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1. **Introduction:**

The curriculum of the Wright Center for Graduate Medical Education (WCGME) cardiovascular diseases fellowship consists of a variety of clinical experiences and didactic conferences that take place at both the Community Medical Center and Regional Hospital and the VA Hospital. Fellows rotate on several inpatient services and outpatient services and provide both direct and consultative care. Fellows also attend a weekly continuity cardiology clinic. Procedural skills are gained as fellows rotate through the invasive and non-invasive laboratories at all hospitals, and extensive experience in cardiac catheterization, echocardiography, and nuclear cardiac perfusion imaging is readily available.

This training is acquired either on the noninvasive echo or nuclear rotation or during the outpatient rotation at the cardiology clinic or during an elective rotation dedicated to advance cardiac imaging.

Several conferences occur throughout the week, and a core curriculum lecture series is covered over a two year rotating cycle. Additionally, journal club takes place twice a month and provides a forum to critically review the literature and to debate current topics in cardiology.

A final aspect of the curriculum involves fellow involvement in teaching. This occurs in several settings, including direct clinical teaching of Internal Medicine residents on the inpatient cardiology services (intensive care unit, heart failure service and consult service) as well as assisting in the early training of new cardiology fellows. Fellows are expected to give didactic lectures at cath conferences, cardiology clinical conference lecture series (cardiology grand rounds), board review lecture series, morbidity, and mortality conference.

**COCATS 3:**

COCATS 3 (Core Cardiology Training Symposium) is the curriculum guiding document for fellowships in cardiovascular disease. This document consists of the reports of individual task forces, which reviewed and made recommendations for training in each of 11 vital areas of cardiovascular disease. A brief description will be given as to how WCGME Fellowship Program in Cardiovascular Disease addresses each Task Force’s recommendations.

**Task Force 1: Training in Clinical Cardiology**

Extensive training in general clinical cardiology occurs both in the inpatient and outpatient and in the laboratory and non-laboratory setting. The cardiology fellow is primarily
responsible for the management of inpatients with cardiovascular diseases on the STRP consult service, CMC (intensive care unit), CMC and Regional inpatient cardiology service. Training in procedural skills is acquired in the CMC and Regional cardiac catheterization laboratory, nuclear medicine/cardiology laboratory, echocardiography laboratory and exercise-testing laboratory. Outpatient consults and management of chronic cardiovascular disease takes place in the weekly continuity clinics at the WCGME Cardiology Clinic.

Task Force 2: Training in Electrocardiography, Ambulatory Electrocardiography, and Exercise Testing

Fellows interpret ECG and Holter monitor recordings during the WCGME outpatient and inpatient rotations. Fellows interpret Holter monitor recordings during CMC, Regional Hospital electrophysiology rotation. Fellows interpret ECG and stress tests on the CMC and Regional Cardiology rotation. Fellows directly supervise exercise stress tests during the STRP Outpatient rotation and jointly supervise exercise stress tests at CMC and Regional Hospital. These studies are then reviewed by the attending cardiologist. In addition, a four-week course in basic ECG interpretation is conducted at the beginning of training period and an ECG conference is held weekly at Regional Hospital.

Task Force 3: Training in Diagnostic Cardiac Catheterization and Interventional Cardiology

All fellows complete at least 6 months in the cath labs. Additional two months are available for fellows during the intensive care unit and heart failure rotation. Fellows receive extensive training in vascular access, left and right heart catheterization, diagnostic coronary angiography, invasive hemodynamics, RV biopsy. A weekly Cath Conference is held during which faculty, fellows present teaching case and review angiographic, hemodynamic findings, discuss diagnostic, and management issues, review complications and promote discussion of specific cardiology topics pertaining to invasive cardiology.

Task Force 4: Training in Echocardiography

Transthoracic and transesophageal echocardiography training occurs during the Echocardiography laboratory rotation and during the STRP Outpatient and CMC and REGIONAL HOSPITAL inpatient rotation. All fellows complete at least 3 months on these rotations to achieve level 1 certification. Additional months for Level 2 certification are available for fellows on elective rotations. All fellows receive training in transesophageal echocardiography after the first month of training in echocardiography. A weekly Echocardiography Conference is held that includes echocardiography case reviews and case specific didactic teaching. A series of lectures in echocardiography is also presented at the core curriculum lecture series.

Task Force 5: Training in Nuclear Cardiology
All fellows complete at least 2 months in the Nuclear Cardiology Lab; one month at Regional Hospital and the remainder during half–day rotations during the two WCGME outpatient cardiology rotations. Fellows interested in achieving Level 2 certification may choose to take additional elective rotations and also participate in interpretation of studies during the inpatient rotations. Once every three months, a multidisciplinary joint nuclear medicine – cardiology conference is conducted in the division of cardiovascular diseases to correlate angiographic findings with the perfusion results. Lectures in nuclear cardiology are provided by cardiology and nuclear medicine faculty.

Task Force 6: Training in Specialized Electrophysiology, Cardiac Pacing, and Arrhythmia Management

All fellows complete 2 months on the Electrophysiology (EP) service to achieve Level 1 EP training. Fellows wishing to practice The EP service cover all EP consults and procedures at both the CMC and the Regional Hospital. Fellows evaluate inpatient consults at both hospitals; perform device interrogations with dedicated personnel for device interrogation and/or with the EP faculty physician. Fellows obtain informed consents, explain indications and contraindications of procedures and may assist with procedures performed in the EP laboratory usually during the senior year of training. A weekly EP Conference is held at REGIONAL HOSPITAL to review interesting EP cases, basic EP topics. Hands-on sessions with the device representatives are scheduled at the beginning of each year to acquaint fellows with the device interrogation equipment. In addition, basic EP topics are addresses during the core curriculum conference series.

Task Force 7: Training in Cardiovascular Research

The Cardiology Division is active in both clinical and basic science research. All fellows are encouraged to become involved in ongoing research projects. Research is an important and critical component of training in cardiovascular disease. The Commonwealth Medical college research activities are at the cutting edge of basic science research and clinical research. All fellows expected to spend time engaged in research usually during their second year of training. The fellows are carefully paired with mentors depending on fellow’s research interests. In the future, this requirement will be expended or curtailed in accordance with ACGME guidelines and to tailor it to the individual trainee. Fellows are also encouraged to prepare and submit interesting clinical cases for publication.

Task Force 8: Training in Heart Failure and Transplantation

All fellows complete 2 months on the heart failure. Fellows on this service admit and manage patients with cardiac transplant related issues or de-compensated heart failure. Outpatient consults are performed on patients referred to the heart failure/ transplant clinic for assistance with heart failure management or for consideration of cardiac transplantation. Fellows may perform right heart catheterizations procedures and right ventricular endomyocardial biopsies on selected patients on this service.
Task Force 9: Training in the Care of Adult Patients with Congenital Heart Disease

All fellows have an option to do off site clinics at the adult congenital heart disease clinic during the course of their fellowship. Fellows are under the supervision of the pediatric cardiology faculty members in the clinics and may follow the patients undergoing cardiac procedures. Additionally, lectures on congenital heart disease and their associated surgical procedures are given as a part of the core curriculum lecture series.

Task Force 10: Training in Preventive Cardiovascular Medicine

In addition to discussing prevention-related issues relevant to individual patients seen on the inpatient services or in the outpatient clinics, dedicated lectures on Preventive Cardiovascular Medicine are provided to the fellows as a part of the core curriculum lecture series. These lectures cover cardiovascular (CV) genetics, clinical epidemiology and biostatistics, principles of clinical trials, principles of outcomes research, principles of clinical pharmacology, principles of behavior change and aspects of compliance, and principles of disease management and multidisciplinary system development. The specific content areas defined by the task force are HTN, hyperlipidemia, thrombosis/hypercoagulable states, smoking cessation, cardiac rehabilitation, exercise physiology, nutrition, psychosocial and behavioral aspects of CV disease, metabolic disorders, gender and racial differences as related to CV disease, and population demographics as related to CV disease. Over a rotating two-year period, the content areas outlined by this task force are addressed through core curriculum conference series, review of current literature in the journal cub setting, state of the art review and controversial topics in the cardiology grand rounds lecture series.

Task Force 11: Training in Vascular Medicine and Peripheral Catheter-based Interventions

A dedicated rotation as an elective in Vascular Medicine is available for the fellows based at the CMC. In addition the fellows spend one half day per week during the nuclear cardiology rotation at CMC vascular medicine laboratory to learn the indications for screening, performance and interpretation of carotid artery, renal artery, and lower extremity peripheral artery disease is emphasized. Percutaneous renal and lower extremity angiograms and interventions are performed in the Cath Lab. Fellows may assist with the diagnostic angiogram. In addition, we have combined Cardiology-Vascular Surgery Conference at the CMC. The basic concepts in Vascular Medicine are reviewed in a multidisciplinary setting.

Procedure Certification:

Certification levels are defined by COCATS 2 as follows:

Level 1: Basic training required of all trainees to be competent consultant cardiologists.
**Level 2:** Additional training in one or more specialized areas that enables the cardiologist to perform or interpret (or both) specific procedures at an intermediate skill level or engage in rendering cardiovascular care in specialized areas.

**Level 3:** Advanced training in a specialized area that enables a cardiologist to perform, interpret, and train others to perform and interpret specific procedures at a high skill level.

In general, level 2 certification is required to independently interpret and/or perform a specific cardiac procedure and level 3 certification is required to run a procedure-related laboratory.

All fellows are required to maintain detailed documentation of the procedures they perform. The procedure log is to be turned in twice a year to be reviewed by the program director during the fellow’s biannual evaluation.

**ROTATIONS**

**Cardiac Rehabilitation**

Training in Cardiac Rehabilitation is a required element of the Training Program in Cardiovascular Disease as mandated by the ACGME. The Department of Cardiac Rehabilitation Medicine, administers a robust program for inpatient and outpatient cardiac rehabilitation on the fifth floor at the Regional Hospital of Scranton. Elaine Walker is the director of the cardiac rehab department. There is also a Cardiac Rehabilitation Service at the Community Medical Center.

For the purposes of satisfying this training requirement, Elaine Walker shall serve as the contact faculty member.

The required experience for Cardiac Rehabilitation for Fellows in the Training Program in Cardiovascular Disease comprises the following:

- Attendance 2 weeks rotation on the Cardiac Rehabilitation service under the supervision of a cardiac rehabilitation specialist. (See below.)
- Demonstration of having satisfactorily attained the goals and objectives of this experience as delineated below

Satisfaction of these requirements must be documented by the signature of faculty supervisor on the form supplied herein. The completed form must be placed in the Fellow file for review by the Program Director.

**These requirements can be satisfied any time during the first 2 years of training and are pre-requisite for advancement into the third year.**

Faculty:
Samir Pancholy M.D, FACC
Elaine Walker, RN, BNS
Goals and Objectives for First or Second Year Fellows in Cardiovascular Disease Training in Cardiac Rehabilitation

Patient Care
By the end of this training, you should be able to
• Appropriately refer patients for a program of cardiac rehabilitation
• Administer a session of supervised exercise to a cardiac rehabilitation patient according to their exercise prescription

Medical Knowledge
By the end of this training, you should know:
• The indications and contraindications for cardiac rehabilitation
• The anticipated benefits of a cardiac rehabilitation program
• The various types of exercise that comprise a cardiac rehabilitation program
By the end of this training, you should be able to:
• Understand the data derived from exercise cardiopulmonary stress testing
• Write an exercise prescription

Interpersonal and Communication Skills
During this experience, you should learn to:
• Effectively communicate with patients enrolled in cardiac rehabilitation
• Effectively communicate with the therapists and physicians on the rehabilitation service to impart an effective exercise program to the rehabilitation patient

Systems Based Practice
During this experience you will learn about:
• Effective interaction with the various services/physicians who refer patients for cardiac rehabilitation
• The use of additional resources including social service, pharmacy, etc.
• The third party payor relationship to cardiac rehabilitation services

Practice Based Learning and Improvement
As a result of this experience you will:
• Recognize the value of rehabilitation services to your current patients in continuity clinic and reassess their need for same

Professionalism
During this experience you will
• Demonstrate sensitivity for the disability of cardiac patients
• Demonstrate sensitivity for diverse ethnicities, life styles and socioeconomic backgrounds, and recognize how these factors determine activity habits
• Show respect for other members of the rehabilitation service team and all patients
Rotation: Coronary Care Unit

Educational Goals and Objectives:

In the CCU, the Fellow in Cardiovascular Disease is educated in the management of the wide spectrum of acute cardiovascular diseases particular to our busy hospitals. The overall goal of this rotation is to provide a broad experience in the management of patients with acute cardiac illness, frequently with associated problems in other organ systems. This is accomplished under the close supervision of the attending cardiology faculty. The main categories of experience and anticipated mastery are:

- The management of patients with chest pain syndromes and the selection of appropriate noninvasive diagnostic tests and the determination of appropriate candidates for cardiac catheterization, coronary arteriography and surgery.
- The management of patients with acute myocardial infarction, including thrombolysis and acute catheter-based interventions. This entails training in bedside monitoring of intracardiac pressures and the selection of patients for coronary bypass surgery. There is a close collaboration with the Catheterization Laboratory and on the Cardiac Surgical Service. The trainees participate in the insertion of intra-aortic balloon pumps and manage these devices in patients with cardiogenic shock and low output states.
- The diagnosis and management of acute cardiac arrhythmias: The Fellow is responsible for interpreting a large number of ECG’s recorded in the unit, and works closely with our Electrophysiology Service in the management of many types of acute arrhythmias. The Fellow is responsible for insertion and management of temporary pacemakers and also participates in the selection of patients for EPS, ablation therapy, and the implantation of defibrillators and permanent pacemakers.
- The management of acute and chronic congestive heart failure, with precise use of pharmacologic and mechanical intervention and the occasional selection of patients for cardiac transplantation or ventricular assist device implantation.
- The diagnosis and management of patients with syncope, many of whom are admitted to the CCU
- The diagnosis and management of patients with valvular heart disease: Our service treats large numbers of patients who arrive acutely ill from the consequences of aortic and mitral valve disease. Our population includes large numbers of elderly patients, so patients with complicated heart disease are numerous. Obviously, through this experience and that in the clinic, the Fellow also is able to hone skills in auscultation and physical diagnosis. (This is augmented by the active role our trainees play in teaching physical diagnosis to medical students and house staff.)
- Diagnosis and management of patients with pericarditis and myocarditis and the use of pericardiocentesis and myocardial biopsy.
- Management of patients with bacterial endocarditis, of which Bellevue has large numbers. Trainees learn the principles of diagnosis, often with bedside TEE, the selection of appropriate antibiotics and the selection of patients for surgical intervention.
- Patients with dilated cardiomyopathy are also seen in large numbers and in progressive states of cardiac failure. The Fellow in the CCU may learn to manage such patients in the
early acute stages of their illness and follow their course in the continuity clinic, providing the Fellow with a sense of continued management of what is commonly a chronic disease.

- **Cardiac pharmacology and initiation of secondary preventive measures** are important experiences provided to the trainee by the CCU rotation. Anticoagulation and antithrombotic therapy is generally initiated in the CCU, as is the long-term use of afterload reduction, the chronic use of second and third generation beta-blockers, rennin/angiotensin/aldosterone blocking agents, and cholesterol-lowering agents.

- **Complex cardiovascular/medical diseases** are managed in large numbers by our Fellows in CV Disease and these cases provide them with experience with the central role of the cardiologist in such patients with chronic infectious diseases (especially HIV), sepsis, pulmonary embolism, endocrine and renal disease.

- **Interaction with families and with the social and emotional problems of patients who become acutely ill with cardiac disease** is an important part of the trainees’ experience. The waiting room is always filled with anxious relatives, and the Fellows in CV Disease learn to guide the patients and their families through problems ranging from mild and transient disability to difficult decisions about surgery and the devastating experience of deciding to terminate supportive measures. With personal responsibility for their patients, the trainee gains experience in ethical and moral aspects of patient care and the economic impact of acute and chronic illness.

- **The continued management of patients returning from the Cardiac Catheterization Laboratory after angioplasty and stenting for coronary artery disease** provides the Fellow with an understanding of the principles of continued management of such individuals with acute monitoring and the use of heparin, anti-platelet agents and newer inhibitors of thrombosis.

The flow of patients to the CCU/Telemetry is from the Emergency Room or via elective admission from the Clinics and General Admitting Office. Some are admitted for stabilization before or after procedures in the Cardiac Catheterization or the Electrophysiology Laboratories.

The Fellow is primarily involved in the care of all the patients in the Unit, is responsible for their treatment on the Unit, and for selecting diagnostic procedures and therapeutic interventions. In addition, the Fellow is responsible for the CCU during their nights and weekends on call. In the continuity clinic the Fellow will provide follow-up of these patients for their cardiovascular care needs.

**Venue:**

The Coronary Care Unit at Community Medical Center consists of 5 acute-care beds and 12 beds in a step-down unit. Some of the admitted patients to the Unit and their continued care are a responsibility of House Staff in Internal Medicine, whom the Fellows directly supervise, in turn under the supervision of the Faculty of the Division of Cardiology.

**Educational Methods:**

By working closely with the medical residents, the Fellow is immediately involved in the
teaching relationship, which fosters greater intellectual rigor and clarity in their diagnostic and therapeutic decision-making. During each rotation through the CCU, they make daily rounds with the medical residents, third year students, and fourth year students on electives in cardiology and with the cardiology attendings who rotate through the service for 2-4 week periods. The CCU rotation provides our trainees with an intense exposure to a wide variety of the most important clinical syndromes. It provides the imperative to learning the basic pathophysiology and management of heart disease: a constant flow of sick patients for whom the Fellow is responsible, always under appropriate supervision. There is a close working relationship with the attending faculty. Daily attending rounds include the presentation of all admissions to the CCU with complete discussion of patient evaluation and treatment, and bedside confirmation of history and physical findings. All patients in the unit are seen and discussed by the fellow, house staff team and the attending. There is always academic discussion centered on various aspects of the individual patients. In addition there are several core seminars given to the CCU Fellow and house staff during each month by Dr. Rao.

**Patient Population:**

The acuity of many of these patients’ presentations often precludes choice of where to be hospitalized. Therefore, the Fellow will be exposed to patients from all socio-economic, age, gender and ethnic groups during this rotation as well as a large traveling and immigrant population.

**Fellows Responsibilities:**

Under the supervision of the rotating faculty fellow in Community Medical Center Coronary Care Unit is responsible for the care of all patients admitted to that unit. Combined work and teaching rounds are to be made daily with the medical house staff and attending supervisor(s). The fellow is to lead these rounds, demonstrating organization, leadership and teaching skills. The fellow is to learn and improve his practice in a progressive fashion.

The fellow will provide the medical house staff with didactic sessions on an ad hoc basis, centered on the management of CCU patients and disease entities encountered in this venue. The fellow will accompany the house staff to the various clinical laboratories to review and explain the procedure and results of the tests performed on the CCU patients.

The fellow will supervise the house staff in the placement of central lines when necessary. In turn, the fellow will place all temporary wires and right heart catheters under the supervision of the attending or senior fellow staff as appropriate. Elective cardioversions in the CCU will be performed by the fellow, with supervision for this procedure and the attendant conscious sedation. The fellow will assist in the placement and management of intra-aortic balloon pumps as indicated, under the appropriate supervision.

The fellow will help to coordinate the cardiology testing of the patients in the CCU through frequent and meaningful discussion with the staff of the exercise, echo and catheterization laboratories and the electrophysiology services. Likewise, he will coordinate consultation on CCU patients by the cardiothoracic and other surgical teams as necessary.
The fellow will participate in discharge planning, patient safety and any other ancillary sessions necessary to coordinate care for patients while hospitalized in the CCU. She/he will assure appropriate hand-offs each day and for weekend coverage and when patients are transferred to other services and house staff teams.

During this rotation, the fellow is responsible for attending all of the regularly scheduled conferences of the program and division and to attend his/her continuity clinic.

**Supervision:**

The attending cardiology faculty rotating onto this service provides continuous supervision. Responsibility is afforded the Fellows according to their level of advancement and demonstrated competence.

**Research:**

The Fellow is responsible for identifying and enrolling patients for clinical trials. Many ongoing investigations of treatments for patients with acute coronary syndromes. Participation by our trainees is constantly encouraged and, in fact, vital to the success of our research efforts.

**Educational Resources:**

There is Internet access and an extensive library available to the Fellow in CV Disease in the Fellows’ Room located in the third floor /room 333. The Fellow and the medical house staff make ample use of the expertise of the cardiology faculty in the various clinical laboratories as well.

**Evaluation:**

The Fellow on the Community medical center CCU will be evaluated for knowledge of medical information as it relates to the evaluation of a wide variety of cardiovascular conditions, including but not limited to acute coronary syndromes and atherosclerotic heart disease, valvular heart disease, congenital heart disease, hypertensive disease, acute and chronic heart failure, etc. Practice guidelines are stressed. The Fellow will be directly observed during patient encounters for effective communication skills, compassionate care, and appropriate history and physical examination skills. The Fellow will be evaluated for competence in the pursuit of learning from supervisors, texts and primary sources in a case-based context. The Fellows will be evaluated for their teaching skills as well. The Fellow will therefore be evaluated in terms of the competencies designated by the ACGME in writing for inclusion in the Fellow’s file. A meeting at the end of this rotation will comprise face-to-face discussion with constructive criticism of the Fellow’s performance.

The medical students and house staff rotating on this service will be solicited for evaluation of the Fellow’s teaching and communication skills, his/her professional behaviors, and medical knowledge.

The Fellow will have the opportunity to anonymously evaluate this learning experience and the
supervisory faculty members.

**Faculty:**
Madhava Rao, M.D, FACC
Samir Pancholy M.D, FACC
Michael C. Kayal, D.O
Lee Loewinger, M.D

**Goals and Objectives for the First/Second Year Fellow in Cardiovascular Disease in the Coronary Care Unit**

**Patient Care:**

By the end of this rotation, you should be able to:

- Obtain an accurate history and perform a comprehensive physical examination in an appropriately directed fashion for the acutely ill cardiac patient
- Rapidly assess the acuity of a patient’s illness.
- Treat the complications of procedures germane to the CCU (central lines, arterial lines, pulmonary artery catheters, intra-aortic balloon pumps)
- Synthesize and integrate clinical data with special emphasis on critical care issues
- Communicate findings and treatment and diagnostic plans to the patient
- Diagnose and risk stratify patients presenting with chest pain, determining appropriate candidates for cardiac catheterization and surgery
- Determine the appropriate sequence of tests for your patients
- Manage patients with acute coronary syndromes
- Manage patients with chest pain syndromes, selecting appropriate noninvasive diagnostic tests, and
- Diagnose and treat patients with ST elevation MI with thrombolysis or referral for acute catheter-based interventions.
- Recognize and treat acute valvular emergencies
- Manage patients with acute decompensated heart failure
- Recognize and treat brady- and tachyarrhythmias
- Read a portable CXR (including assessment for line and tube placement)
- Interpret telemetry and rhythm strips
- Manage various ventilator settings
- Supervise a cardiac arrest
- Perform pericardiocentesis with supervision
- Refer appropriate patients to cardiac rehabilitation
- Appropriately obtain consultation from other services
- Recognize the appropriate timing for transfer out of the CCU
Medical Knowledge:

By the end of this rotation, you should know:

- The criteria for an admission to the CCU or Step-down Unit
- The management options for acute and chronic congestive heart failure, including pharmacologic and mechanical intervention
- The management of pericardial diseases such as acute pericarditis and pericardial effusion
- The differential diagnosis and management of acute cardiac arrhythmias.
- The appropriate selection of patients for EPS, ablation therapy, and the implantation of defibrillators, and permanent pacemakers.
- Recognize and manage various degrees of heart block
- The differential diagnosis and management of patients with syncope
- The differential diagnosis of heart block and myocarditis.
- Indications and complications of endomyocardial biopsy
- How to manage valvular diseases and know the indications and selection criteria for valvuloplasty, repair and replacement
- The management of endocarditis including principles of diagnosis, its complications and indications for surgery.
- The ACLS protocol for a cardiopulmonary arrest,
- How to manage pacemaker infections
- The management of the post-catheterization patients and their complications
- The indications for and complications of pulmonary artery catheters
- The indications for non-invasive vs. invasive ventilation
- The indications for volume-cycled vs. pressure-cycled ventilation
- The uses of different vasoactive drugs
- The differential diagnosis of hypotension, CO2 retention, hypoxemia, oliguria, altered mental status, fever in the CCU patient, acute renal failure, hyper- and hypoglycemia, various ECG abnormalities
- The management of cardiogenic shock
- Cardiovascular drug pharmacology and secondary preventive measures
- The types of patients who may benefit from cardiac rehabilitation
- The indications/contraindications and complications of IABP placement

You should be able to cite textbooks and literature about many of the conditions listed above.

You should know how to use information technology to supplement your medical knowledge.
Interpersonal and Communication Skills:

By the end of this rotation, you should be able:

- Establish rapport with patients from different backgrounds
- Educate patients and their families about their medical conditions, procedures, diagnostic and therapeutic plans
- Work effectively with and supervise the house staff team
- Interact effectively with other members of the health care team
- Effectively answer questions asked of you by the medical students and junior house staff
- Have “difficult” conversations with patients (e.g. discussing grave prognoses, discussing end of life issues, handling the angry patient or family member, asking for an autopsy).
- Act as the team leader
- Model effective working relationships with other members of the health care team.
- Lead and teach junior house staff effectively.

Systems-Based Practice:

By the end of this rotation, you should know:

- The nature of the health care system/network (Bellevue Hospital and the Health and Hospitals Corporation)
- The different members of the health care team

By the end of this rotation, you should be able to:

- Communicate effectively with the patient’s primary care provider and/or referring physician
- Help the patient and family navigate the health care system
- Educate other members of the health care team about individual patients’ conditions.
- Incorporate issues of cost effectiveness into your management, and know the economic impact of acute and chronic cardiac illnesses
- Call on system resources such as palliative care consults, ethics consults, and risk management when appropriate
- Ensure a smooth transition from CCU to ward care or home
- Delegate responsibilities to house staff and students and help them prioritize.

Practice-Based Learning and Improvement:

By the end of this rotation, you should:

- Understand and implement the procedures used to minimize physician error
- Understand and adhere to standard infectious disease precautions in the CCU setting
- Be able to analyze your own performance and find ways to improve.
- Identify and review your own and your teams’ errors in management.
- Teach about errors in management (both your own and others)
• Appropriately disclose errors to patients.
• Apply scientific evidence from the literature to your own patients
• Learn from autopsy reports and specimens when available
• Complete evaluations of junior house staff

**Professionalism:**

By the end of this rotation, you should have:
• Demonstrated respect for patients and staff, regardless of their background
• Upheld basic ethical principles especially with regard to advanced directives, withdrawing/withholding life sustaining treatments, and medical futility
• Demonstrated facility with the informed consent process for various procedures, imaging studies, and blood transfusions.
• Modeled professional behavior for your team.

**Rotation: Consultation Service**

The Fellow in Cardiovascular Disease provides consultative services to the general medical house staff and house staff from other departments, for cardiovascular problems manifest in their patients. The range of diagnoses encountered is that of cardiovascular disease itself. Management of in-hospital cardiovascular disease, pre-surgical risk stratification, and peri-operative cardiovascular management are common areas of endeavor.

**Educational Goals and Objectives:**

The educational objective of this component of the training program is to develop the skills necessary to be an effective consultant in cardiovascular disease for the hospitalized patient population. The specific skills to be developed are:
• To learn to obtain a thoroughly detailed medical and cardiac history (patient care, interpersonal and communication skills)
• To learn to perform an accurate, complete general and cardiac examination (patient care)
• To combine the aforementioned information with the appropriate laboratory testing and imaging procedures so as to develop a correct differential diagnosis and management strategy. (patient care, medical knowledge)
• To convey this information, orally and in writing, in a learned and articulate fashion. A critical component of this experience is learning to interact appropriately with house staff, Fellows and attendings from Internal Medicine, its subspecialties, and other services. (interpersonal and communication skills, systems-based practice)
• The Fellow is responsible for supporting the analysis of the patient’s problem with the relevant literature. (practice-based learning and improvement)
• The Fellow will learn how cardiovascular disease complicates the care of patients whose primary diagnosis may be outside the specialty purview of cardiology or internal medicine.
• The Fellow is also responsible for educating the house staff and students on the subject of the patient's illness and its management. (interpersonal and communication skills, practice-based learning and improvement)

Venue:

All in-patient care sites
The Fellows’ Room is located on the Third floor at CMC-Rm333. At the VA , on the Third floor Room(xxx)

Methods:

Consultations are performed under the supervision of cardiology faculty. Attending rounds are held daily for 3-4 hours, and, 3 times per week jointly with an additional member of the cardiology faculty who rotates on service. Patients are presented to the faculty members by Fellows, or by medical students and house staff under the supervision of the Fellows. All ancillary studies and consultations are reviewed by the faculty members who provide educational feedback and supervisory instruction. Bedside learning is the pillar of this educational experience during which confirmation of the history and physical examination is undertaken.

Educational Resources:

The Fellow will have access to the Internet and a full library of texts and literature on site in the Fellows’ Room, and at the local hospitals libraries. A reading list pertinent to the role of cardiology consultation, preoperative risk assessment, and peri-operative management of the cardiac patient undergoing non-cardiac surgery is provided. In addition, the teaching resources of the various clinical laboratories and the faculty therein are readily available and will be consulted regularly as indicated.

Patient Population:

The nature of the patient population is that of the hospital itself. There is a tremendously wide array of diagnoses encountered during each rotation, ultimately comprising all of the clinical inpatient experience of cardiology.

Responsibilities:

This rotation will have one Fellow. The Fellow performs consultations for patients from all the clinical services. These patients represent the entire spectrum of cardiac pathology.
The Fellow will be responsible for the appropriate division of service requirements between him/herself and the residents.
Transfers to the Regional Hospital of Scranton and, CMC from other municipal hospitals within for the purpose of extended cardiac evaluation and care are very frequent. As during all other rotations, the Fellow is expected to attend the full complement of divisional and program conferences, and continuity clinic, while serving as cardiology consultant.

Research:

This is a very busy clinical rotation and performance of any research project will prove difficult. However, there is much support from the Clinical Research Group in the Division of Cardiology and a definite need for scholarly endeavor at all levels of training. Identification and enrollment of patients in the various clinical protocols in force at the site are important functions of the Fellow.

Supervision:

The Fellow will be supervised by the Faculty and the rotating attending physicians. All new consultations will be presented to these faculty supervisors and the diagnostic and treatment plans will be reviewed for appropriateness. Consultation notes will be reviewed as well, to assure correctness. Follow-up of patients is undertaken by the Fellows and presented on attending rounds.

Evaluation:

The Fellow on the Consultation Service will be evaluated for knowledge of medical information as it relates to the evaluation of a wide variety of cardiovascular conditions, including but not limited to atherosclerotic heart disease, valvular heart disease, congenital heart disease, hypertensive disease, etc. Knowledge of practice guidelines is stressed. The Fellow will be directly observed during patient encounters for effective communication skills, compassionate, and appropriate history and physical examination skills. The Fellow is expected to render consultative care that is insightful, effective and ethical. The Fellow will be evaluated for competence in the pursuit of learning from supervisors, texts and primary sources in a case-based context. The Fellows will be evaluated for their teaching skills as well. The evaluation of Fellows on this service will include assessment of their use of resources such as ancillary services and the clinical laboratories. The Fellow will therefore be evaluated in terms of the competencies designated by the ACGME in writing for inclusion in the Fellow’s file. A meeting at the end of each rotation will comprise face-to-face discussion with constructive criticism of the Fellow’s performance.

Direct Observation Exercise: The Fellow will interview and examine a patient in consultation while the attending supervisor directly observes the encounter. The Fellow will be evaluated in writing and immediate feedback will be offered. Record of this will be entered in the Fellow’s file for review with the program director. This should occur at the beginning of each rotation and at again at the end.

The nurse practitioner, medical students and house staff rotating on this service will be solicited for evaluation of the Fellow’s teaching and communication skills, and his/her
professional behaviors.

The Fellow will have the opportunity to anonymously evaluate the learning experience of this rotation as well as the teaching effectiveness of the faculty.

**Goals and Objectives for the First Year Fellow in Cardiovascular Disease on the Cardiology Consultation Service**

**Patient Care:**

By the end of this rotation you should be able to
- Provide compassionate care
- Evaluate and treat patients with a wide variety of cardiac diseases including, but not limited to, ischemic heart disease, valvular heart disease, congenital heart disease in the adult, hypertensive heart disease, cardiomyopathy, congestive heart failure, pericardial diseases, cerebrovascular disease, peripheral vascular disease, genetic disorders, lipid and other metabolic disorders, various cardiac conditions in pregnancy
- Demonstrate history-taking skills for the evaluation of various cardiovascular symptoms in order to determine a plan for diagnosis and/or therapy
- Perform a complete physical examination, especially pertaining to the cardiovascular system
- Determine the appropriate diagnostic procedures for the evaluation of cardiac disorders
- Explain to the individual patient the reasons for performing both noninvasive and invasive cardiac procedures, including risks, benefits, and alternatives
- Gather essential and accurate information from various diagnostic modalities for use in formulating a differential diagnosis
- Synthesize a plan specific to those patients and problems for which you are asked to consult

**Medical Knowledge:**

By the end of this rotation you should
- Have developed a fund of knowledge comprising the etiology, natural history, pathophysiology, and treatment of a large number of diverse cardiac conditions typical of this patient population
- Know the cardiovascular manifestations of non-cardiac medical diseases
- Know the appropriate evaluation of cardiac patients in need of non-cardiac surgery
- Know how to evaluate patients who have recently undergone cardiovascular surgery
- Know the evidence base for the management of patients referred for the pre-surgical evaluation
- Know the indications and contraindications of diagnostic cardiac studies, both
invasive and noninvasive

You should be familiar with textbooks of clinical cardiology and be able to use information technology to supplement your knowledge of the cardiovascular literature

**Interpersonal and Communication Skills:**

By the end of this rotation you should be able to

- Establish a respectful rapport with the patient and family
- Interact in an effective and productive manner with all professional staff, including nurses, clerical staff, colleagues, and faculty
- Communicate effectively as a consultant to referring physicians
- Effectively teach and answer questions posed by students and other professional staff
- Present cases accurately to faculty members and engage in intelligent dialogue regarding differential diagnosis, pathophysiology, and treatment
- Communicate effectively to patients and their families an understanding of their diagnoses, treatments, and prognoses

**Practice-Based Learning and Improvement:**

By the end of this rotation you should

- Incorporate the instruction and feedback of the faculty preceptors in order to improve patient management
- Incorporate experience obtained on this service and through your interaction with the various cardiology laboratories (i.e., echo, stress nuclear, catheterization, and electrophysiology) and other clinical laboratories (e.g., pulmonary function, vascular) to recognize the utility of various tests/procedures for diagnosis and/or treatment
- Facilitate the learning of medical students and other health care professionals
- Recognize deficiencies in your knowledge base and supplement it with reading of textbooks and the medical literature
- Accept constructive criticism

**Professionalism:**

Throughout this rotation you are expected to

- Demonstrate a commitment to ethical medical practice
- Maintain patient privacy
- Demonstrate respect and compassion for the patient including sensitivity to the patient’s culture, age, gender, and any disabilities
- Demonstrate respect for all members of the healthcare team, support staff, faculty,
Systems-Based Practice:

By the end of this rotation you should know

- The appropriate method of maintaining a accurate and complete medical records for communication with other individuals responsible for the patient’s care
- The issue of cost effectiveness of various cardiac diagnostic tests in the evaluation of cardiac symptoms
- The various members of the healthcare team and their respective roles
- How to recognize external barriers to providing optimal patient care and utilize various services available to circumvent these obstacles
- The place of Bellevue Hospital within the Health and Hospitals Corporation system

Goals and Objectives for the Second Year Fellow in Cardiovascular Disease on the Cardiology Consultation Service

Patient Care:

By the end of this rotation you should be able to

- Provide compassionate care
- Evaluate and treat patients with a wide variety of cardiac diseases including, but not limited to, ischemic heart disease, valvular heart disease, congenital heart disease in the adult, hypertensive heart disease, cardiomyopathy, congestive heart failure, pericardial diseases, cerebrovascular disease, peripheral vascular disease, genetic disorders, lipid and other metabolic disorders, various cardiac conditions in pregnancy
- Demonstrate expertise in history-taking skills
- Demonstrate expertise in physical examination skills
- Appropriately apply the various diagnostic procedures in the evaluation of a wide array of cardiac disorders
- Demonstrate expertise in the process of informed consent
- Gather complete and accurate information from multiple sources and correlate the data from various diagnostic modalities to provide the optimal treatment plan in the context of the individual patient
- Suggest additional appropriate referrals and coordinate patient care as required of a consultant
- Synthesize and effectively implement a diagnostic and treatment plan specific to those patients and problems for which you are asked to consult, taking into account the expressed wishes of the individual patient
Medical Knowledge:

By the end of this rotation you should
• Have developed a fund of knowledge comprising the etiology, natural history, pathophysiology, and treatment of a large number of diverse cardiac conditions
• Know and recognize the cardiovascular manifestations of non-cardiac medical diseases
• Know and implement the appropriate evaluation of cardiac patients in need of non-cardiac surgery
• Know how to manage patients who have recently undergone cardiovascular surgery
• Develop and use an evidence-based approach to managing patients with cardiac conditions by being familiar with major textbooks of cardiology and citing medical literature and major studies
• Know and recognize the indications and contraindications for diagnostic cardiac studies, both invasive and noninvasive

You should be familiar with textbooks of clinical cardiology and be able to use information technology to supplement your knowledge of the cardiovascular literature.

Interpersonal and Communication Skills:

By the end of this rotation you should be able to

• Establish a respectful rapport with the patient and family
• Interact in an effective and productive manner with all professional staff, including nurses, clerical staff, colleagues, and faculty
• Communicate effectively as a consultant to referring physicians
• Effectively teach and answer questions posed by students and other professional staff
• Present cases accurately and concisely to faculty members and engage in intelligent dialogue regarding differential diagnosis, pathophysiology, and treatment
• Communicate effectively to patients and their families an understanding of their diagnoses, treatments, and prognoses

Practice-Based Learning and Improvement:

By the end of this rotation you should
• Incorporate the instruction and feedback of the faculty preceptors in order to improve patient management
• Incorporate experience obtained on this service and through your interaction with the various cardiology laboratories (i.e., echo, stress nuclear, catheterization, and electrophysiology) and other clinical laboratories (eg. pulmonary function, vascular) to recognize the utility of various tests/procedures for diagnosis and/or
treatment
• Facilitate the learning of medical students and other health care professionals
• Recognize deficiencies in your knowledge base and supplement it with reading of textbooks and the medical literature
• Accept constructive criticism

Professionalism:

Throughout this rotation you are expected to
• Demonstrate a commitment to ethical medical practice
• Maintain patient privacy
• Demonstrate respect and compassion for the patient including sensitivity to the patient’s culture, age, gender, and any disabilities
• Demonstrate respect for all members of the healthcare team, support staff, faculty, colleagues and students
• Interact in a mature and helpful manner with all other medical/surgical services for whom you will consult

Systems-Based Practice:

By the end of this rotation you should

• Maintain an accurate and complete medical records for communication with other individuals responsible for the patient’s care
• Incorporate issues of cost effectiveness into your diagnostic and treatment plans
• Effectively include various members of the healthcare team in their respective roles in the care of your patients
• Start to code appropriately for services rendered
• Overcome external barriers to optimal patient care and use the various services available to circumvent these obstacles
• Recognize the role of Bellevue Hospital within the Health and Hospitals Corporation system

Rotation: Echocardiography Laboratories

Fellows rotate through the Community Medical Center, The Regional Hospital of Scranton and Wilkes-Barre VA Medical Center echocardiography laboratories for a total of 3-6 months during the first two years of training. Fellows have the opportunity to spend their entire third year in the echocardiography laboratories, or to combine a large block of this experience with other imaging modalities, in an effort to gain additional qualifications required for certification by the American Society of Echocardiography and credentialing that may ultimately lead to a laboratory directorship.
**Educational Goals and Objectives:**

The fellow will learn the indications for, the techniques of, and the interpretation of all modalities of transthoracic and transesophageal, and stress echocardiography. The primary goal of these rotations is to foster a degree of independence in the performance and interpretation of echocardiographic studies as they relate to clinical problems. At the VA-WB, the primary experience in echocardiography is combined with, a Heart Failure clinic, and brief experiences with other imaging modalities such as cardiac CT and MR. At the VA site site ECG and 24-hour ambulatory ECG (Holter monitoring) interpretation is also taught.

**Venues:**

The echocardiography laboratory of CMC, the Regional Hospital of Scranton, and Wilkes-Barre VA Medical Center performs a significant number of echocardiographic studies per year for both out- and in-patients. The Laboratories have an excellent reputation locally as an outstanding center for the noninvasive evaluation of patients with all varieties of cardiac and vascular disorders.

The laboratories at Wilkes-Barre VA Medical Center, CMC, and the Regional Hospital of Scranton have experienced faculty members who are all committed to the teaching program. The laboratories cooperate with the Stress/Nuclear Laboratories, the Cardiac Catheterization Laboratories, and the Electrophysiology Service to develop an integrated approach to patient evaluation and care, as well as for enhanced instruction of fellows.

The Non-Invasive Laboratories experience at the Regional Hospital Of Scranton, CMC, and Wilkes-Barre VA Medical Center includes an active echocardiography service with M-mode, 2 dimensional, pulsed and continuous wave Doppler, color flow Doppler, exercise and pharmacologic stress echocardiography, Tissue Doppler, Strain. Transesophageal echocardiography. In addition, The Regional Hospital of Scranton offers 3-D echocardiography experience as well. Dedicated ECG reading sessions with the VA faculty are scheduled for several hours per week. Additional learning experiences with integration of cardiac CT data is also afforded by cross-trained faculty.

**Educational Methods:**

The laboratories offer the fellows a unique opportunity to learn basic and advanced echocardiographic techniques from exceedingly experienced attending echocardiographers, with a very high volume and an exceedingly diverse array of studies. There is a comprehensive teaching program that lasts throughout the workday with ever-present faculty supervisors.

The trainee is expected to learn the various techniques via hands-on participation at all levels. Instruction in the performance of transthoracic echocardiography is afforded by highly skilled technologists as well as by the physician faculty. The technique of transesophageal echocardiography and its attendant pre-procedure evaluation and
informed consent process will be learned directly from the attending echocardiographers who have personally performed and supervised thousands of these procedures.

The fellows are exposed to the various technologies and are engaged in detailed discussions of cardiac pathophysiology, hemodynamics, and ultrasound physics in a case-based learning process. Each week, the trainee can be involved in the interpretation of approximately 100 transthoracic echocardiograms and 5 transesophageal echoes. In addition, the fellows learn the basics of how to operate the ultrasound equipment so that they will be capable of performing and interpreting emergency transthoracic echocardiograms while on-call at night and the basics of performing emergency TEEs under attending supervision as well.

Interpretation of echocardiography is taught by first having the fellow observe the faculty supervisor as cases are reviewed and discussed. As experience accrues the fellow will be asked to verbally interpret studies. With additional training the fellow will interpret many studies “solo” and then review all studies with an attending, who will then fashion the final report with them. These daily reading sessions always include extensive discussion not only of echocardiography, but also of anatomy, pathophysiology, differential diagnosis and management. When appropriate, incorporation and review of information from other diagnostic modalities (i.e. physical examination, cardiac catheterization, angiography, exercise testing, ECG, electrophysiology, etc.) is pursued and discussed.

The echocardiography faculty will provide a formal series of didactic sessions. This is required of all fellows in the first two years.

The experience in the echocardiography laboratories is one of progressive didactic teaching and increasing fellow responsibility. During the first month’s rotations the fellow will learn the principles of diagnostic ultrasound, the standard views of interrogation and the basic modalities that comprise the complete examination. The curriculum will teach the normal echocardiographic anatomy, basic ventricular function and hemodynamics as derived from the echocardiogram. The fellow will begin to learn the workings of the echocardiograph machine and how to perform the standard examination. Echocardiograms will be read in conjunction with the faculty and with third year fellows assigned to the laboratories. A host of cardiovascular diagnoses will be learned via practice-based learning afforded by the large volume and tremendous diversity of patients and diseases that characterize the services of these busy clinical laboratories. The fellow is expected to review the materials from the American Society of Echocardiography (ASE) available in the laboratories and from various textbooks listed in the reading lists, on the topics listed below. The fellow will perform an average of two transthoracic echocardiograms each day under the supervision of technicians and/or faculty. There will be an experience interpreting and performing transesophageal echocardiograms in the immediate presence of a faculty supervisor, learning first how to manipulate the probe and later, the technique of esophageal intubation.

The second year’s experience is characterized by the continued exposure to a large volume of patients and experience with an ever-expanding list of diagnoses. Some degree of independence in the interpretation and performance of transthoracic echocardiograms
is expected at this stage and the fellow should be capable of performing a diagnostic echocardiogram for most patients. These skills will be refined under tutelage of the technologists and faculty. The fellow will write their own interpretations and have them reviewed by the faculty who will then fashion the final report with the fellow. The fellow will participate in the informed consent process for transesophageal echocardiography with a high degree of competence as judged through the direct observation of faculty (see evaluation below). In addition the fellow will review another set of lectures and slide presentations including the topics listed below. The fellow will continue to perform an average of two transthoracic echocardiograms daily with technicians and/or faculty and to perform TEE under direct faculty supervision.

**Additional Learning Experiences:**

At the VA site there are regular one-on-one teaching sessions centered upon the interpretation of 24-hour ambulatory ECGs (Holter monitors), Heart Failure clinics, and Pre-operative evaluation clinics

**Fellow’s Responsibilities:**

During rotations through the echocardiography laboratories, the fellow must participate in the following activities:

- Didactic sessions given by faculty on various aspects of echocardiography.
- Fellows must formally present selected cases of educational value at the weekly Echocardiography Conference on Friday mornings at 7:30 AM.
- Fellows will attend all regularly scheduled conferences of the training program and of the division of cardiology
- Fellows will continue regular attendance at their scheduled continuity clinic.

Fellows are responsible for:

- The pre-procedure evaluation of each patient undergoing TEE and the informed consent process
- Selecting pre-procedure antibiotics and intra-procedure anesthetics or sedatives when indicated
- Interpreting echocardiographic studies under supervision. A minimum of 150 supervised interpretations over the course of the training program is required. Although this is the minimum for satisfaction of ACGME requirements, a far greater experience of several hundred interpretations is expected to accrue. Progress will be monitored by the program director and the associate director at the regularly scheduled performance evaluation meetings.
- Performing a minimum of 75 echocardiograms (TTE) under supervision over the first two years of the training program. It is expected that an average of two echocardiograms per day be performed by the trainee, which will result in a
far greater experience than the stated minimum required by the ACGME. Progress will be monitored by the program director and the associate director at regularly scheduled performance evaluation meetings.

- Supervise exercise and pharmacologic stress echocardiograms as directed.

In addition, the fellow will:

- Continue to document the interpretation of ECGs under supervision. This must total at least 3500 studies by the end of training. The number of studies interpreted during each dedicated reading session will vary and is subject to the decision of the supervisor. Progress will be monitored by the program director and the associate director at regularly scheduled performance evaluation meetings.

- At the VA site, and CMC, interpret ambulatory ECG monitorings under supervision, the total of which must be at least 150 by the end of training. The number of studies interpreted during each dedicated reading session will vary and is subject to the decision of the supervisor. Progress will be monitored by the program director and the associate director at regularly scheduled performance evaluation meetings.

- Log all interpretations and procedures performed (echocardiograms, ECGs, Holters) with a date, patient identifier, supervisor, and location in the standard program log format, maintain that log in a safe place with suitable backup, and submit that log in up-to-date form to the program director in a timely fashion prior to the tri-annual performance evaluation meetings with the program director and the associate director.

- Participate in a direct verbal and written feedback session with a supervisor at the end of each rotation experience.

Educational Resources:

During these rotations, the fellow is to become familiar with at least one of the standard textbooks of echocardiography from amongst those authored/edit by Feigenbaum, Weyman and Otto. Copies of these texts are available in the laboratories. There will be ample use of the published literature via the Internet access available at all venues, as well as a large variety of specialized and general cardiology texts. There is a reading list of primary references made available, appended to the rotation curriculum which is discussed with the fellow at the outset of each rotation. The aforementioned review material of the ASE will be available. For research purposes and patient care, very large databases comprising all prior echocardiographic studies are maintained in the respective laboratories.
Patient Population:

The patient population is very diverse, including in- and outpatients at all three sites, the elderly, and a wide variety of ethnicities and cultures that is unsurpassed. In addition, fellows see many patients with coronary artery disease, congenital heart disease, cardiomyopathies, pericardial disease and vascular disorders such as abdominal aneurysms, carotid disease and peripheral vascular disease. Patients are assigned to fellows at the VA site by virtue of their referral to the laboratories for evaluation.

Heart Failure Clinic:

During rotation at the VA Non-Invasive Laboratories, there will be a block of at least 2 half days per week set aside for Heart Failure clinic.

Supervision:

There are faculty members continuously present in the various laboratories for consultation and supervision. Transesophageal echocardiograms are never performed by fellows without the physical presence of a qualified supervisor in the procedure room. ECGs, Holter monitor interpretation, and management of the patients presenting to the Heart Failure Clinic are all supervised by the on-site faculty.

Evaluation:

The trainee is evaluated for understanding of pathophysiology and hemodynamics, ability to interpret and perform transthoracic and transesophageal echocardiograms, and the ability to combine the knowledge obtained from noninvasive modalities with information obtained by history, physical examination and invasive techniques. The ability to synthesize all of these data into a coherent diagnosis and treatment plan is emphasized.

The fellows will be evaluated in writing according to the six competencies defined by the ACGME. Two specific direct observation evaluations will be undertaken for those fellows in the first two years of training. As described above the faculty will observe the fellow’s performance of transthoracic echocardiography. In addition, the faculty will observe the fellow as he/she demonstrates the informed consent process with patients referred for transesophageal echocardiography. The echocardiography technicians will evaluate the Fellows (a component of 360° evaluation) for competencies of communication skills, professionalism, practice-based learning and improvement, and systems-based practice. Their evaluations will be reviewed with them verbally and in writing and they will have the opportunity to evaluate the Faculty and the overall learning experience in these laboratories.

Third year fellows will be evaluated for their competence performing transesophageal echocardiograms with direct observation, as well as their knowledge and performance pertaining to the stated goals and objectives below. Their research effort will be evaluated in writing for the program director at least three times during the year by faculty mentors.
Goals and Objectives for the First Year Fellow in Cardiovascular Disease in the Echocardiography Laboratory

Patient Care

By the end of this rotation, you should:

- Know the routine indications and contraindications for echocardiographic examination, including transthoracic and transesophageal procedures
- Be able to explain the reasons for and procedure of the echocardiographic examination to patients referred for transthoracic and transesophageal studies
- Obtain informed consent for those procedures requiring it
- Know how to position the patient and perform echocardiographic examinations with maximum comfort for the patient.
- Be able to perform the basic echocardiographic examination including 2-D, M-mode, pulsed, continuous wave and color Doppler imaging.
- Be able to recognize a suboptimal study so that more experienced individuals may be called to assist when necessary

By the end of your several standard echocardiography rotations, you should be able to perform uncomplicated studies and obtain diagnostic images with reasonable frequency under supervision. You should be able to use the data obtained to further the diagnostic and therapeutic approach to your patients.

The fellow should perform at least two transthoracic echocardiograms per day while on this rotation. The fellow should be involved in the performance of TEEs on a regular basis during this rotation.

Medical Knowledge

During this rotation, you should acquire knowledge of:

- The basics of ultrasound physics
- The basic operation of the echocardiograph machine
- The various views and windows of the echocardiographic examination
- The normal echocardiographic anatomy of the heart and great vessels
- The echocardiographic correlates of physical findings and of the cardiac cycle
- The method of evaluation and basic findings in patients with a variety of cardiac diseases
  including, but not limited to, ischemic heart disease, valvular heart disease, adult congenital heart disease, hypertensive heart disease, cardiomyopathy and pericardial disease
- Basic Doppler echocardiography (pulsed and continuous wave, and color flow) for the evaluation of various valvular and hemodynamic derangements
- How echocardiographic data relate to data obtained from other techniques and
investigations and their relative merit and limitations.

- The fellow should learn about the following topics from didactic talks (see conference schedules) and discussions, the available textbooks and review materials available in the laboratories:
  - Normal transthoracic and transesophageal examination
  - Artifacts
  - Chamber quantification
  - LV systolic function
  - M-mode echocardiography
  - Echocardiography in aortic regurgitation, aortic stenosis, mitral stenosis and mitral regurgitation, including mitral valve prolapse
  - Non-invasive catheterization and hemodynamic evaluation
  - Echocardiography in hypertrophy and heart failure
  - Echocardiography in pericardial disease
  - Echocardiography in bacterial endocarditis
  - Echocardiography in cardiomyopathy

- The interpretation of 24-hour ambulatory monitoring and ECGs. These interpretations must be documented in a log with notation of a supervisor(s) who has instructed you in this skill. This log may include readings performed while on other rotations as well. By the end of the Training Program, interpretation of 150 24-hour ambulatory monitorings and 3500 ECGs must be documented in a log. This log may include readings performed while on other rotations as well.

You should demonstrate familiarity with textbooks of echocardiography and be able to use information technology to supplement your knowledge of the echocardiography literature.

**Interpersonal and Communication Skills**

By the end of this rotation, you should be able to:

- Establish rapport with the patient and explain the procedure of the echocardiographic examination and its results
- Evaluate patients prior to transesophageal echocardiography and relay information to the supervising faculty
- Obtain consent for TEEs in a reassuring yet informative manner and with appropriate disclosure
- Interact in an effective and productive manner with all professional staff, colleagues, and faculty
- Effectively teach and answer questions posed by students and other professional staff
Practice-Based Learning and Improvement

By the end of this rotation you should:

- Recognize suboptimal technique and work to improve your skill
- Incorporate the lessons and feedback of your faculty supervisors in order to improve your interpretative and technical skills
- Correlate data obtained in the echocardiography laboratory with those from other sources and thereby learn the relative merits and shortcomings of various diagnostic techniques
- Facilitate the learning of medical students and other health care professionals

Professionalism

Throughout this rotation you are expected to:

- Demonstrate respect for all members of the healthcare team, technicians, support staff, faculty, colleagues and students
- Maintain patient privacy and dignity
- Demonstrate respect and compassion for the patient including sensitivity to the patient’s culture, age, gender, and any disabilities
- Demonstrate initiative in self-education as requisite for a program of life-long learning

Systems-Based Practice

By the end of this rotation you should be aware of:

- The various members of the echocardiography laboratory and their respective roles
- The issue of cost effectiveness as it relates to the various studies performed in the echocardiography laboratory
- The appropriate mechanisms of recording the results of echocardiographic studies for the medical record and for reporting them to other individuals responsible for the patient’s care

Goals and Objectives for the Second Year Fellow in Cardiovascular Disease in the Echocardiography Laboratory

Patient Care

By the end of this rotation you should:

- Know the indications and contraindications for routine and emergent
echocardiographic examination, including transthoracic, transesophageal, and stress procedures

- Clearly explain the reasons for and procedure of the echocardiographic examination to patients referred for transthoracic, transesophageal and stress studies
- Perform and document the informed consent process for those procedures requiring it at the level of a subspecialist in cardiovascular disease
- Routinely position the patient and perform echo exams with maximum comfort for the patient.
- Be able to recognize a suboptimal study so that more experienced individuals may be called to assist when necessary

By the end of your several standard echocardiography rotations during the first and second years of training, you should be able to perform studies and obtain diagnostic images with reasonable frequency and accuracy under supervision, commensurate with the competence of a new practitioner in cardiovascular disease.

You should be able to use the data obtained to further the diagnostic and therapeutic approach to your patients.

You should perform approximately two transthoracic echocardiograms daily while on this rotation.

**Medical Knowledge**

During this rotation you must acquire knowledge of:

- The method of evaluation and basic findings in patients with an increasing variety of cardiovascular disorders.
- Doppler echocardiography (pulsed and continuous wave, and color flow) for the quantification of hemodynamic data including assessments of cardiac output, shunt fractions, vascular resistance, intracardiac and intravascular pressures
- How echocardiographic data relate to data obtained from other techniques and investigations and their relative merit and limitations.
- Stress echocardiography including exercise and pharmacologic studies

The fellow will learn about the following topics from didactic talks and discussions, the available textbooks and review materials available in the laboratories:

- Echocardiography in right heart disease
- Echocardiography in congenital heart disease
- Echocardiography of prosthetic valves
- Echocardiography in systemic disease
- Stress echocardiography

By the end of this rotation you should have completed interpretation of at least 150 24-hour ambulatory monitorings (at the Tisch site) and have demonstrated competence in this skill. These interpretations must be documented in your procedure log. This log may
include readings performed while on other rotations as well.

The fellow will learn the basics of stress echocardiography during this rotation.

**Interpersonal and Communication Skills**

By the end of this rotation you should be able to:

- Establish rapport with the patient and explain the procedure of the echocardiographic examination and its results
- Evaluate patients completely as needed prior to transesophageal echocardiography and relay information to the supervising faculty
- Perform the informed consent process for TEEs in a reassuring yet informative manner, with appropriate disclosure
- Interact in an effective and productive manner with all professional staff, colleagues, faculty, and junior fellows.
- Effectively teach and answer questions posed by students, junior fellows and other professional staff

**Practice-Based Learning and Improvement**

By the end of this rotation your should:

- Recognize suboptimal technique and work to improve your skill
- Incorporate the lessons and feedback of your faculty supervisors in order to improve your interpretative and technical skills
- Correlate data obtained in the echocardiography laboratory with those from other sources and thereby learn the relative merits and shortcomings of various diagnostic techniques. In particular, correlate stress echo data with coronary angiography when possible and with patient outcomes
- Facilitate the learning of medical students, junior fellows and other health care professionals

**Professionalism**

Throughout this rotation you are expected to:

- Demonstrate respect for all members of the healthcare team, technicians, support staff, faculty, colleagues, junior fellows and students
- Maintain patient privacy and dignity
- Demonstrate respect and compassion for the patient including sensitivity to the patient’s culture, age, gender, and any disabilities
• Demonstrate initiative in self-education as requisite for a program of life-long learning

Systems-Based Practice

By the end of this rotation you should be know:

• The various members of the echocardiography laboratory and their respective roles, and be able to call upon them appropriately
• The issue of cost effectiveness as it relates to the various studies performed in the echocardiography laboratory

By the end of this rotation you should be able to:

• Reliably, timely and accurately report and document study results for the individual(s) responsible for the patient’s care

Goals and Objectives for the Third Year Fellow in Cardiovascular Disease in the Echocardiography Laboratory

Patient Care

By the end of this rotation you must:

• Be able to administer moderate sedation for TEE studies and be able to recognize and treat any complications with the competence of a new practitioner
• Have demonstrated competence in transthoracic and transesophageal echocardiography so as to become an independent operator and interpreter of such studies. The general requirements of this competence are described in the ACC/AHA Clinical Competence Statement on Echocardiography (JACC 2003;41,#4:687-708).
• Perform at least 300 transthoracic echocardiograms and 50 transesophageal echocardiograms (including 25 esophageal intubations) and you must interpret at least 750 transthoracic echocardiograms by the end of training. The actual numbers of transesophageal studies the training program expects that the fellow will perform is far more: hundreds of TEEs will be performed during the 3rd year under direct faculty supervision. These procedure numbers exceed the minimums required for certification in transthoracic echocardiography and transesophageal echocardiography by the National Board of Echocardiography. (For Comprehensive Certification in Adult Echocardiography, the fellow must also interpret 100 stress echocardiographic studies.)
• These procedures must be accurately logged for review by the laboratory director or other echocardiography faculty, and will be monitored by the program director at the regularly scheduled performance review meetings so as to assure appropriate progress.
Medical Knowledge

By the end of this rotation you should have acquired:

• Knowledge of the application of advanced techniques of echocardiography including:
  o contrast echocardiography
  o myocardial perfusion echocardiography
  o intra-operative transesophageal echocardiography
  o 3-dimensional echocardiography
  o myocardial strain echocardiography
  o tissue Doppler techniques and dyssynchrony studies

• Competence in working with various echocardiograph machines
• Competence in the administration of conscious sedation for transesophageal echocardiography, including the selection of sedating agents and monitoring the patient for signs of excessive sedation
• Competence in recognizing the complications of the transesophageal echocardiographic procedure and how to address them

You must have participated in at least one investigational project for which you have had a major role in design, execution, data collection and analysis, formulation and authorship, as mentored by the Faculty from the Echocardiography Laboratory

Interpersonal and Communication Skills

By the end of this rotation you should be able to:

• Communicate in an effective and productive manner with all professional staff, colleagues, and faculty
• Effectively teach and answer questions posed by junior fellows and present an appropriate role model for them, peers and students.

Practice-Based Learning and Improvement

By the end of this rotation your should:

• Recognize suboptimal technique and work to improve your skill
• Incorporate the lessons and feedback of your faculty supervisors in order to improve your interpretative and technical skills
• Facilitate the learning of medical students, junior fellows, faculty and other health care professionals

Professionalism

Throughout this rotation you are expected to:
• Demonstrate respect for all members of the healthcare team, technicians, support staff, faculty, colleagues, junior fellows and students
• Maintain patient privacy and dignity
• Demonstrate respect and compassion for the patient including sensitivity to the patient’s culture, age, gender, and any disabilities
• Demonstrate initiative in self-education as requisite for a program of life-long learning

Systems-Based Practice

By the end of this rotation you should be able to:

• Reliably, timely and accurately report and document study results for the individual(s) responsible for the patient’s care with the competence of a new consultant in cardiovascular disease.
• Correlate data obtained in the echocardiography laboratory with those from other sources
• Consider cost-effectiveness and patient safety concerns in the management plan.
• Recognize suboptimal technique of others and constructively work to improve their skill

Rotation: Clinical Cardiac Electrophysiology

Educational Goals and Objectives

The Clinical Cardiac Electrophysiology Service at WCGME provides comprehensive exposure to all aspects of clinical cardiac electrophysiology. This includes the diagnosis and management of atrial and ventricular arrhythmias, clinical pharmacology of anti-arrhythmic drugs, diagnostic electrophysiology studies and interventional electrophysiology procedures including catheter ablation, and implantation and troubleshooting of pacemakers and implantable defibrillators.

At the end of their rotation, the fellows will: (1) have understanding of the underlying physiology and pathophysiology of the cardiac rhythm, (2) advance their knowledge and competence in the interpretation of ECGs and ambulatory monitoring, (3) learn the indications for and management of temporary and permanent pacemakers and defibrillators, (4) gain experience with the indications for and the technique of direct current cardioversion, (5) improve skills of consultation for patients with arrhythmia, and (6) become familiar with catheter placement for electrophysiology studies as well as the interpretation of data including conduction times, refractory periods, and programmed stimulation for the initiation and termination of atrial and ventricular rhythm disturbances.

Learning Venues
The fellows in Cardiovascular Disease spend 2 blocks on the Electrophysiology Service during their first two years of training and may opt to spend additional elective blocks during their third year on the Electrophysiology Service with the approval of the Program Director.

The electrophysiology services provide consultation and management for patients in both inpatient (at either the Regional Hospital of Scranton and the Community Medical Center or the Wilkes-Barre VA Medical Center) and outpatient (Advanced Cardiology Specialists, Wilkes-Barre VA Medical Center) venues.

Fellows also attend the Arrhythmia/Device Clinic at either Advanced Cardiology Specialists or the Wilkes-Barre VA Medical Center, both of which provide out-patient pacemaker and defibrillator follow-up under the supervision of electrophysiology faculty.

**Educational Methods**

The fellow in Cardiovascular Disease participates in the clinical evaluation of patients referred to the service with arrhythmias, performs consultation and is directly involved in the various procedures including electrophysiologic studies, ablations, and device implantation and interrogation, and cardioversions. Extensive discussions regarding the clinical management of cardiac arrhythmias address: (1) the pharmacokinetics, pharmacodynamics and toxicities of antiarrhythmic drug therapy and their interactions with interventional procedures, (2) invasive and non-invasive techniques for diagnosis and therapy, and (3) catheter and device based therapy. These are a large part of the training program and are reviewed extensively on rounds and in clinical conferences. The conferences include the cardiac electrophysiology weekly conference, EPS topics covered in the Journal Club, and daily meetings with the full-time electrophysiology staff regarding patients on the service as well as interventional procedures performed daily. The fellows are responsible for presenting at these conferences and being familiar with all patients referred to the electrophysiology service. The fellows also read ECG’s in a dedicated fashion (with attending feedback for honing interpretation skills) while on this and various other rotations throughout their three years of training.

**Patient Diversity**

The two electrophysiology services involve the 3 major hospitals and 2 outpatient clinics and, therefore, entail contact with the full spectrum of patient diversity evidenced at these large medical centers. Large numbers of patients with the entire gamut of arrhythmias, pacemakers, defibrillators, and other electrophysiological problems are continuously encountered.

**Supervision**

The fellows on electrophysiology rotation are supervised and instructed at all times by full-
time electrophysiology faculty. The faculty member meets with the rotating fellow on a daily basis to: (1) introduce them to the workings and responsibilities of the rotation, (2) review basic concepts in electrophysiology and device therapy, (3) discuss clinical cases currently on the service, and (4) provide general mentorship.

**Fellows’ Responsibilities**

The fellow(s) on EP rotation will attend the service on a daily basis at the times indicated by the faculty supervisor. They will attend all conferences of the service and present cases and didactic materials as instructed. Fellows will perform consultations on patients referred to the service for evaluation of arrhythmias and devices, present their findings to the faculty supervisor and, if requested, write a consultation note based upon a formulation of their findings after attending discussions, instruction and approval. Fellows are responsible for communicating these findings and recommendations to the referring physicians and house staff. The fellows will continue to attend the other required didactic conferences as well as the regularly scheduled continuity clinic while rotating on this service.

**Procedures**

Fellows will participate in procedures as directed and supervised by the faculty including cardioversions, electrophysiologic studies, ablative procedures, and device implants. Procedures are performed in all three of the major hospital affiliations, as are consultations for the medical staff in general and for the Cardiology Division in particular. The level of their participation will be entirely determined by the faculty and will be based on the fellow’s level of training, their demonstrated competence, and the complexity and risks of the procedure. The fellow will attend dedicated ECG reading sessions as directed. All procedures will be recorded online at www.myevaluations.com indicating procedure type, diagnosis, indication(s) of the procedure, patient name and medical record number, supervising physician’s name, and whether any complications were encountered.

**Research**

There may be research projects ongoing in this section ranging from device trials to antiarrhythmia therapy. The fellows in Cardiovascular Disease are encouraged and expected to involve themselves with these projects.

**Educational Resources**

It is understood that building a strong foundation in the fundamental physiologic concepts of clinical electrophysiology is necessary to achieve competence. The following represents a graduated textbook list for Fellows in Cardiovascular Disease:

First year fellows should concentrate on arrhythmia diagnosis and management, EP studies,
and interventional electrophysiology in these texts: 
*Handbook of Cardiac Electrophysiology.* Murgatroyd and Kahn.  
*Practical Clinical Electrophysiology.* Zimetbaum and Josephson.

For pacing and ICDs, one of the following books may be used:  
*Cardiac Pacing, Resynchronization, and Defibrillation.* Hayes.  
*Clinical Cardiac Pacing.* Ellenbogen.

Second year fellows should consult the following:  
*Clinical Arrhythmology and Electrophysiology.* Zipes.  
*Cardiac Electrophysiology.* Zipes and Jalife.  
*Josephson's Clinical Cardiac Electrophysiology*

All fellows should know the evidence base for clinical electrophysiology practice as presented in the most current AHA/ACC/ESC/HRS guidelines regarding Ventricular Arrhythmias/SCD, SVT, PPM and ICD implantation

Other sources of interest:  
*Antiarrhythmic Drugs.* Fogoros.  
*Chou’s Electrocardiography in Clinical Practice.* Surawicz and Knilaus.

**Methods of Evaluation**

**Resident Performance:** Formal performance evaluation is made in writing including assessment of the fellow’s understanding of cardiac electrophysiology, pacemakers, defibrillators, therapies, and electrophysiologic studies. Fellows are evaluated for competence at placing transvenous wires, performing elective cardioversions, interpreting ECGs and ambulatory monitorings. The trainee is evaluated for the six core competencies of the ACGME as they relate to patient consultations and care.

**Faculty Performance:** Fellows also get the opportunity to anonymously evaluate the EPS faculty.

**Program Performance:** Fellows also do a yearly evaluation of the program which is used by the faculty to improve the program.

**Faculty**

Suppiramaniam Sree Hari Kesan, MD  
Arun Gadhoke, MD

**Goals and Objectives for First Year Fellows on the Electrophysiology Rotation**
1. Patient Care

By the end of this rotation, the first year fellow should be able to:

- communicate effectively and demonstrate caring and respectful behavior towards patients and their families.
- communicate to patients and their families the reason for their procedure, the risks, appropriate alternatives, and ramifications of test results or procedures.
- counsel and educate patients and families about primary and secondary disease prevention strategies.
- make basic decisions about diagnostic and therapeutic interventions based upon patient specific data and wishes, and relevant scientific and clinical evidence in order to develop and carry out patient management plans.
- elicit a focused history and perform a focused physical examination designed to identify contraindications to electrophysiologic studies (EPS), noninvasive arrhythmia testing (NIAT), device implantation (DI), and cardioversion.
- perform basic interpretation of intracardiac electrophysiologic data.
- perform basic interrogation of pacemakers and defibrillators under the direct supervision of their attending.
- perform direct current cardioversion (at least 10 procedures logged) with the immediate presence of a supervisor.
- place transvenous wires for temporary pacemakers both in a laboratory and a critical care setting (at least 10 procedures logged) with the immediate presence of a supervisor.
- initiate a treatment plan for patients with a wide array of electrophysiologic abnormalities including bradyarrhythmias and tachyarrhythmias,

2. Medical Knowledge

By the end of this rotation, the first year fellow should have basic knowledge of:

- the pathophysiology evaluated by specific types of arrhythmia testing (invasive and noninvasive).
- the indications for, and complications of EPS, NIAT, and DI.
- the performance of EPS, NIAT, device interrogations, and clinical consultations.
- the treatment of complications of EPS, NIAT, or DI.
- the molecular, ionic, cellular and structural basis for arrhythmogenesis.
- the mode of action, pharmacology, clinical utility, and side effects of cardiac medications.
- the physiology and pathophysiology involved in invasive and noninvasive testing and risk stratification.
- normal and pathologic anatomy and physiology of the central venous, cardiac, coronary, and pulmonary systems.
- the pathophysiology/differential diagnosis/treatment of syncope in patients with normal and structurally abnormal hearts.
- the pathophysiology/differential diagnosis/treatment of various tachyarrhythmias (supraventricular and ventricular) including pharmacologic and nonpharmacologic
therapies.
- the pathophysiology/differential diagnosis/treatment of various bradyarrhythmias including pharmacologic and non-pharmacologic therapies.
- the physiology and electrical determinants of defibrillation.
- an array of relevant articles in cardiac electrophysiology (see reading list).
- an array of clinical trials in electrophysiology and application of this data to specific patient populations (see reading list).
- how to apply investigational and analytic thinking to clinical situations.

By the end of this rotation, the first year fellow should have technical knowledge of how to:
- obtain central venous access and place catheters to perform electrophysiologic tests and temporary transvenous pacing, so as to perform the latter under direct supervision.
- perform basic interrogations and reprogramming of implanted pacemakers and defibrillators so as to perform the latter under direct supervision.
- understand the performance of noninvasive arrhythmia testing including tilt table testing, T Wave alternans testing, and Holter monitoring.
- begin to read and interpret electrocardiograms.
- interpret basic intracardiac electrophysiologic studies.
- appropriately dose anti-arrhythmic medications.
- limit radiation exposure of medical personnel and patients during fluoroscopic procedures.
- perform direct current cardioversion in elective situations.
- cite textbooks and relevant medical literature related to cardiac electrophysiology.
- use information technology to supplement their medical knowledge.

3. Interpersonal and Communication Skills

By the end of this rotation, the first year fellow should be able to:
- establish a working rapport with patients, families, ancillary staff, and other health providers from different backgrounds.
- create and sustain a therapeutic and ethically sound relationship with patients.
- educate patients about invasive and noninvasive testing procedures and device implantation.
- work effectively with your team as well as other members of the health care team including medical and surgical referring physicians, nursing staff and technologists.
- educate patients, students, and colleagues about clinical and basic cardiac electrophysiology.

4. Systems-Base Practice

By the end of this rotation, the first year fellow should be able to:
• work with a multidisciplinary team comprising of physicians, nurses, nurse practitioners, technicians, social workers, and administrators from cardiology and other related disciplines to provide patient-focused care.
• recognize issues of cost-effectiveness in health care.
• advocate for patient care and assist patients in dealing with healthcare system complexities.
• understand methods of controlling health care costs and allocating resources for the better of society at large.
• understand how these elements may affect your own practice of medicine.
• understand how to partner with health care providers and health care managers to assess, coordinate, and improve health care.

5. Practice-Based Learning and Improvement

By the end of this rotation, the first year fellow should:
• locate, appraise, and assimilate evidence from scientific studies related to their patients’ health problems.
• obtain and use information about your own population of patients and the larger population from which the patients are drawn.
• apply knowledge of study designs and statistical methods so the appraisal of clinical studies and other information on diagnostic and therapeutic effectiveness (e.g. journal club).
• use information technology to manage information, access on-line medical information and support your own education.
• understand and adhere to standard infection control precautions.

6. Professionalism

By the end of this rotation, you should have demonstrated:
• respect, compassion, and integrity; a responsiveness to the needs of patients and society that supercedes self-interest; accountability to patients, society, and the profession; and a commitment to excellence and on-going professional development.
• a commitment to ethical principles pertaining to provision or withholding of clinical care, confidentiality of patient information, informed consent, and business practices.
• sensitivity and responsiveness to patients’ and colleagues’ culture, age, gender, and disabilities.

Goals and Objectives for Second and Third Year Fellows on the Electrophysiology Rotation

1. Patient Care
By the end of this rotation, the second and third year fellows should be able to:

- communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families.
- demonstrate complete competence in the process of informed consent.
- counsel and educate patients and families about primary and secondary disease prevention strategies.
- make decisions regarding diagnostic and therapeutic interventions based upon patient specific data and wishes, integrating relevant scientific and clinical evidence and sound clinical judgment in order to develop and carry out patient management plans.
- elicit a focused history and perform a focused physical examination and identify contraindications to electrophysiologic studies (EPS), noninvasive arrhythmia testing (NIAT), device implantation (DI) and cardioversion.
- perform advanced interpretation of intracardiac electrophysiologic data.
- initiate a treatment plan for patients with a wide array of electrophysiologic abnormalities including bradyarrhythmias and tachyarrhythmias.
- competently perform device interrogations and programming with the skill of a new practitioner consultant in cardiovascular disease.
- competently perform direct current cardioversion (at least 10 procedures logged during the Cardiovascular Disease fellowship) with the skill of a new practitioner consultant in cardiovascular disease.
- competently place a transvenous pacemaker (at least 10 procedures logged during their three years of training) with the skill of a new practitioner consultant in cardiovascular disease.
- recognize and treat device problems/malfunctions.

2. Medical Knowledge

By the end of this rotation, the second and third year fellows should have basic knowledge of:

- the pathophysiology evaluated by specific types of arrhythmia testing (invasive and noninvasive).
- the indications for, and complications of EPS, NIAT, DI, and direct current cardioversion.
- the performance of EPS, NIAT, device interrogations, cardioversion and clinical consultation.
- the treatment of complications of EPS, NIAT, or DI.
- the mode of action, pharmacology, clinical utility, dosing and side effects of cardiac medications.
- the physiology and pathophysiology involved in invasive and noninvasive testing.
- normal and pathologic anatomy and physiology of the central venous, cardiac, coronary, and pulmonary systems.
- the pathophysiology/differential diagnosis/treatment of syncope in patients with normal and structurally abnormal hearts.
the pathophysiology/differential diagnosis/treatment of various tachyarrhythmias (supraventricular and ventricular) including pharmacologic and nonpharmacologic therapies.

the pathophysiology/differential diagnosis/treatment of various bradyarrhythmias including pharmacologic and nonpharmacologic therapies.

the basics of radiofrequency ablation.

basics of pacemaker and defibrillator technology.

the use of fluoroscopy and risks and determinants of radiation exposure.

a wider array of relevant articles in cardiac electrophysiology (see reading list).

a wider array of clinical trials in electrophysiology and application of this data to specific patient populations (see reading list).

how to apply investigational and analytic thinking to clinical situations.

By the end of this rotation, the second and third year fellows should have technical knowledge of how to:

- obtain central venous access and place catheters to perform electrophysiologic tests and temporary transvenous pacing.
- perform more advanced interrogations and reprogramming of implanted pacemakers and defibrillators competently.
- understand the basic setup and performance of noninvasive arrhythmia testing including tilt table testing, T Wave alternans testing, and Holter monitoring.
- read and interpret electrocardiograms.
- interpret more advanced intracardiac electrophysiologic studies including ablation of supraventricular tachycardias.
- understand the basics of radiofrequency ablation.
- appropriately dose antiarrhythmic medications.
- limit radiation exposure of medical personnel and patients during fluoroscopic procedures.
- perform direct current cardioversion in elective and emergent situations.
- cite textbooks and relevant medical literature related to cardiac electrophysiology.
- use information technology to supplement their medical knowledge.

3. Interpersonal and Communication Skills

By the end of this rotation, the second and third year fellows should be able to:

- establish a working rapport with patients, families, ancillary staff, and other health providers from different backgrounds.
- create and sustain a therapeutic and ethically sound relationship with patients.
- educate patients about invasive and noninvasive testing procedures and device implantation.
- use effective listening skills.
- work effectively with your team as well as other members of the health care team including medical and surgical referring physicians, nursing staff and technologists.
- educate patients, students, and colleagues about clinical and basic cardiac electrophysiology.
4. Systems-Base Practice

By the end of this rotation, the second and third year fellows should be able to:
- work with a multidisciplinary team comprising of physicians, nurses, nurse practitioners, technicians, social workers, and administrators from cardiology and other related disciplines to provide patient-focused care.
- practice cost-effective health care and resource allocation that does not compromise quality of care.
- advocate for patients by assisting them to negotiate the complexities of the healthcare system.
- understand methods of controlling health care costs and allocating resources.
- understand how patient care and other practices affect other health care professionals, health care organizations, and society at large.
- understand how to partner with health care providers and health care managers to assess, coordinate, and improve health care.

5. Practice-Based Learning and Improvement

By the end of this rotation, the second and third year fellows should:
- implement procedures used to minimize physician error.
- locate, appraise, and assimilate evidence from scientific studies related to their patients’ health problems.
- obtain and use information about your own population of patients and the larger population from which the patients are drawn.
- apply knowledge of study designs and statistical methods to the appraisal of clinical studies and other information on diagnostic and therapeutic effectiveness (e.g. journal club).
- use information technology to manage information, access on-line medical information and support your own education.
- understand and adhere to standard infection control precautions.
- facilitate the learning of students and other health care professionals.

6. Professionalism

By the end of this rotation, the second and third year fellows should have demonstrated:
- respect, compassion, and integrity; a responsiveness to the needs of patients and society that supercedes self-interest (altruism); accountability to patients, society, and the profession; and a commitment to excellence and initiative in self education as requisite for a program of life-long learning.
- a commitment to ethical principles pertaining to provision or withholding of clinical care, confidentiality of patient information, informed consent, and business practices.
• sensitivity and responsiveness to patients’ and colleagues’ culture, age, gender, and disabilities.

Rotation: Nuclear Cardiology

The cardiovascular fellow on the nuclear rotation will learn to interpret nuclear studies obtained in patients with possible or known cardiac disease and will learn to conduct stress tests (exercise and pharmacologic). The fellow will learn how to:

• Document the reason for the stress test.
• Obtain an appropriate history and perform an appropriate physical (H&P) examination to be certain the patient can safely undergo the planned testing.
• Determine if the requested test is appropriate to perform.
• Oversee the performance of the stress test.
• Review the ECG and nuclear results of the study and develop an impression of the results.
• Communicate the diagnosis to the patient; recommend to the patient any tests and/or treatments thought to be appropriate.
• When appropriate, communicate test results to requesting physicians.

EDUCATIONAL GOALS

Diagnostic imaging utilizing radio-isotopes is an integral component of Diagnostic Cardiology. The Wright Center for Graduate Medical Education Cardiology Fellowship Program is designed to provide the trainee, within the standard three-year program, two levels of COCATS training. With basic training, COCATS I is provided to all and with advanced, COCATS II. Individually selected, the Cardiology Fellow is provided with an opportunity to understand the fundamental concepts of radioisotope imaging, the clinical experience for the application/performance of diagnostic studies, and training in the interpretation of these studies.

Training Objectives

• Expand upon previously developed knowledge in the areas of Cardiac Physiology and Coronary Anatomy.
  o Patient Care, Medical Knowledge, Practice-Based Learning and Improvement
• Understand the basic physiology of “stress testing” as it applies to nuclear perfusion imaging. This applies to exercise treadmill studies as well as pharmacologic stress, utilizing both vasodilator and catecholamine “stress.”
  o Patient Care, Medical Knowledge, Practice-Based Learning and Improvement
• Establish a clinical experience consisting of, but not limited to, the indications, contraindications, risk-benefit, performance, and identification/treatment of side effects for “stress” testing.
  o Patient Care, Medical Knowledge, Practice-Based Learning and Improvement
• Develop a patient-based understanding of these studies through the informed consent process by describing the potential major/minor side effects encountered with the various forms of “stress.”
  o Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills, Professionalism, System-Based Practice
• Understand/be exposed to the physics of the various radioisotopes and imaging cameras/technology utilized.
  o Medical Knowledge, Practice-Based Learning and Improvement
• Learn the various tests offered in nuclear cardiology, Radionuclide Ventriculography (RVG), Myocardial Perfusion Imaging (MPI), Positron Emission Tomography (PET) regarding indications, contraindications and interpretation.
  o Patient Care, Medical Knowledge, Practice-Based Learning and Improvement
• Develop interpersonal skills in interacting and communicating with other caregivers, patients and their families.
  o Interpersonal and Communication Skills, Professionalism
• Develop skills in teaching medical students, residents and colleagues, including primary care physicians.
  o Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills, Professionalism
• Develop skills in communicating test results to other physicians (both cardiologists and non-cardiologists).
  o Interpersonal and Communication Skills, Professionalism

**Principle Teaching Methods**

• Mentor-Student Method - In regards to the interpretation of studies, the Mentor–Student relationship will be utilized as the main teaching method. The Fellow is expected to utilize all available scientific research, published guidelines and expert opinion to assist with decision-making and learning.
• The stress studies are performed in the morning and continue through early afternoon. Upon completion, the Fellow and the daily Cardiology Attending for nuclear studies review the stress data and the report. On a daily basis, this usually includes 5-10 studies and extends for 60-90 minutes.

**Didactic Method**

• A syllabus at the beginning of the Fellowship which includes introductory information in the areas of nuclear physics, including radioisotopes and imaging, stress data for exercise and pharmacologic stress, risk stratification, protocols and
references. This packet is to serve as both a short-term and long-term resource throughout their training and subsequently into practice.

- “Hands-On Experience”
- Lecture series for the Fellowship
  - An every-other week lecture series alternating with the Echocardiography laboratory on Friday mornings with the sessions comprised of the following:
    - Introductory lectures in the areas of stress testing and basic nuclear imaging
    - Specific topic of interest, such as PET imaging, radiation safety, prognostic significance of nuclear perfusion imaging, assessment of viability, etc.
    - Journal review where the Attending or Fellow selects recent articles of educational/clinical significance
    - Combined Radiology/Cardiology nuclear/catheterization correlates lectures where cases are presented with both nuclear and cardiac catheterization data for discussion amongst Cardiology Fellows and Attending as well as Radiology Residents and Attending
  - Performance of the nuclear stress testing. The Fellows oversee the actual stress test, monitoring the ECG for the development of ST abnormalities and arrhythmias, the patient’s subjective state (chest pain/discomfort, dyspnea, fatigue, “dizziness”) and hemodynamic parameters (blood pressure and heart rate) and determine the point at which the test is terminated.
  - An Attending physician is available for consultation, should questions or emergencies arise.
  - Processing of nuclear studies is done in conjunction with both the technologists and the Attending physicians, as time and studies permit.

**EVALUATION METHODS**

- The Attending Cardiologist will utilize a standardized evaluation process to assess the performance of the Fellow. A written evaluation of the Cardiac Fellow’s performance on the nuclear cardiology service will be made each month by the Attending Cardiologist on the nuclear service.
- The Attending will evaluate each Fellow according to the ACGME general competencies including: Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills, Professionalism and Systems-Based Practice.
- The Cardiology Teaching Attending will meet with each Cardiac Fellow at the end of each six-month rotation to review the written evaluation. Fellows are required to electronically sign each evaluation in the MyEvaluations software.

**EDUCATIONAL CONTENT**

The nuclear rotation evaluates using nuclear studies patients referred by Cardiologists and non-Cardiology physicians. Patients with a variety of cardiac disorders including coronary
artery disease, hypertension, peripheral vascular disease, hyperlipidemia, valvular heart disease, myocardial and peripheral disease, and congenital heart disease will form the case mix on this service. Patient age varies from those as young as 18 to as old as 90 years of age. Patients of all ethnic and socioeconomic backgrounds are tested. Patients include those from both rural and urban settings. Some patients are inpatient, while others are outpatient.

The nuclear laboratory is located on the ground floor of the Community Medical Center, in the basement of the Regional Hospital of Scranton, and on the second floor at the VA in Wilkes-Barre. There are additional labs at Dr. Samir Pancholy’s office and at the Advanced Cardiology Specialists office site on the Morgan Highway. The reading of studies takes place at these locations. Procedures performed include:

- Radionuclide Ventriculography (RVG)
- Nuclear Perfusion Imaging, (NPI) with both thallium and the Tc99 agents—Sestamibi (Cardiolite) and tetrofosmin (Myoview). The NPI’s image interpretation includes perfusion, gated wall motion analysis, and ejection fraction.

Cardiac PET imaging is not performed at our institution but a detailed topic review is provided with outline as follows:

- Physics and Theory
- Tracers: Rubidium – 82, N – 13 ammonia, Oxygen-15 water, 18F – 2-fluoro-2-deoxyglucose (FDG)
- Perfusion imaging: N-13 perfusion study; Rb-82 rest/stress perfusion imaging
- FDG Viability imaging, including physiology, protocols, imaging and image interpretation

**Criteria for Competence at Level 1 and Level 2**

*Level 1*

At the end of two months, the Fellow should be able to:

- Be able to identify indications and contraindications to stress testing, both treadmill and pharmacologic to include an understanding of the best type of test for each patient.
- Be able to adequately oversee stress testing, both treadmill and pharmacologic o Be able to identify the high risk patient for testing and treat any emergencies arising during or after stress testing.
- Be aware of the basic radioisotopes used in nuclear perfusion imaging as well as the basics issues involved in image acquisition.
- Correctly interprets nuclear perfusion studies of low-level complexity (e.g. those suggesting severe ischemia in a single vessel territory) with a minimum of 100 cases reviewed.
**Level 2**

At the end of four months, the Fellow should be able to:

- Level 1 criteria PLUS:
  - Understand the basic physics of nuclear imaging, the differences among the various radioisotopes used in imaging, their dosing and be able to calculate isotope doses
  - Understand issues involved in image acquisition and processing.
  - Be able to appropriately handle spills or contamination of radioactive substances.
  - Be able to independently interpret all coronary nuclear studies, including those with findings suggestive of multiple vessel disease with a minimum of 300 cases reviewed.

Training required for procurement of Authorized Used (AU) status:

- Level 2 above PLUS
  - Radiation work experience totaling a minimum of 620 hours (much of the 620 hours credit is obtained during the procurement of Level 2 training), performed in the clinical environment where radioisotopes are handled, under the supervision of both Radiologists and Nuclear Cardiologists that are on the hospital nuclear license.
  - During the third year of training, the Fellows complete the physics experience with additional off site training as needed to supplement the combined Radiology/Cardiology physics lectures provided during the Fellowship.
  - Fellows can then sit for the CBNC (Certification Board for Nuclear Cardiology). Upon completion of the Cardiology Fellowship and passing of the CBNC, the Fellows receive their Authorized User (AU) status.
READING LIST AND OTHER EDUCATIONAL RESOURCES

Selected references include:

1. ACCF/ASNC Appropriateness Criteria for Single-Photon Emission Computed Tomography Myocardial Perfusion Imaging  


