Clinical Cardiac Electrophysiology (CCEP) Rotation Cardiology Fellow Curriculum for Level 1 Training Penn State Hershey Medical Center

OVERVIEW

As part of the cardiology core training program, fellows will spend at least 2 months on the CCEP rotation to achieve Level 1 training. Specific responsibilities include:

- Fellows will see Electrophysiology (EP) consults. Bedside teaching rounds will then be conducted with the EP consult attending, where proper history taking and exam to diagnose arrhythmias and etiology of syncope will be demonstrated. They will learn the indications for EP studies, ablations, pacemakers, biventricular devices and ICD's, as well as the risks and benefits of these procedures.
- At least one day per week the fellow will attend device clinic, observing and performing
 interrogations and testing of pacemakers and ICD's. They will interact with pacemaker
 technicians and EP attendings in learning troubleshooting techniques and proper
 programming of devices.

NOTE: Level 2 training for device programming and follow-up is achievable. The trainee is expected to function as the primary programming operator who interrogates, interprets, prescribes, and reprograms devices in at least 100 patients. The fellow should keep a case log of these activities.

- Fellows will spend time in the EP lab observing implantation of all types of devices, EP studies and ablations. They will be able to observe intracardiac data generated in real time and review results with the EP attending. The fellow will learn how to monitor the patient and recognize complications.
- While on the EP service fellows will become familiar with the noninvasive methods of diagnosing arrhythmias and vasovagal syncope. They will observe tilt table testing, as well as pre-read holters and event/loop recordings. They will review this data with the EP attending.
- Fellows will spend at least one half day per week in electrophysiology clinic with an EP attending. They will see new patients sent for arrhythmia evaluation. Proper technique for eliciting history and examination to focus on diagnosing arrhythmias will be taught by an EP attending. The fellow will also see patients being followed for antiarrhythmic drug management and understand the process for drug selection, monitoring and judging efficacy. They will also become familiar with the important side effects and EKG changes associated with antiarrhythmic drugs
- While on the EP rotation, fellows will participate in elective cardioversions, and learn the proper placement of patches, selection of energy to be delivered, and sedation

- management. Further CV experience will be obtained throughout their 3 year general cardiology fellowship training.
- During the 3 year general cardiology fellowship, fellows will attend the weekly EKG conferences, conducted by the EP attendings. Content of these conferences will include EKG recordings of arrhythmias (both external and intracardiac). The fellows' Core Curriculum Lecture Series includes didactic lectures by EP attendings on all the major EP topics, providing knowledge of arrhythmias and necessary clinical correlations. Both of the above conferences occur weekly and attendance is required by the fellows.

EDUCATIONAL GOALS

By the end of the rotation fellows will be expected to:

- Understand the diagnosis and management of arrhythmias
- Know the indications for devices
- Know how to manage and follow-up patients with implanted pacemakers and defibrillators
- Become skilled in the selection of patients for electrophysiology (EP) studies and ablation.

TRAINING OBJECTIVES

- Fellows will acquire knowledge and experience in the diagnosis and management of arrhythmias. They will become skilled in obtaining an accurate and focused history and physical exam, designed to best diagnose arrhythmias. They will be exposed to noninvasive techniques related to arrhythmias diagnosis and management, including ambulatory monitoring, event recorders, loop recorders, implantable loop recorders (ILRs), exercise testing for arrhythmia assessment, and tilt table testing. Fellows will learn the proper use of antiarrhythmic drugs, along with their drug interactions and proarrhythmic potential. They will also become familiar with arrhythmias associated with congenital heart disease. (Patient Care, Medical Knowledge, Systems-Based Practice, Interpersonal & Communication Skills, Professionalism)
- Fellows will know the indications for implantable devices including pacemakers, defibrillators (ICD's), biventricular pacemakers or ICD's, & ILR's. They will be exposed to the implantation procedures of these devices. Fellows will also understand the indications for temporary pacing. They will have formal instruction and experience in insertion, management and follow-up of at least 10 of these temporary pacemakers. They will become knowledgeable in the measurement of pacing thresholds and intracardiac electrograms. They will also have instruction and experience in the use of transcutaneous pacing systems. Fellows will know the indications and techniques for emergency and elective cardioversions. These experiences with placing temporary

pacing wires and performing cardioversions will occur throughout the fellow's training, mainly on the EP, catheterization lab and ICU rotations. (Patient Care, Medical Knowledge, Systems-Based Practice, Interpersonal & Communication Skills, **Professionalism**)

- Fellows will know how to manage and follow-up patients with implanted pacemakers and ICDs. They will know the pacing modes and techniques for interrogation, programming and surveillance of these devices. (Patient Care, Medical Knowledge, Systems-Based **Practice, Interpersonal & Communication Skills, Professionalism)**
- Fellows will learn the indications for and limitations of EP studies. They will be able to interpret intracardiac tracings, including AH and HV intervals, and basic activation sequences during tachycardia. They will be able to differentiate between SVT & VT, and understand the use of pacing to terminate tachyarrhythmias. Fellows will learn the appropriate indications for catheter ablation procedures. They will have exposure to EP studies and ablations. (Patient Care, Medical Knowledge, Systems-Based Practice, **Interpersonal & Communication Skills, Professionalism**)

PRINCIPLE TEACHING METHODS

- An attending cardiologist will serve as a mentor for the fellow. The mentor–student relationship will be utilized as the main teaching method after the fellow has seen and examined the patient and presented the patient's findings and plans to the attending. The fellow is expected to utilize all available scientific research, published guidelines and expert opinion to assist with decision making and learning.
- Discrepant findings on diagnostic data, controversial issues and differences of opinion will be discussed with the attending cardiologists. When appropriate the attending will examine the patient and discuss discrepancies of examination with the fellow.

EVALUATION METHODS

The attending cardiologist will utilize a standardized evaluation process to assess the performance of the cardiac fellow. The cardiology 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. In addition, bedside skills such as obtaining history, physical examination and performance of cardiac procedures will be evaluated. The cardiology teaching attending will meet with the cardiac fellow at the end of each month to review the written evaluation. Fellows are required to electronically sign each evaluation in the New-Innovations program.

EDUCATIONAL CONTENT

The EP consult service will provide evaluations and patient care for patients referred by noncardiology physicians and cardiologists. Although the primary problem for these patients will be an arrhythmia issue, the patients with often have a variety of cardiac disorders including coronary artery disease, hypertension, peripheral vascular disease, hyperlipidemia, valvular heart disease, myocardial and peripheral disease, endocarditis, pericardial diseases and congenital heart disease. Adults of all ages, both men and women, and of a variety of ethnic and socioeconomic backgrounds will make up the patient population.

BIBLIOGRPAHY

- "Techniques of EP Evaluation" in Hurst's *The Heart*, 12th edition, 2008; 1064-1076.
- "Treatment of Cardiac Arrhythmias with Catheter-Ablative Techniques" in Hurst's *The Heart*, 12th edition, 2008; 1095-1101.
- "Indications and Techniques of Electrical Defibrillation and Cardioversion" in Hurst's *The Heart*, 12th edition, 2008; 1102-1108.
- "The Implantable Cardiverter Defibrillator" in Hurst's *The Heart*, 12th edition, 2008; 1109-1120.