APPENDIX I. DESCRIPTION OF ROTATIONS

CORONARY CARE UNIT

Description of Rotation

The coronary care unit (CCU) is a closed unit rotation. The overall purpose of the CCU rotation is to provide trainees with a comprehensive training experience in the evaluation and management of common cardiac disorders as well as training experience in evaluation and management of other life threatening illnesses that may present with cardiovascular manifestation. This intensive training experience is designed to expose the trainee to both acute presentations of cardiac dysfunction and ensure that the fellow acquires the necessary clinical and procedural skills to care for cardiac disorders routinely encountered in the practice of cardiology.

Each cardiology fellow will rotate on the CCU service for 5 to 6 months during the course of their fellowship. On this rotation, the fellow will learn how to evaluate and manage patients with acute coronary syndromes, including cardiac arrest and cardiogenic shock, cardiac dysrhythmias, congestive heart failure, valvular heart disease, myocardial and pericardial heart disease, aortic and hypertensive emergencies.

Fellows will be introduced to and become proficient in the performance and interpretation of a number of cardiac procedures including, but not limited to, pulmonary artery catheter placement, temporary venous pacemaker insertion, intra-aortic balloon pumps management, and elective cardioversion. Review and integration of laboratory, radiographic, hemodynamic, and cardiac diagnostic studies will be emphasized during this clinical rotation. During this rotation the development will of a strong mentoring relationship with clinical faculty is developed and emphasizes leadership skills for managing a healthcare team.
The fellow will be responsible in day to day management of patients, triaging transfers and phone calls/admissions to the CCU, screening patients for appropriate admission, coordinating with the charge nurse for bed assignment, and ensuring timely transfer to the Cath lab for STEMI.

**Educational Purpose**

1. Achieving competency in triaging, treating acutely ill patients, and formulating plan of action
2. Developing the skills to diagnose and treat life threatening conditions
3. Managing patients on ventilators, inotropes, intra-aortic balloon pump
4. Developing good technical skills in invasive procedures (central lines, temporary pacers, pericardiocentesis, intubation)
5. Developing communication skills in dealing with ill patients, their families, and approach to end-of-life care
6. Treating patients based on standard of care and recent evidence based medicine
7. Integrating imaging skills (Cath, Echo, CXR, CT and ECG interpretation) into a clinical decision
8. Providing teaching for residents and medical students.

**Assessment Summary**

By the end of the rotation, the fellow should receive results of the following assessments

1. Informal verbal feedback from the CCU attending
2. Formal staff evaluation
3. Nurse evaluation provided by the charge nurse that reflects evaluation from the nurses and feedback from patients
4. Resident evaluation

The fellow will complete the following assessments

1. Evaluation of staff
2. Evaluation of the rotation
3. Evaluation of the residents
**Expectations and Responsibilities**

1. In the CCU, medical residents are primarily responsible for all patients. The fellow is responsible for supervising the house-staff teams assigned to the CCU and assists in the management of the CCU patients.

2. It is the responsibility of the CCU fellow to be intimately involved in the management of the CCU patients. The CCU fellow should be aware at all times of the status and treatment plan of these patients.

3. The fellow must evaluate all new admissions, pre-round on ill or sick patients that need immediate care or transfer to the Cath lab, and formulate a plan of action with the house-staffs and the attending.

4. The fellow will coordinate with the charge nurse for bed availability regarding transfers from outside hospitals, transfer of sick patients from the floor, ER admissions, and STEMIs

5. The fellow is responsible in facilitating transfers of STEMI to the Cath lab to minimize door to balloon time with goal <90 min

6. The fellow must review all imaging studies and data including Cath, Echo, ECG, CXR with the house-staffs and attending and formulate a treatment plan

7. A dedicated CCU attending physician will oversee all aspects of the fellow’s duties; will make twice daily rounds with the fellow.

8. The fellow will supervise the performance of all invasive procedures performed by house staff on cardiology inpatients in the CCU.

9. Weeknight and weekend call responsibilities are outlined in the section on CALL. All critically ill patients and any issues that need follow-up overnight will be checked out in a detailed manner to the on-call fellow.

10. Conference attendance in mandatory unless there is a critically ill patient that needs immediate attention:
General Cardiology fellowship Core Curriculum: Wednesday 8 AM, Suha Kanj conference 9th floor
Internal Medicine Grand Rounds – Tuesday none, SB101
Journal club/cases/imaging: Thursday 5:30 PM, Suha Kanj, 9th floor
Cardiovascular Medicine Grand Rounds – Wednesday noon, Suha-Kanj conference 9th floor
Advanced ECG conference: Thursday 5:30 PM, Suha Kanj 9th floor
CCU core-lecture series-daily.

**Orientation**

Fellows assigned to CCU will meet with the supervising attending cardiologist on the first day of the month to ascertain goals, expectations and timing of rounds.

**Supervision**

The attending physician, fellow, and house staff will provide a team-based, patient-centered approach toward patient care and teaching as it relates to the etiology, pathogenesis, clinical presentation, natural history, and treatment of the various general cardiac disorders seen on this service. The fellow will be responsible for the day to day management of the CCU as set forth during daily morning rounds. The attending will review the fellow’s presentation, review and constructively critique the fellow’s plan of care, confirm the fellow’s physical exam findings, and review and confirm the fellow’s notes. As appropriate, the attending will review and supplement the fellow’s teaching of the other members of the team. The attending may assign readings or other learning activities as necessary. The attending will supervise the fellow during invasive procedures based on the level of the fellow’s skills.

**List specific topics that the fellows are expected to learn**

A. Interpretation of angiograms and electrocardiograms
B. Interpretation of hemodynamics and wave forms
C. Management of intra-aortic balloon pumps
D. Management of ventilators
E. Management of life threatening arrhythmias
F. Acute care of ACS, myocardial infarction
G. Management of acute and chronic decompensated heart failure
H. Management of aortic disease, critical valvular disease and pericardial disease
I. Management of critically ill patients ventilators

Patient characteristics/mix of diseases/types of clinical encounters

Training occurs at the AUBMC and provides a wide range of pathology and a diverse patient population. Both men of women of all adult ages and of various ethnic backgrounds are seen. Clinical encounters are primarily centered on evaluations of critically ill patients in the emergency room, other inpatient units and patient transferred from community hospitals to the CCU. Performance of invasive procedures is common and includes hemodynamic monitoring catheters (pulmonary artery catheters, arterial lines, and central venous lines), intra-aortic balloon pumps, temporary venous pacemakers, elective and emergent cardioversions, and intubations.

Educational Resources

A syllabus of core articles are recommended:

1. The Cardiac Care Unit survival guide. Herzog et al. Lippincott Williams & Wilkins, Philadelphia.
2. ACC/AHA/ESC guidelines

Core Competency Overview

1. Patient Care
2. Medical Knowledge
3. Practice-based Learning and improvement
4. **Interpersonal skills and communication**

**PATIENT CARE:** By the end of the rotation, the fellow will demonstrate the basic knowledge, attitudes and skills necessary to provide patient care that is compassionate, appropriate and effective in the care of patients admitted to the CCU.

The fellow will be evaluated whether he/she:

- Evaluate and manage acutely ill patients
- Performs invasive procedures adequately and efficiently
- Integrate imaging and clinical data
- Formulate good differential diagnosis, appropriate testing and reach correct diagnosis
- Formulate adequate treatment plan
- Learn to communicate with patients and their families

**MEDICAL KNOWLEDGE:** By the end to the rotation, the fellow will acquire factual and experiential knowledge of the cardiac conditions encountered in the CCU and apply this knowledge to patient care

The fellow is expected to learn the most updated guidelines in the management of ACS, NSTEMI, STEMI, angina, heart failure, atrial fibrillation, ventricular arrhythmia, valvular heart disease, and aorta disease

**PRACTICE BASED LEARNING AND IMPROVEMENT:** The fellow should demonstrate behaviors that reflect the desire to critically appraise scientific literature, assimilate new evidence, apply knowledge of biostatistics, research study design, and seek to improve patient care outcomes (door to balloon time, patient satisfaction, minimize readmission) on an ongoing basis.

**INTERPERSONAL SKILLS AND COMMUNICATION:** The fellow should demonstrate the interpersonal and communication skills that enable him/her to establish and maintain professional relationships with adult
Cardiac patients and their families, to whom they will be providing initial and ongoing management. The fellow is also expected in dealing with end-of-life care, code status, and difficult patients, as well as patient education. The fellow is also expected to form professional working relationships with Cardiac staff/attending, nurses, residents, medical students, ancillary staff and other healthcare providers.

**PROFESSIONALISM:** The fellow should exhibit behaviors that reflect a commitment to continuous professional development, sensitivity to patients of diverse backgrounds (cultural sensitivity), and the ethical practice of medicine in interacting with patients, their families and their colleagues.

**SYSTEMS BASED PRACTICE:** The fellow should demonstrate 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 with the goal of achieving optimal health care outcomes with cost-effectiveness.

1. The goals and objectives for the rotation will be verbally communicated at the beginning of the rotation.
2. The fellow’s progress will be reviewed verbally mid-rotation.
3. A standard fellow evaluation form will be completed by the supervising physician at the end of the rotation.
4. The final evaluation will be based on the fulfillment of the rotation objectives as determined by:
   - Staff evaluation
   - Peers feedback
   - Nurses and patients feedback/survey
   - Residents and medical student’s feedback
   - Procedure log
   - Commitment to teaching
   - Excellence in patient care, education, and follow-up
CARDIOLOGY CONSULTATION SERVICE

Description of Rotation

Each fellow will do 5-6 months of Consult service in their 3 years of fellowship. The service includes an attending, a fellow, and residents (AUBMC or those doing electives when available). The fellow is consulted on inpatients on the floor, ICU, recovery area, triage and preadmission unit. Consult fellow also sees ER patients that do are not being admitted to the CCU (usually handled by the CCU fellow).

Educational Purpose

The goals of this rotation are:

1. To gain experience in providing cardiology consultation on inpatients, including providing prompt response, assessment of all clinical data (especially ECG monitoring), differential diagnosis, outlined evaluation and interpretation of evaluations, and follow-up of prescribed therapies.
2. To work closely with the assigned cardiology staff, which provides opportunity for detailed discussion of treatment plans and demonstration of characteristics and qualities to deliver quality care.
3. To develop proficiency in inpatient consultative cardiology including pre-operative and peri-operative evaluation.
4. To develop proficiency in intensive care consultation on critically ill cardiac patients utilizing invasive and non-invasive tests and interventions.
To encourage and develop humanistic care of inpatients.

**Learning objectives**

1. Obtain training in the concepts and practice of effective inpatient cardiac consultation. This includes:
   a. Improving skills for acquiring a detailed and accurate history and physical examination.
   b. Improving skills for insightful review of laboratory data.
   c. Training in review of noninvasive and invasive cardiac tests and incorporation of the test results into the context of the patient’s cardiac presentation.
   d. Training in placing the cardiac findings in the patient’s overall medical context.
   e. Formulation of a broad differential diagnosis with focus on the most likely diagnosis.
   f. Formulation of an effective treatment plan.
   g. Using evidence based medicine
   h. Gain experience in effective communication and interaction with referring physicians and staff.

2. Organizing a consultative service, including effective prioritization based on acuity of patients’ clinical problems.

3. Gain exposure to a broad range of cardiac conditions through individual patient consultations, supplemental reading, and formal didactic presentations on rounds.


5. Learn to assist physicians on other services in the management of cardiac emergencies.

**Assessment Summary**

By the end to the rotation, the fellow should receive and/or complete the following assessments

1- Verbal and written feedback from the cardiology staff
2- Complete evaluation of the attending, residents (when available), and the rotation.
**Expectations**

1- The fellow receives all initial requests for cardiology consultation, and address the new consults same day and staff them with the attending
2- The consulting team should have a preliminary assessment of the patient with an HPI in chart
3- A full consultation note should be written with complete history, exam, and review of records including most recent imaging data.
4- A preliminary plan of action should be formulated and then discussed with the attending
5- The team should see the overnight consults first and then round on the new consults that day and follow up on patients when appropriate
6- A significant number of consults involve pre-operative evaluations for cardiac patients undergoing noncardiac surgery, using the Cardiac Risk Index of Goldman unless state otherwise by the attending
7- The fellow will be requested to present suitable cases (case of the month) at the Thursday PM Report Conference.

**Responsibilities for the Fellows include:**

1. The consult fellow is responsible for all inpatient and Urgent Care Clinic cardiology consults between 8:00 am and 5:00 PM Monday through Fridays.
2. The consult fellow is expected to evaluate any urgent consult as soon as possible. This includes performing a history and physical examination and reviewing all diagnostic test results, laboratory data, and progress notes. The fellow then formulates a differential diagnosis and treatment plan and offers any urgent recommendations immediately. The fellow presents the urgent consultation to the attending cardiologist as soon as is necessary for optimal patient care.
3. All consultations on patients in the Intensive Care Unit or wards must be reviewed with a staff cardiologist. This interaction should be documented by entering the staff physician’s name as the supervising physician and naming the staff as a cosigner on the note. In most cases, patients should be discussed with the designated consultation cardiology staff, but may, at the discretion of the fellow/general cardiology staff
physician be discussed with the cardiac catheterization staff, electrophysiology service staff or other cardiology staff with particular expertise depending on the nature of the problem.

4. Daily follow up of inpatients should continue as long as the patient’s cardiology problem is active.

5. Daily review of Consult Service patients with the designated staff is expected.

6. Night (5:00 PM to 8:00 AM) hours and weekend coverage of the inpatient service will be provided by the fellow on call. Patients that require follow up on the weekend or are unstable should be indicated to the fellow on Division call.

7. The fellow may participate in the procedure (including insertion of temporary pacemakers and Swan-Ganz catheters, electrical cardioversions, etc.).

8. The fellow is expected to meet with the Cardiology staff daily for review of patients and clinical teaching. Requests for inter-hospital patient transfers may be evaluated by the fellow.

9. The Consult Fellow must communicate with the fellow on call the previous night to determine if there are any pending consults or patients requiring immediate follow-up. Similarly, the Consult Fellow must call the fellow taking call after 5pm and review any critically ill patients that may require follow up consultation overnight. Weekend cardiology consult coverage is provided by the on-call cardiology fellow.

**Orientation**

Orientation to the consult service occurs for all first-year fellows at the initiation of the fellowship program. In addition, individual fellows will be re-oriented at the start of their cardiology consultation rotation and will meet with the attending on day one to review goals and expectations.

**Supervision**

All cardiac consultations are reviewed in detail with the supervising cardiologist with attention to patient and diagnosis-based teaching of the fellow. In addition to clinical review, the attending cardiologist reviews the progress of the fellow in providing appropriate communication and collaboration with the requesting service. This most importantly includes review of the written consultation documented in the chart. The fellow’s teaching and learning skills are reviewed on rounds and constructive suggestions are made. The attending cardiologist reviews cardiac invasive and non-invasive tests on cardiac consult patients with the fellow on attending rounds.
Mix of Diseases and Patient Characteristics

On this rotation, fellows will perform inpatient cardiology consultations. Most inpatients at the AUBMC are adult males and females of a variety of ages and ethnicity. A variety of cardiac disorders will be encountered, including coronary artery disease, heart failure, arrhythmias, and valvular heart disease, preoperative and peri-operative consultation.

List specific departmental conferences that the residents are expected to attend

General Cardiology fellowship Core Curriculum: Wednesday 8 AM, Suha Kanj conference 9th floor
Internal Medicine Grand Rounds – Tuesday none, SB101
Journal club/cases/imaging: Thursday 5:30 PM, Suha Kanj, 9th floor
Cardiovascular Medicine Grand Rounds – Wednesday noon, Suha-Kanj conference 9th floor
Advanced ECG conference: Thursday 5:30 PM, Suha Kanj 9th floor

Educational Methods

1. Teaching by the attending cardiologist occurs daily on attending rounds and is supplemented as needed for urgent consultations. The attending physician reviews the detailed consult presentations prepared by the fellow.

2. The attending cardiologist provides constructive suggestions for acquisition of additional relevant clinical information, alternate interpretations of the data presented, recommendations for additional diagnostic considerations, and additional treatment considerations.

3. The attending cardiologist reviews noninvasive and invasive studies with the fellow, including ECGs. The attending cardiologist provides bedside teaching of clinical history and cardiac examination skills.

4. Fellows will be expected to have completed the accompanying reading list by the end of their rotation.


Prevention of Premature Discontinuation of Dual Antiplatelet Therapy in Patients With Coronary Artery Stents A Science Advisory From the American Heart Association, American College of Cardiology, Society for Cardiovascular Angiography and Interventions, American College of Surgeons, and American Dental Association, With Representation From the American College of Physicians. JACC 2007

ACC/AHA Guideline Update for Perioperative Cardiovascular Evaluation for Noncardiac Surgery—Executive Summary Circulation 2002:105;1257-1267

ACC/AHA updated guidelines in the management of atrial fibrillation

ACC/AHA updated guidelines in the management of ventricular arrhythmia


**Evaluations**

1. The goals and objectives for the rotation will be verbally communicated at the beginning of the rotation.
2. The fellow’s progress will be reviewed verbally at mid-rotation.
3. A standard electronic fellow evaluation form will be completed by the attending cardiologist at the end of the rotation.
4. The attending cardiologist’s final evaluation will be based on the fulfillment of the rotation objectives as determined by:
   a. Personal observation during interaction with the fellow.
   b. Evidence of literature review related to the individual consult patient.
   c. Evidence of a thorough and accurate patient history and physical examination for each consult.
   d. Accuracy in interpretation of invasive and non-invasive tests for the consult patient, with good insight into the role of those test results in arriving at an appropriate differential diagnosis and treatment plan.
   e. Performance of the fellow in arrival at a broad, appropriate differential diagnosis, with focus on a most likely diagnosis.
   f. Use of literature and guidelines to develop appropriate treatment plans.
   g. Improved accuracy in interpretation of electrocardiograms.
   h. Evidence of effective written and oral communication with referring physicians.
   i. Evidence of effective patient follow-up following initial consultation.
   j. Feedback from other consult team members and referring physicians.

Each fellow will evaluate the attending, rotation, and residents
The fellow will be evaluated by the attending and resident

Core Competency Overview

<table>
<thead>
<tr>
<th>Patient Care</th>
<th>Interpersonal skills and communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Knowledge</td>
<td>Professionalism</td>
</tr>
<tr>
<td>Practice-based Learning and</td>
<td>Systems-based Practice</td>
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<td>improvement</td>
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**PATIENT CARE:** By the end of rotation, the clinical trainee will demonstrate the basic knowledge, attitudes and skills necessary to provide patient care that is compassionate, appropriate and effective in the care of the cardiac consultation patient
MEDICAL KNOWLEDGE: By the end to the rotation, the fellow will acquire a basic working knowledge of the normal and abnormal cardiovascular physiology, common acute and chronic medical conditions that a cardiology consultant sees, and indications for cardiac testing

PRACTICE BASED LEARNING AND IMPROVEMENT: By the end of the rotation, the fellow will gain an understanding of the knowledge, attitudes and skills necessary to initiate self-directed and independent learning, critically review journal and evidence, and triage patients based on acuity of care

INTERPERSONAL SKILLS AND COMMUNICATION: The fellow should demonstrate the interpersonal and communication skills that enable him/her to establish and maintain professional relationships with patients. The fellow should demonstrate professional working relationships with their staff attending, nursing personnel, ancillary staff and other healthcare providers.

PROFESSIONALISM: The fellow should demonstrate behaviors that reflect a commitment to continuous professional development and to the ethical practice of medicine in their interaction with patients, families and colleagues.

SYSTEMS BASED PRACTICE: The fellow should gain an understanding of the context and systems in which healthcare is provided and gain an understanding of the importance of applying this knowledge to both improve and optimize healthcare, including preventive care medicine and cost-effective medicine.
CARDIAC CATHETERIZATION LABORATORY

Description of Rotation

This is a series of 10-11 monthly rotations over the course of the three-year fellowship. During this experience the fellow is expected to become competent and capable of performing diagnostic left and right heart catheterization under supervision and, by the end of the fellowship, to be able to perform these procedures independently. The fellow will achieve level2 ACC competency by assisting in performing > 300 procedures. Fellows also get exposed to interventional cardiac procedures including angioplasty, stent placement, but as secondary operators.

Educational Purpose

The purpose of the rotation is to gain an understanding of coronary anatomy and hemodynamics and to acquire the technical, cognitive and motor skills required to gain venous and arterial access and to perform coronary angiography.

The first year trainee will develop and be expected to demonstrate expertise in the following aspects related to the procedure including:

1. Understanding the appropriateness of procedure. The trainee should understand the indications for right and left heart catheterization, right ventricular end myocardial biopsy, and be able to estimate the risk and benefit of procedures performed. Knowledge of comorbid factors that increase the risk of a procedure should be demonstrated.
2. Obtaining informed consent. The trainees should communicate the risk and benefits of a procedure in a manner that is understood by the patient and address questions raised by the patient. In situations where the patient cannot give informed consent, the trainee should obtain consent from appropriate sources.

3. Administering anesthesia. The trainee should demonstrate knowledge of the pharmacology of medications used for conscious sedation, contraindications for their use, side effects, and the treatment of side effects. The trainee should develop the skills to make the patient comfortable during an examination, follow the degree of sedation, and recognize and treat complications.

4. The trainee should develop skills in obtaining vascular access to the internal jugular, subclavian and femoral veins as well as the femoral artery and brachial artery.

5. The trainee should be able to achieve hemostasis after pulling the arterial sheath.

6. Coronary angiography and ventriculography. The trainee should develop skill in the injection of contrast material for angiography; recognize the potential complications of the use of x-ray contrast material. The trainee should develop a high level of competence in the interpretation of hemodynamic data and angiographic data.

7. Pericardiocentesis. The trainee should be able to understand the indications and potential risks of cardiac pericardiocentesis. He should demonstrate skill in performing the procedure by the end of the year.

8. Evaluating and treating complications. The trainee should have full knowledge of the potential complications of the procedures of diagnostic catheterization, the mechanisms for monitoring complications when suspected, and full knowledge of the appropriate treatment of these complications.

9. Learn the correct interpretation of hemodynamic data

10. Learn to minimize radiation exposure

11. Learn to normal coronary anatomy, its variants, and how to interpret normal and abnormal angiogram

12. Learn the technique of Judkins technique and perform a diagnostic LHC (not expected to inject bypass grafts)

SECOND YEAR FELLOWS

1. Master the objectives set for the first year fellow

2. Manipulating the C-arm, panning under supervision

3. Engaging bypass grafts (SVG, LIMA)
4. Second operators in interventional or complex cases
5. Right ventricular endomyocardial biopsy. The trainee should have full understanding of the indications for diagnostic endomyocardial biopsy and should have skill in performing this procedure both from the internal jugular and femoral venous approach. The trainee should have understanding of the potential complications and be prepared for emergent pericardiocentesis should complications arise.

THIRD YEAR FELLOWS

In addition to master the objectives set for the first and second year trainee, third years fellows should be:

1. Primary operator on non-complex cases.
2. Train and supervise first year fellows in simple cases
3. Learn brachial and radial access
4. Be second operator on complex and interventional cases including STEMI
5. Perform right ventricular endomyocardial biopsy.

Assessment Summary

By the end of the rotation, the fellow should receive results of the following assessments

1. Verbal feedback from preceptors at mid rotation
2. Formal staff evaluation
3. Evaluation by the charge nurse

The fellow will perform:

1. Attending evaluation
2. Rotation evaluation

Expectations and Responsibilities
During the three years of training the fellow will aim to acquire the cognitive and motor skills to perform left and right heart catheterization. A minimum of 8 months is dedicated to this area with a preparation for level 2 ACC certification.

Duties and responsibilities include the following:

1. The fellow will evaluate all patients referred for cardiac catheterization and interventional procedures. The fellow will see all inpatients referred for cardiac catheterization or interventions on the ward or unit to which the patient is admitted.
2. The fellow will evaluate each patient prior to performing any invasive procedure. This evaluation will include reviewing all pertinent paperwork (H&P, labs, non-invasive studies, etc.), perform a focused physical exam, ensure informed consent properly obtained, and answer any questions from the patient or family members.
3. The fellow will discuss cases with the cath lab attending.
4. The fellow will arrive at least 30 minutes before the first scheduled case in order to greet the first patient and review any outstanding lab data or answer any last minute questions.
5. The fellow will perform all cath lab procedures under the supervision of the cath lab attending physician.
6. The fellow will complete the post-procedure paperwork (post-cath orders, brief note for chart, dictate the formal cath report, etc.).
7. The fellow will call the house staff with results and to discuss any pertinent management issues and will inform the appropriate inpatient or outpatient cardiology fellow or physician assistant of any complication or complicated management issues.
8. The fellow will see all outpatients in the Cath Lab recovery area prior to discharge to perform a post-procedure groin check, review results, and answer any questions. Post-cath inpatients must be seen by the end of the procedure day for a post-procedure groin check.
9. The fellow will prepare a case for presentation at the weekly Cath Conference.
10. The second and third year’s fellows assist the interventional staff with PCI cases emergency/primary angioplasties and elective cases.
11. The fellow will maintain a complete and accurate log of all procedures performed.
12. The fellow will screen all outpatient referrals for cardiac catheterization and enter orders for the procedure if appropriate.
13. Fellows are expected to attend all conferences unless there is an emergency
14. The fellow should notify the staff immediately of a procedural related complication
15. The fellow should minimize radiation exposure to patient and operators
16. If an access cannot be obtained after 3 attempts, the fellow should allow the attending to take the lead
17. If a fellow detects >50% left main disease or significant damping upon engaging an ostial artery, he/she should stop and allow the supervising attending to proceed.
18. The fellow should not cross severe aortic stenotic valve without the approval of the staff

**Orientation**

Fellows should meet with their primary attending staff of the rotation prior to starting the rotation in order to go over the goals and expectations for the rotation.

**Supervision**

The fellow will review all cases with the cath lab attending prior to performing any procedure. All invasive cardiac procedures will be performed under the direct supervision of an invasive or interventional attending cardiologist.

**Mix of Diseases and Patient Characteristics**

The patient population that presents for cath lab procedures consists mostly of adults from various ethnic and socioeconomic backgrounds. Patients presenting to the Cath Lab for procedures have a variety of cardiac disorders, including coronary artery disease, valvular heart disease, congestive heart failure, and pericardial disease. Clinical encounters include pre-procedure evaluations in the ambulatory surgery unit and on the inpatient wards, performing the requested procedure, and providing any immediate post-procedure follow-up. Procedures performed include left and right heart catheterization, coronary, percutaneous coronary intervention, and temporary pacemaker placement.
List specific departmental conferences that the fellows are expected to attend

Mandatory attendance of all conferences unless there is an emergency case:
General Cardiology fellowship Core Curriculum: Wednesday 8 AM, Suha Kanj conference 9th floor
Internal Medicine Grand Rounds – Tuesday none, SB101
Journal club/cases/imaging/Cath conference: Thursday 5:30 PM, Suha Kanj, 9th floor
Cardiovascular Medicine Grand Rounds – Wednesday noon, Suha-Kanj conference 9th floor
Advanced ECG conference: Thursday 5:30 PM, Suha Kanj 9th floor

Learning the following topics:
Judkins Technique
Coronary Anatomy anomalies and normal variants
Radiation Safety and Imaging
Hemodynamics
Intra-Aortic Balloon Pump: Mechanisms, Indications, and Technique
Managing complications of catheterization
Myocardial Biopsies: Techniques and Pathology
Interpretation of Coronary Angiograms, ventriculogram and aortogram
Angioplasty Indications, Outcomes, and Technique
ACS: Mechanisms, Treatment and Management

Educational Resources

Morton Kern. The cardiac catheterization manual, 4th edition

Core Competency Overview
1. The goals and objectives for the rotation will be verbally communicated at the beginning of the rotation.
2. The fellow’s progress will be reviewed verbally mid-rotation.
3. A standard fellow evaluation form will be completed by the attending at the end of the rotation.
4. The final evaluation by the supervising physician will be based on the fulfillment of the rotation objectives as determined by:
   a. Personal observation during interaction with the fellow while performing Cath Lab procedures.
   b. Evidence of literature reviews appropriate for the individual patient and topic.
   c. Evidence of ability to perform appropriate pre-procedure evaluation.
   d. Evidence of ability to properly select patients for testing.
   e. Competent performance of cardiac procedures relative to the fellow’s level of training.
   f. Correct interpretation of procedure data obtained.
   g. Evidence of ability to provide appropriate post-procedure care.
   h. Feedback from Cath Lab staff members, other healthcare providers, and patients

**PATIENT CARE:** By the end of the rotation, the fellow will demonstrate the basic knowledge, attitudes and skills necessary to provide patient care that is compassionate, appropriate and effective in patients undergoing cardiac catheterization, tailored to their year of training as detailed above.

**MEDICAL KNOWLEDGE:** By the end to the rotation, the fellow will acquire factual and experiential knowledge of the cardiac conditions encountered in the cardiac catheterization laboratory (STEMI, valvular disease, aortic disease, peripheral vascular disease, and cardiogenic shock) and apply this knowledge to patient care.
PRACTICE BASED LEARNING AND IMPROVEMENT: The fellow should demonstrate behaviors that reflect the desire to critically appraise scientific literature, assimilate new evidence, and seek to improve patient care outcomes on an ongoing basis.

INTERPERSONAL SKILLS AND COMMUNICATION: The fellow should demonstrate the interpersonal and communication skills that enable him/her to establish and maintain professional relationships with adult Cardiac patients, to whom they will be providing initial and ongoing management. The fellow is also expected to form professional working relationships with Cardiac staff preceptors, nursing personnel, ancillary staff and other healthcare providers.

PROFESSIONALISM: The fellow should exhibit behaviors that reflect a commitment to continuous professional development, sensitivity to patients of diverse backgrounds, and the ethical practice of medicine in interacting with patients, their families and their colleagues.

SYSTEMS BASED PRACTICE: The fellow should demonstrate 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 with the goal of achieving optimal health care outcomes.
ECHOCARDIOGRAPHY LABORATORY

Description of Rotation

The overall purpose of the echocardiography rotation is to provide trainees with a general overview of all aspects of cardiac echocardiography and to ensure fellows acquire the necessary expertise required to perform and interpret transthoracic, transesophageal, and stress echocardiography studies which are routinely encountered in the practice of cardiology.

Each cardiology fellow will rotate on the AUBMC echocardiography service for at least 6 months during the course of their fellowship (2 months each year) with the aim of completing level 2 ACC competency. On this rotation, the fellow will learn principles of echocardiography as pertains to the evaluation and management of patients with general cardiac disorders such as heart failure, coronary artery disease, valvular disorders, pericardial diseases, and cardiac masses.

Educational Purpose

First year

1. Understand the standard echocardiographic views and how they are obtained.
2. Be able to perform and interpret a basic echocardiographic examination.
3. Be able to assess common cardiac emergencies by echocardiography including cardiac tamponade, acute MI
4. Understand basic physics of ultrasound, including Bernoulli equation for assessment of pressure gradients and the continuity equation in estimation of valve area.
Second year

1. Be able to perform a comprehensive Doppler and echocardiographic study independently.
2. Be able to classify diastolic function by Doppler echocardiography.
3. Quantify LV systolic function and regional wall motion abnormality
4. Identify valve lesions and quantify its severity.
5. Recognize wall motion abnormalities and the presumed underlying coronary anatomy.
6. Be able to differentiate features of constrictive from restrictive physiology.
7. Learn the basics of transesophageal echocardiography.

Third year

1. Be able to successfully interpret a comprehensive echocardiographic and Doppler examination independently.
2. Understand the common pitfalls in interpretation of native and prosthetic valves.
3. Accurately interpret and report out stress echocardiography.
4. Be able to successfully pass the TEE probe, perform a TEE with image interpretation, and recognize procedure related complications

Responsibility

1. The fellow is the point of contact for all echocardiography services.
2. Fellows should generally arrive at the lab by 8:00 am (or immediately following morning conference) Monday through Friday exceptionally Wednesdays at 9:00am due to the core lecture series and is expected to stay until all studies are read and discussed by the attending cardiologist. Weekend echo coverage is provided by the on-call fellows.
3. Fellows will perform at least 2 transthoracic echocardiographic studies with the sonographers each day. These studies are to be performed and recorded as if the fellow is the sonographer, and the performing
fellow should be identified in the study information section. The echo fellow should pre-read all scans performed.
4. Fellows will pre-read as many echocardiograms performed in the lab during the course of the day as possible
5. Fellows will formally read the echocardiograms with the attending cardiologist every day.
6. Fellows will review all TEE requests and assist in scheduling the procedure in a timely fashion. The fellow will notify the attending immediately if a TEE is deemed urgent.
7. After fellows are encouraged to oversee and attend all stress echo procedures after the first two weeks in the echo lab during which time they will become acquainted with the performance and interpretation of transthoracic studies.
8. Fellows will attend to all emergencies encountered in the Echo Lab during routine TTEs, TEEs, or stress echocardiograms.
9. The echo fellow is expected to remain in the general vicinity of the Echo Lab throughout the day and is expected to notify the lab staff if there are any conflicting schedules including vacation.
10. Fellows should be available and participate in performing contrast echocardiography, as well as supervising, performing and interpreting exercise and dobutamine echo studies. The echo lab serves as a good venue to acquire the necessary skills in exercise testing as a part of the exercise stress echocardiography laboratory studies.
11. Fellows are responsible for screening all inpatient transesophageal echocardiograms for appropriate indications and contraindications and for preparing both inpatients and outpatients referred for this procedure. The specific responsibilities include: obtaining consent to perform the TEE, assessing the indications and safety of the procedure, reviewing any pertinent pre-procedure data (e.g., labs or TTE), and discussing the case with the echo attending for that day. All fellows must perform and record at least 30 transthoracic echoes prior to being eligible to participate in transesophageal echocardiography
13. The fellow will keep a log of all the TTEs, TEEs, and stress echoes performed and interpreted during the course of the rotation. This log will be reviewed by the program director monthly.
**Assessment Summary**

By the end of the rotation, the fellow should receive results of the following assessments
- Informal verbal feedback from preceptors
- Formal staff evaluation
- Format charge nurse evaluation

The fellow will complete the following assessments
- Evaluation of staff and rotation

**Educational Purpose:**

1. Obtain training in the principles and methods of echocardiography as related to patients with a variety of cardiovascular diseases.
2. Become proficient in obtaining adequate two-dimensional echocardiographic images with complete spectral and color Doppler data as is routinely acquired. This includes learning proper transducer manipulation and ultrasound system adjustments. Mastering correct transducer manipulation is critical to obtaining optimal image quality and optimal Doppler flow velocity signals. Fellows are expected to acquire a working knowledge of ultrasound instrument settings, such as transducer frequency, harmonics, mechanical index, depth, gain, time-gain-compensation, dynamic range, filtering, velocity scale manipulations, and the display of received signals.
3. Gain an understanding that becoming skilled in the performance of TTEs facilitates the physician's understanding of optimal echocardiographic data acquisition and technical quality and this knowledge adds to proper interpretation and diagnostic accuracy of studies.
4. Acquire skill in the various techniques of echocardiography including 2D imaging, color-flow Doppler, and both pulse-wave and continuous-wave spectral Doppler.
5. Learn the indications and limitations of transthoracic echocardiography.
6. Become proficient with the use of echo contrast and its various indications and uses.
7. Become proficient in performing and interpreting transesophageal echocardiograms and learn the indications, limitations, and risks of the procedure.
8. Learn the elements of safe administration of conscious sedation.
9. Become proficient in the interpretation of stress echocardiograms and learn the indications, limitations, and risks of the procedure.
10. Acquire basic knowledge of ultrasound physics.
11. Understand the proper use and maintenance of echo equipment.
12. Gain exposure to a broad range of acute and chronic cardiovascular problems through direct patient imaging and through formal and informal didactic teaching sessions.
13. Gain a better understanding of the anatomy and physiology associated with a broad variety of cardiac disorders.
14. Learn to use acquired echo data to assess intracardiac pressures and hemodynamics.
15. Learn to use acquired echo data to detect and quantify cardiac valvular stenosis and regurgitation as well as other abnormal flow states, such as intracardiac shunts.
16. Learn to communicate echocardiographic findings at a level appropriate for patients, family members, and members of the health care team.
17. Gain an appreciation for the role of the members of the echo lab staff, including the sonographers, nurses, and administrative staff.
18. Learn to generate accurate, thorough yet efficient, and understandable echo reports which clearly answer the question being asked.
19. Learn to coordinate with other cardiology services (e.g., EP for TEE cardioversions, the Cath Lab for PFO/ASD closures or pericardiocentesis, etc.) and thereby gain an understanding of how the health care delivery system can be used to the maximal benefit for patients.
20. Learn to coordinate Echo Lab procedures with other medical and surgical services and thereby gain an understanding of how the health care delivery system can be used to the maximal benefit of patients.
21. Gain hands on scanning experience by interacting with sonographers that will lead to the ability to perform high quality scans with measure to provide good echo lab quality control.
22. Complete the specific training requirements for the desired level of certification as outlined by COCATS 2 and the American Society of Echocardiography.

a. It is important to emphasize that the numbers of examinations refer to comprehensive two-dimensional and Doppler echocardiographic studies that are diagnostic, complete, and quantitatively accurate.
b. The actual number of procedures required to accomplish clinical competence in echocardiographic procedures is somewhat arbitrary, because there is individual variation in cognitive, analytical, and manual-dexterity skills. The listed numbers are therefore the minimum requirements anticipated to properly train the average cardiology fellow, and individual fellows may be required to perform additional studies as determined by the echo lab staff physician.

c. Minimum training standards for transthoracic echocardiography are as follows:

### COCATS Training Requirements for Transthoracic Echocardiography

<table>
<thead>
<tr>
<th>Training Level</th>
<th>Cumulative Duration</th>
<th>Cumulative Number of Cases Performed</th>
<th>Cumulative Number of Cases Interpreted</th>
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<tbody>
<tr>
<td>I</td>
<td>3</td>
<td>75</td>
<td>150</td>
</tr>
<tr>
<td>II</td>
<td>6</td>
<td>150</td>
<td>300</td>
</tr>
<tr>
<td>III</td>
<td>12</td>
<td>300</td>
<td>750</td>
</tr>
</tbody>
</table>

All fellows are required to fulfill criteria for Level Criteria for Level I training. In addition, fellows are encouraged to perform 50 supervised TEE studies and 100 exercise echo and dobutamine echo studies.

**Orientation**

Fellows assigned to the echocardiography laboratory should meet with Dr Antoine Abchee and Lara Masri on the first day of the rotation to ascertain goals, expectations and scheduling of examinations.

**Supervision**

The AUBMC echo fellows will pre-read or simultaneously read studies with the staff physician. This will facilitate patient care and teaching as it relates to the etiology, pathogenesis, clinical presentation, natural history, and the treatment of various cardiac disorders. The attending will review and constructively critique the fellow’s interpretations of all TTE, TEE, and stress echo studies. The attending will review and constructively critique the
fellow’s performance of TTE. The attending will directly supervise the fellow’s performance of all TEE procedures. The attending will provide didactic sessions on basic concepts in echocardiography and may assign readings or other learning activities as necessary.

**Mix of Diseases and Patient Characteristics**

Both men and women of all adult ages and various ethnic backgrounds undergo echo Lab procedures. Patients presenting to the Echo Lab have a variety of cardiac disorders, including coronary artery disease, valvular heart disease, congestive heart failure, and pericardial disease. Procedures performed include the acquisition and interpretation of transthoracic, transesophageal, and exercise and pharmacologic stress echocardiograms. Clinical encounters include brief pre-procedure evaluations on the inpatient wards and in the Echo Lab prior to performing TEEs, performing the requested procedure, and providing any immediate post-procedure follow-up.

**List specific departmental conferences that the fellows are expected to attend**

General Cardiology fellowship Core Curriculum: Wednesday 8 AM, Suha Kanj conference 9th floor
Internal Medicine Grand Rounds – Tuesday none, SB101
Journal club/cases/imaging: Thursday 5:30 PM, Suha Kang, 9th floor
Cardiovascular Medicine Grand Rounds – Wednesday noon, Suha-Kanj conference 9th floor
Advanced ECG conference: Thursday 5:30 PM, Suha Kanj 9th floor

**Educational Resources**


Core Competency Overview

<table>
<thead>
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</tr>
</thead>
<tbody>
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<td>Practice-based Learning and improvement</td>
<td>Systems-based Practice</td>
</tr>
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1. The goals and objectives for the rotation will be verbally communicated at the beginning of the rotation.
2. The fellow’s progress will be reviewed verbally mid-rotation.
3. A standard fellow evaluation form will be completed by the attending at the end of the rotation.
4. The attending’s final evaluation will be based on the fulfillment of the rotation objectives as determined by:
   a. Personal observation during interaction with the fellow in echo reading sessions and in the performance of echo procedures.
   b. Evidence of extensive literature reviews appropriate for the individual patient and topic.
   c. Progressive improvement in the ability to adequately acquire TTE data.
   d. Progressive improvement in the ability to safely and properly perform TEEs.
   e. Progressive improvement in the ability to correctly interpret TTEs, TEEs, and stress echocardiograms.
   f. Participation at Echo Conference.
   g. Feedback from other team members, other healthcare providers (sonographers, echo lab administrative personnel, and patients
PATIENT CARE: By the end of the rotation, the fellow will demonstrate the basic knowledge, attitudes and skills necessary to assess patients being evaluated by echocardiography, as outlined in the objectives based on their training year.

MEDICAL KNOWLEDGE: By the end to the rotation, the fellow will acquire knowledge of cardiac ultrasound and the findings associated with the common cardiac conditions and apply this knowledge to patient care.

PRACTICE BASED LEARNING AND IMPROVEMENT: The fellow should demonstrate behaviors that reflect the desire to critically appraise scientific literature, assimilate new evidence, and seek to improve patient care outcomes on an ongoing basis.

INTERPERSONAL SKILLS AND COMMUNICATION: The fellow should demonstrate the interpersonal and communication skills that enable him/her to establish and maintain professional relationships with adult cardiac patients, to whom they will be providing an echocardiographic evaluation. The fellow is also expected to form professional working relationships with Cardiac staff preceptors, technical and ancillary staff and other healthcare providers.

PROFESSIONALISM: The fellow should exhibit behaviors that reflect a commitment to continuous professional development (being timely, complete documentation), sensitivity to patients of diverse backgrounds, and the ethical practice of medicine in interacting with patients, their families and their colleagues.

SYSTEMS BASED PRACTICE: The fellow should demonstrate 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 with the goal of achieving optimal health care outcomes.
Description of Rotation

The Cardiovascular Disease fellow will be assigned to the EP service (2-4 months in 3 years) with the aim of achieving level 1 training.

The overall purpose of the EP rotation is to provide trainees with a general overview of all aspects of cardiac electrophysiology and to ensure fellows acquire the necessary expertise required to manage the electrophysiology disorders routinely encountered in the practice of cardiology. During this rotation, the fellow will work under the supervision of electrophysiology attending physician. The fellows are expected to acquire knowledge and experience in the diagnosis and management of arrhythmias, the indications and limitations of electrophysiologic studies, the appropriate use of antiarrhythmic agents and defibrillator devices, understand noninvasive and invasive techniques used to assess patients with arrhythmias and become acquainted with the basics of pacemaker /ICD management and device interrogation. The fellow will also have exposure to the EP lab (device implantation and ablation)

Educational Purpose

1. Obtain basic training in the concepts of clinical cardiac electrophysiology, including: normal physiology of the cardiac conduction system, pathophysiology of bradydysrhythmias and tachydysrhythmias, and mechanisms of AV block.
2. Gain basic understanding of the indications, use limitations, and complications of diagnostic EP studies and radiofrequency ablation therapy.
3. Gain basic training and experience in the use of pharmacologic and non-pharmacologic options for treating cardiac dysrhythmias.
4. Gain basic training in the indications, interpretation, and clinical application of ECG interpretation, ambulatory electrocardiography (Holter) monitoring, event recorders, exercise testing for dysrhythmia assessment, tilt table testing, signal-averaged ECG, and implantable loop recorders.
5. Gain basic training in the fundamentals of cardiac pacing, recognition of normal and abnormal pacer function, knowledge of temporary pacing and permanent pacing, knowledge of pacing modes and the general approach to programming, surveillance, and troubleshooting of pacemakers and implantable cardioverter-defibrillators (ICDs).
6. Understand the indications for cardiac pacemakers, ICDs, and resynchronization devices.
7. Gain basic training in the insertion of temporary pacemakers and the indications and techniques for elective and emergent DC cardioversion.
8. Gain basic training in arterial and venous access for the placement of catheters and performance of EP studies.
9. Evaluate patients in both the inpatient and outpatient setting who may have an electrophysiology disorder by taking a thorough problem-directed history, performing a careful physical examination, and generating a differential diagnosis and plan of care.
10. Provide follow-up care for both inpatient and outpatient consult patients to assess success and adverse effects of treatment, including anti-dysrhythmic agents.
11. Explain the etiology, pathogenesis, clinical presentation, and natural history of major EP disorders, including syncope, bradydysrhythmias, tachydysrhythmias, and sudden cardiac death.
12. Learn to choose appropriate EP-related diagnostic tests.
13. Learn to recognize and manage EP emergencies.
14. Gain an appreciation for the role of the staff members in the electrophysiology, including the technicians, nurses, and administrative staff.
15. Learn to generate a comprehensive written consultation carefully explaining the diagnosis and management plan for patient’s with EP disorders.
16. Learn to distinguish those arrhythmias that have serious clinical implications from those that are clinically benign (VT vs. SVT).
Assessment Summary

By the end to the rotation, the fellow should receive and/or complete the following assessments

   Verbal ad formal feedback from preceptors
   Formal feedback from the charge nurse in the EP lab

The fellow will perform evaluation of the attending and the rotation

Expectations/responsibilities
1. The EP inpatient consults at the AUBMC are performed by the EP fellow supervised by the EP attending, and should be addressed daily in a timely manner.
2. The fellow receives and reviews all EP inpatient consults, performs the initial evaluation, reviews all pertinent laboratory data and related test results, develops an initial management strategy, presents the patient to the EP attending, and writes the final consult.
3. The fellow will conduct daily rounds on all EP inpatients and communicate management plans to the patient’s primary team. The fellow will review each patient with the EP attending and write an appropriate follow up consult progress note.
4. The fellow will assist the EP attending during procedures performed in the EP lab, or on the wards and will progress to higher levels of participation including performance of EP studies as the fellow’s skill level allows. The fellow will communicate the patient’s study information to the house staff post-procedure and do the appropriate post-procedure checks (x-ray, operative site, labs, etc.).
5. The fellow will participate, perform and / or interpret ECGs, Holter monitors, event recorders, exercise stress tests for dysrhythmia management, tilt table tests, and signal-averaged ECGs.
6. The fellow may present selected cases, with guidance of the attending, at EP conference when held.
7. The fellow is expected to interpret all EKG’s in the ECG Lab daily. These EKG’s are located in the EKG lab and are to be completed by 10:00 am.
8. Participate in EP conferences and teaching sessions

Orientation
Orientation to the consult service occurs for all first-year fellows at the initiation of the fellowship program. In addition, individual fellows will be re-oriented at the start of the EP consultation rotation.

**Supervision**

The attending physician and fellow will care for patients as a team to facilitate patient care and teaching as it relates to the etiology, pathogenesis, clinical presentation, natural history, and the treatments of the various electrophysiology disorders seen. The attending will review the fellow’s presentation, review and constructively critique the fellow’s plan of care, confirm the fellow’s physical exam findings, review and confirm the fellow’s notes, and review and supplement the fellow’s teaching of other members of the team. The attending may assign readings or other learning activities as necessary. The attending will supervise the fellow during invasive procedures based on the level of the fellow’s skills.

**Mix of Diseases and Patient Characteristics**

Training provides a wide range of pathology and a diverse patient population. Both men and women of all adult ages and of various ethnic backgrounds are seen. Clinical encounters including inpatient consultation, and peri-procedural care. Both non-invasive and invasive procedures are performed, including the interpretation of ECGs, Holter monitors, event monitors, exercise testing for dysrhythmia management, tilt table testing, and signal-averaged ECGs as well as the participation in performing temporary and permanent pacemaker placement, ICD and cardiac resynchronization device placement, DC cardioversion, diagnostic EP studies, radiofrequency ablation, loop recorder implantation, and trans-septal catheterization.

**List specific departmental conferences that the residents are expected to attend**

General Cardiology fellowship Core Curriculum: Wednesday 8 AM, Suha Kanj conference 9th floor
Internal Medicine Grand Rounds – Tuesday none, SB101
Journal club/cases/imaging: Thursday 5:30 PM, Suha Kang, 9th floor
Cardiovascular Medicine Grand Rounds – Wednesday noon, Suha-Kanj conference 9th floor
Advanced ECG conference: Thursday 5:30 PM, Suha Kanj 9th floor

**Educational Methods**

1. Clinical Activities: Fellows will be supervised in their acquisition of clinical data, interpretation, and management plan through the daily attending rounds.

2. Clinical Activities: The fellow’s ability to interpret electrocardiographic rhythm, Telemetry, Holters, device interrogation.

3. Lectures/Conferences: Fellows on the consult service will be expected to attend the cardiology conferences

4. Reading assignment:


Evaluations

1. The goals and objectives for the rotation will be verbally communicated at the beginning of the rotation.
2. The fellow’s progress will be reviewed verbally mid-rotation.
3. A standard fellow evaluation form will be completed by the attending at the end of the rotation.
4. The final evaluation of the staff physician will be based on the fulfillment of the rotation objectives as determined by:
   a. Personal observation during interaction with the fellow.
   b. Evidence of extensive literature reviews appropriate for the individual patient and topic.
   c. Ability to construct a logical management plan.
   d. Inclusion of appropriate physical examination.
   e. Appropriateness of use of diagnostic tests.
   f. Correct interpretation of diagnostic tests.
   g. Appropriate selection of pharmacologic and non-pharmacologic therapies.
   h. Competent performance of cardiac procedures relative to the fellow’s level of training.
   i. Appropriate follow-up.
   j. Feedback from other team members, other healthcare providers, and patients.

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PATIENT CARE: By the end of rotation, the clinical trainee will demonstrate the basic knowledge, attitudes and skills necessary to provide patient care that is compassionate, appropriate and effective in the care of the EP consultation patient (diagnostic and treatments of supraventricular and ventricular arrhythmia, syncope, sudden cardiac death, device interrogation and programming)
MEDICAL KNOWLEDGE: By the end to the rotation, the fellow will acquire a basic working knowledge of the common acute and chronic medical conditions that an EP consultant sees, in addition to basic skills in the EP lab.

PRACTICE BASED LEARNING AND IMPROVEMENT: By the end of the rotation, the fellow will gain an understanding of the knowledge, attitudes and skills necessary to initiate self-directed and independent learning - skills that an EP consultant must perform to keep up to date with the ever changing medical landscape of consultative cardiology.

INTERPERSONAL SKILLS AND COMMUNICATION: The fellow should demonstrate the interpersonal and communication skills that enable him/her to establish and maintain professional relationships with patients and the fellow should demonstrate professional working relationships with their staff attending, nursing personnel, ancillary staff and other healthcare providers.

PROFESSIONALISM: The fellow should demonstrate behaviors that reflect a commitment to continuous professional development and to the ethical practice of medicine in their interaction with patients, their families and their colleagues.

SYSTEMS BASED PRACTICE: The fellow should gain an understanding of the context and systems in which healthcare is provided and gain an understanding of the importance of applying this knowledge to both improve and optimize healthcare.

PRACTICE BASED LEARNING AND IMPROVEMENT: By the end of the rotation, the fellow will gain an understanding of the knowledge, attitudes and skills necessary to initiate self-directed and independent learning.

INTERPERSONAL SKILLS AND COMMUNICATION: The fellow should demonstrate the interpersonal and communication skills that enable him/her to establish and maintain professional relationships with patients in the EP lab and the fellow should demonstrate professional working relationships with their staff attending, nursing personnel, ancillary staff and other healthcare providers.
NUCLEAR CARDIOLOGY

Description of Rotation

The purpose of this rotation is for the fellow to acquire knowledge about the indications, the performance, interpretation and limitations of diagnostic nuclear cardiology and stress testing. Fellows are expected to understand the basic principles of radio-isotopes and myocardial perfusion imaging and gain skills required to independently interpret nuclear perfusion studies. Each cardiology fellow will spend 2 months in the nuclear cardiology laboratory, and is expected to achieve level 1 competence. The fellow will encounter both ambulatory and hospitalized patients during the rotation.

Educational Purpose

The overall basic objectives of this rotation include:
1. Understanding the principles of myocardial perfusion and blood flow, factors determining flow, coronary flow regulation, vasoreactivity, coronary flow reserve, regional flow differences, and flow variability
2. Understanding the principles of radioactivity, radioactive decay, radionuclide production, radionuclide generators, photon interactions with matter, and spectrum radiating detectors
3. Developing a basic understanding of the instrumentation, techniques, and principles involved in nuclear imaging, including collimation, resolution, contrast, localization, noise, , SPECT, PET, image reconstruction methods, and attenuation and scatter correction
4. Becoming familiar with the various methods of stress testing (treadmill, upright and reclining bicycle, pharmacologic), including indications, exclusions, safety, and technique and understand the advantages, disadvantages, and differences between various protocols for image acquisition; understand the differences between the various radioisotopes used in nuclear cardiology, including their energy, half-lives, and organs of elimination and gain a proper understanding of the value of perfusion imaging in the diagnosis, prognosis, and management of patients with coronary artery disease.
5. Training in the principles of noninvasive detection and prognostic assessment of patients with known or suspected coronary artery disease.
6. Gaining an understanding of the risks and benefits of various stress testing modalities.
7. Gaining an understanding of the implications of various pharmacologic agents on stress test accuracy.
8. Gaining training in safely conducting stress tests. Learn to recognize and manage emergencies arising in the course of stress testing.
9. Gaining skills in the interpretation of exercise electrocardiograms and stress and rest nuclear cardiac tests.
10. Gain understanding of nuclear methods for measurement of left ventricular function and the complimentary roles of myocardial perfusion and left ventricular function in patient assessment and management.
12. Gaining understanding of the value and limitations of stress test results in the assessment of patient diagnosis and prognosis, and in clinical management.
13. Gaining an appreciation for the role of the staff members in the non-invasive lab, including the technicians, nurses, and administrative staff.

Each fellow is expected to perform and interpret over the 3 year period a minimum of 80 hours of nuclear cardiology study interpretation during the three month training period in Nuclear Cardiology, which fulfills level 1 ACC guidelines for training. These studies include SPECT basically in our center (we are acquiring a PET scanner soon). The fellow will participate in daily readout sessions with the attending physician from nuclear medicine or cardiology responsible for the interpretation of the studies.

**Assessment Summary**

The fellow will be given feedback based on the following assessment techniques:

- Performance evaluations (by the staff)

The fellow will evaluate the staff and the rotation
Orientation

Fellows will meet with Dr. Habib Dakik at the beginning of the rotation to go over the goals and expectations of the rotation.

Responsibilities and Duties of the Service Members and Supervisory Policy

1. The fellow will work with the Nuclear Exercise Laboratory staff to assess the accurate selection of stress for the patient and can be reasonably expected to answer the clinical question.
2. The fellow should ensure there are no contraindication to the vasodilator therapy and that the appropriate test is being ordered.
3. The Nuclear fellow will supervise the exercise stress tests with the nuclear laboratory physician assistant.
4. The Nuclear fellow will be present in the lab in the morning to supervise and interpret stress tests, perform tracer injections when possible. In the afternoon, the Nuclear fellow will interpret perfusion images with the cardiology nuclear staff.
5. The fellows should read all stress electrocardiograms and nuclear perfusion imaging studies in preparation for the afternoon reading session with the attending cardiologist.

Mix of Diseases and Patient Characteristics

Training includes men and women of all adult ages, with a wide range of body habitus and medical co-morbidities, and varied ethnic and socioeconomic backgrounds. Although the majority of patients present with chronic or subacute symptoms, many patients present from the Emergency Department after acute myocardial infarction has been excluded and the patient’s presenting symptoms have been stabilized. Most patients are referred for evaluation of chest pain or exertional dyspnea, but a significant proportion of patients are referred for preoperative cardiac risk assessment, assessment of myocardial viability, or assessment of known or suspected arrhythmias. Diagnostic test options include exercise electrocardiography, exercise and rest myocardial perfusion imaging, pharmacologic coronary vasodilation stress, and inotropic (dobutamine) stress tests.
List departmental conferences that the residents are expected to attend

General Cardiology fellowship Core Curriculum: Wednesday 8 AM, Suha Kanj conference 9th floor
Internal Medicine Grand Rounds – Tuesday none, SB101
Journal club/cases/imaging: Thursday 5:30 PM, Suha Kang, 9th floor
Cardiovascular Medicine Grand Rounds – Wednesday noon, Suha-Kanj conference 9th floor
Advanced ECG conference: Thursday 5:30 PM, Suha Kanj 9th floor

Educational Methods

1. Clinical activities
   a. Perform both stress and chemical stress myocardial perfusion studies and learn the strengths and pitfalls of each technique.
   b. Learn the criteria for interpreting the various nuclear cardiology studies with emphasis on perfusion imaging.
   c. Gain exposure to PET metabolic imaging (to become available soon)

2. Handling of radioactive material safely

3. Attend Lecture conferences

Educational Resources

Atlas of Nuclear Cardiology. Ami Iskandrian & Earnest Garcia


**Evaluations**

**Fellows:** Fellows will receive immediate feed-back from technologists, specialists and medical staff (verbally and formally)

**Evaluations of the rotation:** Fellows will be asked to evaluate their experience in terms of the individual attending assigned and the rotation.
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<table>
<thead>
<tr>
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</tr>
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<td>Systems-based Practice</td>
</tr>
</tbody>
</table>

1. The goals and objectives for the rotation will be verbally communicated at the beginning of the rotation.
2. A standard fellow evaluation form is completed by the attending at the end of the rotation.
3. The attending physician’s final evaluation is based on fulfillment of the rotation objectives as determined by:
   a. Personal observation during interaction with the fellow.
   b. Evidence of a growing knowledge base in exercise testing and nuclear cardiology over the course of the rotation.
   c. Ability to identify appropriate versus inappropriate test selections.
   d. Accuracy of exercise electrocardiogram interpretation.
   e. Accuracy of nuclear cardiology test interpretation.
   f. Appropriate handling of any patient emergencies.
   g. Feedback from ECG monitoring technicians, nurses, and nuclear medicine technologists in the Exercise Nuclear Laboratory.

**PATIENT CARE:** By the end of the rotation, the clinical trainee will demonstrate the basic knowledge, attitudes, and skills necessary to provide patient care that is compassionate, appropriate and effective in the care of a patient undergoing nuclear cardiac procedures, including hot lab experience.

**MEDICAL KNOWLEDGE:** By the end to the rotation, the clinical trainee will acquire a basic working knowledge performance and interpretation of the different nuclear cardiology procedures.

**PRACTICE BASED LEARNING AND IMPROVEMENT:** By the end of the rotation, the fellow will gain an understanding of the knowledge, attitudes and skills necessary to initiate self-directed and independent learning - skills that a cardiovascular imaging attending must perform to keep up to date with the ever changing medical landscape of inpatient cardiovascular medicine.
INTERPERSONAL SKILLS AND COMMUNICATION: The clinical trainee should demonstrate the interpersonal and communication skills that enable him/her to establish and maintain professional relationships with patients undergoing nuclear cardiology procedures and the clinical trainee should demonstrate professional working relationships with their staff attending, nursing personnel, ancillary staff and other healthcare providers.

PROFESSIONALISM: The clinical trainee should demonstrate behaviors that reflect a commitment to continuous professional development and to the ethical practice of medicine in their interaction with patients, their families and their colleagues.

SYSTEMS BASED PRACTICE: Not tested
CONTINUITY CLINIC

PURPOSE / OVERVIEW

The overall purpose of the continuity skills is to develop and demonstrate skills as a consultant cardiologist in the outpatient setting and to learn to address chronic cardiovascular disease management issues on a long term basis. The goals of the ambulatory experience are to provide exposure to outpatient cardiology practice, including both consultative and continuity experiences, and to provide a means for clinical follow-up of patients recently discharged from the hospital. This experience provides an opportunity to follow and manage patients for a full 3 years in an outpatient setting. Fellows participate in a continuity clinic one-half day every week during the course of the 3 year cardiology fellowship program. Fellows see an average of 1 new and 2-3 return patients on their clinic day. Fellows are directly responsible for care of the patients to which they have been assigned. Each fellow works with the faculty physician on this rotation. Patients are referred to the clinic for a wide variety of reasons including routine management of common cardiology problems, preoperative evaluations before non-cardiac surgery, evaluations for potential revascularization procedures (surgical and interventional), post-revascularization follow-up, follow-up of recently discharged patients, and referrals for complex cardiology problems. The cost effectiveness of various options in treating outpatient cardiovascular disease will be discussed between the faculty member and fellows. Clinical follow-up of patient outcomes will be used for quality assessment with discussions focused toward quality improvement. Fellows will be instructed on relevant issues of risk management as pertaining to patients with cardiac disease.

RESPONSIBILITY:
The fellow evaluates new cardiology referrals and provides follow-up care for patients with cardiovascular diseases. The fellow performs the initial evaluation, formulates a plan of care, and presents the case to the attending cardiologist. The fellow is responsible for ordering and following up on all appropriate studies.

SUPERVISION:

Attending cardiologists are present for all clinics. All patients are presented to the designated staff physician in the clinic.

LEARNING OBJECTIVES:

1. Evaluate patients in the outpatient clinical setting who have a wide variety of general cardiovascular disorders by taking a thorough problem-directed history, performing a careful physical examination, and generating a differential diagnosis and plan of care.
2. Learn to treat common cardiovascular disorders in the outpatient setting in accordance with established practice guidelines.
3. Learn to generate a well-organized written consultation that clearly conveys the management plan.
5. Gain an appreciation for the role of the ancillary staff members in the outpatient clinic setting, including the nurses, administrative staff, and social workers.

PATIENT CHARACTERISTICS/MIX OF DISEASES/TYPES OF CLINICAL ENCOUNTERS:

All clinical encounters are in the outpatient setting and include both new patient consults and follow-up care. Consults referred cover a wide variety of cardiovascular diseases, including coronary artery disease, heart failure, valvular disease, and dysrhythmias. Male and female patients of all adult ages and of various ethnic backgrounds are seen. Fellows may perform ECG, device interrogation, and Echocardiogram on their patients if cleared and/or supervised by the attending staff.
TEACHING METHODS:

The attending will review the fellow’s presentation, review and constructively critique the fellow’s plan of care, confirm the fellow’s physical exam findings, and review and confirm the fellow’s notes. The fellow will assume progressive levels of responsibility for patient care under the supervision of the attending.

EVALUATION:

1. The goals and objectives for cardiology clinic will be reviewed at the beginning of each academic year.
2. The fellow’s progress will be reviewed verbally and a standard fellow evaluation form will be completed by the attending every 6 months.
3. The final evaluation by the staff physician will be based on the fulfillment of the continuity clinic objectives as determined by:
   a. Personal observation during interaction with the fellow.
   b. Evidence of extensive literature reviews appropriate for the individual patient and topic.
   c. Ability to construct a logical management plan.
   d. Inclusion of appropriate physical examination.
   e. Appropriateness of use and application of diagnostic tests.
   f. Appropriate formulation of treatment plan.
   g. Appropriate follow-up.
   h. Feedback from other team members, other healthcare providers, and patients.
   i. Good communication skills with the patients and their families.