

**University of Michigan Health System
Internal Medicine Residency
Cardiology Curriculum: Inpatient Service**

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Rotation Goals and Educational Purpose

Cardiovascular disease is not only the leading cause of death in the United States but also a leading cause of hospitalization and medical office visits. Accordingly, diagnosis and management of the most common cardiovascular diseases are essential skills for any general internist. The general internist should be able to provide primary and secondary preventive care and initially manage the full range of cardiovascular disorders. The goals of the inpatient cardiology rotation are therefore to develop advanced preventive, diagnostic and management skills for patients with cardiovascular symptoms and risk factors, and to expand resident knowledge of basic and clinical cardiovascular sciences.

This rotation is mandatory for residents at the HO1 and HO2/3 levels.

Rotation Competency Objectives

In supplement to the University of Michigan Longitudinal Learning Objectives, the following provide an overview of the knowledge, skills, and behaviors promoted in this rotation.

- I. Patient Care and Medical Knowledge
 - a. Disease based knowledge
 - i. By completion of the rotation, HO1 residents should reflect biomedical knowledge of fundamental cardiac disorders, including: ischemic heart disease, hypertensive heart disease, valvular heart disease, common cardiac dysrhythmias (AF, heart block, VT/VF), congestive heart failure, cardiomyopathy, and atherosclerotic vascular disease. They should also recognize major risk factors for cardiovascular disease and reflect awareness of standard cardiovascular preventive care, including dietary advice (salt, cholesterol) and lifestyle modification.
 - ii. Additionally, HO2 residents should reflect knowledge of common cardiovascular conditions as listed under Management below.

- iii. By completion of the rotation, HO3 residents should additionally reflect understanding of common adult congenital heart disease and indications for cardiac transplantation.
- b. History and physical examination
 - i. By completion of the rotation, HO1 residents should be able to obtain a complete, hypothesis-driven, cardiovascular history and perform physical examination maneuvers for the detection of common cardiovascular diseases and conditions.
 - ii. By the conclusion of the rotation, HO2 residents will additionally perform cardiovascular history and physical examinations with appropriate efficiency and increasing autonomy.
 - iii. HO3 residents will efficiently obtain history and physical examination data for complex cardiovascular patients with multiple comorbidities.
- c. Laboratory, ECG, radiology, and functional testing
 - i. HO1 residents will
 - 1. interpret ECGs with sufficient facility to recognize acute coronary syndromes and arrhythmias.
 - 2. understand performance characteristics of common cardiovascular laboratory tests, including troponin, BNP, and CK.
 - 3. demonstrate knowledge of the physiologic basis for common cardiovascular radiologic and functional studies (echocardiogram, stress test), sufficient to request appropriate testing for common cardiovascular conditions.
 - ii. HO2 residents should additionally understand functional characteristics that differentiate specific cardiovascular tests (e.g. chemical v. exercise, nuclear imaging v. echocardiogram), sufficient to select optimal testing for standard patient presentations.
 - iii. HO3 residents should additionally select cardiovascular functional tests based on individualized needs of patients, reflecting awareness of the importance of patient pre-test probability for cardiac disease, co-morbid conditions, and previously obtained clinical data on the final selection of cardiovascular studies. They will understand the statistical predictive value of noninvasive and invasive testing, incorporating both critical assessment of obtained data and Bayesian calculation into final patient-centered test interpretations.
- d. Management of urgent cardiovascular conditions
 - i. By completion of the rotation, HO1 residents are expected to demonstrate knowledge sufficient for initial diagnostic suspicion and management of common urgent cardiovascular conditions, detect “red flags” for potentially unstable conditions, and ensure provision of urgent care within a medically appropriate time frame. They must demonstrate sufficient time-sensitive diagnostic skills to recognize indications for invasive v. non-invasive patient management. HO1 residents must be able to suspect, form an initial diagnostic plan, and initially manage the following conditions with minimal supervision by the end of the rotation:
 - 1. Acute coronary syndrome, including myocardial infarction

2. Acute congestive heart failure
 3. Cardiac tamponade
 4. Hypertensive emergency
 5. Acute hypotension (including arrhythmia)
 6. Acute aortic dissection
- ii. HO2 residents should additionally be able to prioritize and initiate diagnostic and therapeutic evaluation of other common acute cardiovascular conditions.
- e. Management of other common cardiovascular conditions
- i. By completion of HO2, residents must demonstrate knowledge of the etiology, risk factors, preventive interventions, pathophysiology, natural history, clinical presentations, diagnostic strategies, laboratory and radiologic evaluation, initial management strategies, interventional indications, potential surgical interventions, and chronic care management for the following common cardiovascular conditions:
 1. Arrhythmias - recurrent ventricular and supraventricular arrhythmias
 2. Congestive Heart Failure and low cardiac output
 3. Ischemic heart disease and Coronary Artery Disease
 4. Co-morbid systemic diseases affecting ischemic heart disease and heart failure diagnosis and management - hypertension, diabetes, chronic obstructive pulmonary disease, chronic renal failure, and the natural history of aging
 5. Valvular disease
 6. Endocarditis
 7. Myocarditis
 8. Cardiomyopathy
 9. Aortic dissection
 10. Pulmonary hypertension
 11. Pericardial disease, including: tamponade and constriction
 12. Heart disease in women
 13. Peripheral vascular disease
 14. Cardiac trauma
 - ii. By completion of the rotation as HO3, residents should additionally demonstrate such knowledge and management skills for
 1. Cardiac transplantation, including pre-transplant planning and post-transplant care
 2. Adult congenital heart disease
- f. Procedures
- i. By completion of HO1, residents should understand indications for electrophysiology, cardiac catheterization, percutaneous intervention, and cardiac nuclear medicine studies. They should be able to apply non-invasive pacing techniques, consistent with ACLS standards.
 - ii. HO2/3 residents will additionally reflect understanding that catheterization results, just as noninvasive functional studies, have limits for sensitivity and specificity (e.g. lack of critical stenosis detection for cases of coronary

emboli, dissection, or other non-plaque-rupture acute coronary syndromes.)

- g. Patient counseling and disease prevention
 - i. HO1 residents are expected to initiate, under supervision, standard cardiovascular preventive care. They will recognize indications for nutrition counseling, smoking cessation counseling, cardiac rehabilitation, and disease-based counseling.
 - ii. By completion of the rotation, HO2 residents should additionally be able to deliver preventive and disease-based counseling with decreasing reliance on direct supervision.
 - iii. HO3 residents should demonstrate ability to actively integrate cardiovascular counseling into daily patient care.

II. Interpersonal and Communication Skills

- a. By completion of the rotation, HO1 residents are expected to
 - i. Under supervision, communicate with primary care and/or subspecialty physicians about the patient's course, the results of specific tests, long-term follow-up plans, issues regarding risk-factor modification, and rehabilitation where appropriate.
 - ii. Develop an organized approach to communication surrounding transitions of care, including post-discharge treatment.
 - iii. Present oral and written communication that develops a constructive relationship with colleagues on non-cardiac services.
- b. Additionally, HO2/3 residents will
 - i. Effectively communicate with patients and other professionals regarding the risks and benefits of cardiovascular testing, incorporating indications and contraindications for interventions. They will, under supervision, engage patients in informed consent discussions for cardiovascular procedures, respecting patient autonomy and promoting patient participation in health care decisions.
 - ii. Engage in patient-centered counseling regarding cardiovascular risk factors.

III. Professionalism

- a. Throughout the rotation, HO1 residents are expected to
 - i. Respond in a timely manner to consultative requests and patient care needs.
 - ii. Recognize and compassionately respond to factors affecting the treatment plans, including personal economic factors, complexities of family care at home, and other factors affecting adherence with medical therapy.
- b. HO2 residents additionally are expected to reflect understanding of appropriate indications to discuss DNR status with patients and families for patients with end-stage or life threatening cardiovascular disease. Sensitively respond to patient and family decisions regarding palliative care.

- c. HO3 residents additionally are expected to reflect awareness of the ethical foundations of cardiac transplantation, including principles of scarce resource distribution.

IV. Practice-Based Learning and Improvement

- a. HO1 residents are expected to
 - i. Demonstrate self-initiative in the use of information technology to access and retrieve materials for self-education regarding cardiac cases. Utilize electronic resources and current literature to generate appropriate diagnostic and therapeutic plans.
 - ii. Constructively respond to and internalize feedback from faculty, nursing, and allied healthcare providers. Demonstrate willingness to change identified behaviors.
- b. HO2 residents are additionally expected to critically review cardiac clinical trial data in the medical literature.
- c. HO3 residents are additionally expected to demonstrate knowledge of the evidence base for national guidelines on diagnosis and management of common acute and chronic heart diseases.

V. Systems-Based Practice – All residents are expected to

- a. HO1 residents are expected to
 - i. Appreciate the importance of cross-disciplinary team care, including anesthesiology and surgical colleagues, in developing comprehensive treatment goals for patients.
 - ii. Develop experience with the triage of patients between the intensive care unit and cardiac telemetry units, as well as other units.
 - iii. Strive to provide cost-effective cardiovascular care.
- b. HO3 residents are additionally expected to assist patients and their caregivers with coordination of complex cardiovascular care across the greater health system. They will appropriately mobilize and facilitate ancillary services including cardiovascular rehabilitation, social services, physician assistant care, nutrition services, smoking cessation services, and disease-based case management programs.

Teaching Methods

- I. Supervised Patient Care (including mix of diseases, patient characteristics, types of clinical encounters, procedures, pathological material, services, the level of faculty supervision for all resident patient-care activities, and other services interacted with)
 - a. The emphasis of the rotation is on experiential learning through consultative management of inpatients. See the rotation schedule below. Residents are under the full supervision of a faculty cardiovascular disease specialist. Patient-centered, case-based faculty discussions review each patient.
 - b. Cardiovascular unit patients include both general ward and intensive care unit patients, utilizing an open unit care team model. Patients present from a broad age

range and socioeconomic backgrounds, with a spectrum of local to quaternary care needs.

- c. Residents analyze ECGs and review reports of echocardiograms and stress tests under the supervision of faculty physicians.
- d. Residents interact with noninvasive laboratory personnel, cardiology fellows, and cardiology physician assistants; residents should consider all such interactions as opportunities for education.

II. Structured Didactics and Small Group Learning

- a. Cardiology M&M – Monthly on Thursdays, 2PM
- b. Faculty Socratic teaching rounds – at least twice weekly, with days/times determined based on resident and faculty clinic schedules. Discussion group includes medical students, residents, and fellows.

III. Independent study - Residents are expected to actively read core content regarding both their patient-based experiences and the common conditions as noted under the rotation learning objectives. The following resources are suggested and are available on line:

- a. Online learning
 - i. Residents are encouraged to access the most recent versions of the following Johns Hopkins Internet Learning Center modules, available to all Michigan residents using their ambulatory care login (click on the “module library” tab to see all available modules):
<http://www.hopkinsilc.org/>
 - 1. Preventive cardiology
 - 2. Hypertension
 - 3. Preoperative evaluation
 - ii. Interns and residents are strongly encouraged to complete the University of Michigan Medical School Professional Skill Builder interactive cardiology cases. While designed for medical students, these cases provide excellent overviews of cardiovascular diagnostic reasoning. Login with your University of Michigan Uniqname and Level 1 password at:
<https://www.umms.med.umich.edu/psb/>
 - iii. Cardiac Examination/Heart Sounds tutorials are available at:
<http://www.blaufus.com/>
 - iv. ACC Case Studies (integrating interpretation of history, physical exam, advanced test interpretation, and management decisions):
<http://www.cardiosource.com/casestudies/index.asp>
 - v. ECG Wave Maven, developed by Nathanson LA, McClennen S, Safran C, and Goldberger AL:
<http://ecg.bidmc.harvard.edu/maven/mavenmain.asp>
- b. Other available multimedia
 - i. Residents are encouraged to contact Dr. Dyke to borrow a copy of the ACC heart sounds learning materials, available on DVD.
- c. Textbooks and Manuals
 - i. O’Keefe JH. *Complete Guide to ECG’s* (most recent edition).

- ii. O'Keefe JH, Hammill SC, Freed MS. The ECG Criteria Book (most recent edition).
- iii. Eagle KA and Baliga RR. *Practical Cardiology* (most recent edition). Lippincott, Williams & Wilkins.
- d. Professional Society Guidelines, as posted on web sites:
 - i. American Heart Association disease guidelines and scientific statements are found at:
<http://www.americanheart.org/presenter.jhtml?identifier=2158>
 - ii. American College of Cardiology Clinical Statements and Guidelines are available for download at:
<http://www.acc.org/qualityandscience/clinical/statements.htm>
 - iii. Information on the Acute Myocardial Infarction GAP Project in Michigan (Principle Investigator, Dr. Kim Eagle) is available at:
http://www.acc.org/qualityandscience/gap/mi/ami_gap.htm
- e. Core clinical journals, with free access available through the Taubman Medical Library e-journal resources:
 - i. Circulation
 - ii. Journal of the American College of Cardiology
 - iii. Heart

Evaluation Methods

Formative face-to-face feedback to residents by attendings occurs at mid-month. Each month, attendings complete online competency-based evaluations of each resident. The evaluation is shared with the resident, is available for on-line review by the resident at his/her convenience, and is sent to the residency office for internal review. The evaluation is part of the resident file and is incorporated into semiannual performance reviews for directed resident feedback.

Residents must complete a service evaluation of the rotation faculty monthly.

Rotation Schedule

First day protocol: All inpatient care rounds meet at the 7C conference room. Obtain prior patient sign out by 7:30 AM.

Call duty: Long call is Q4 days. HO2/3 sign out to a Night Float following completion of call at 8PM. HO1 remain on overnight call duty with early departure the following day. Short call duties are scheduled until noon Q2 except on weekends.

Weekend duty: Residents will have an average of one day off in 7 over the course of a 4-week rotation block. The day off is determined based on the call schedule, and may or may not occur on a weekend. There is no short call on the weekend.

	Monday	Tuesday	Wednesday	Thursday	Friday	Sa/Sun
AM	7:30 Integrated teaching and management rounds (or continuity clinic) 10:30 Morning Report	7:30 Integrated teaching and management rounds (or continuity clinic) 10:30 Morning Report	7:30 Integrated teaching and management rounds (or continuity clinic) 10:30 Morning Report	7:30 Integrated teaching and management rounds (or continuity clinic) 10:30 Morning Report	7:30 Integrated teaching and management rounds (or continuity clinic) 10:30 Morning Report	7:30 Integrated teaching and managemen t rounds
PM	12:00 Noon Conference Teaching rounds time TBD Patient care or continuity clinic	12:30 Intern Report Teaching rounds time TBD Patient care or continuity clinic	12:00 Noon Conference Teaching rounds time TBD Patient care or continuity clinic	12:00 Noon Conference 2:00 Cardiology M&M (monthly) Patient care or continuity clinic	12:00 Medicine Grand Rounds Teaching rounds time TBD Patient care or continuity clinic	Patient Care