Ancillary Educational Materials**
A. A syllabus of basic reading references with a brief synopsis is given to the cardiology residents as a reference to aid in making individualized patient recommendations for management. The residents are also referred to the American College of Cardiology website (http://www.acc.org/clinical/statements.htm) where up to date practice guidelines can be found. The syllabus provides the basis for a structured curriculum with goals and objectives for managing a diverse population of patients. The practice guidelines form the basis for formal instruction in risk management, cost effectiveness, and health care policy.

The Division library also has numerous cardiology textbooks, as well as several journals, such as Circulation, Journal of the American College of Cardiology, and the American Heart Journal, for reference. Internal Medicine maintains the Mandelbaum Library on the 6th floor of the South wing which contains numerous cardiovascular textbooks and on-line computers, and the Medical Center maintains a medical library in the Education Building.

B. There is a comprehensive teaching file of ECG’s to reference during teaching and didactic rounds. A list of ECG references is included in the resources list below.

C. A cardiovascular simulation training center is utilized to practice catheterization skills and interpretation.

D. Suggested References


Interpretation Cribsheets. G. Thomas Evans, Jr., M.D. – Both references are available in the UCDMC bookstore

Marriott’s Practical Electrocardiography. Galen Wagner (10th edition – LWW, 2001) is also highly recommended as a basic reference text for electrocardiography

Online Resources

American College of Cardiology Guidelines:
- www.acc.org/clinical/statements.htm

Electrocardiography Websites:
- www.12leadecg.com
- www.library.med.utah.edu/kw/ecg
- www.emedu.org/ecg

VI. Method of evaluation

A. Resident Performance: Faculty provide formative feedback on clinical performance, including documentation, throughout the rotation. At the end of the rotation, the cardiology faculty provides summative feedback by completing web-based electronic resident evaluation forms provided by the Internal Medicine department. The evaluation is competency-based, fully assessing core competency performance. The evaluation will be shared with residents, is available for on-line review by the residents at their convenience, and is sent to the residency office for internal review. The evaluation will become part of the resident file and will be incorporated into the semiannual performance review for directed resident feedback.

B. Program and Faculty Performance: Upon completion of the rotation, the residents will be asked to complete a service evaluation form commenting on faculty, facilities and service experience. These evaluations will be sent to the residency office for review and the rotation coordinator will review anonymous copies of completed evaluation forms periodically.

VII. Definition of Residents’ supervision by Faculty:

The cardiology attending faculty member is responsible for each patient on an inpatient cardiology service which includes the CICU and telemetry units. In daily rounds, each patient is discussed in detail with the fellow and residents, and the faculty sees each new patient with fellow and resident, supervises their history and physical
examinations, and guides them in their patient management. The fellow directly supervises residents in the absence of the attending physician and consults with the attending physician in all patients in whom questions arise regarding management. The degree of independence of the fellow and residents during the hours of faculty absence varies with the experience, seniority and ability of each fellow and residents as well as the nature and complexity of the patients’ disease and condition.

VI. Structure of Rotation

A. **Teams:** The Cardiology rotation is a 4 week rotation for interns, R2 and R3 residents. Teams consist of 1 resident and 1 intern, and there are 4 teams total. A cardiology fellow and attending supervise all 4 teams.

B. **Curriculum Review:** The Cardiology Curriculum is reviewed with the residents at the start of each rotation, and residents are offered the opportunity to ask questions.

C. **Rounds:** Combined teaching and management rounds are held daily starting at 7:30 AM. Residents must be ready for rounds by 7:30 AM. Rounds start preferentially with new patients and old patients on the post-call team so that they get out by 10 AM.

D. **Call:** Resident teams are on call every 4th night from 7 AM to 7 AM, and then leave after rounds. The total duration of this shift will not exceed 30 hours (24 +6). There are always 10 hours between shifts.

E. **Days off:** Residents and interns each take 1 day off in 7, at a minimum.

F. **Clinic:** residents and interns do attend continuity clinic 2 or 3 session per 4 week block.