



MASSACHUSETTS
GENERAL HOSPITAL

CORRIGAN MINEHAN
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HARVARD
MEDICAL SCHOOL

Program Demographics

Host Institution: Massachusetts General Hospital
Program Subspecialty: Clinical Cardiac Electrophysiology Two Year ACGME Program
Program Address: Cardiac Arrhythmia Service
55 Fruit Street, GRB 109
Boston, MA 02114
Program Email: kheist@partners.org
Program Director: E. Kevin Heist, MD, PhD
Alternate Program Contact: Lisa DeFabritiis, Program Manager
Ldefabritiis1@partners.org

Introduction

History: The primary training facility is the Massachusetts General Hospital, a teaching hospital affiliated with the Harvard Medical School. Since 1980, this laboratory has been dedicated to excellence in clinical care and research on the mechanisms, investigation and treatment of cardiac arrhythmias in experimental models and in patients. The MGH Cardiac Electrophysiology Laboratory was the first clinical electrophysiology laboratory in New England and has approximately one hundred fellows who now fill academic positions in the United States and other parts of the world. The MGH service is among the most clinically active and academically productive arrhythmia services in the world.

Duration: The program encompasses 24 months of rotations through two areas within the cardiac arrhythmia service, eventually completing a total of 20 months in the electrophysiology and cardiac device laboratory and 4 months on the inpatient clinical service. The program exposes the fellow to managing patients with complex cardiac arrhythmias, performing a wide range of invasive and noninvasive cardiac electrophysiologic and pacing procedures. Fellows design and carry out research projects in cardiac electrophysiology throughout the 24 months of training.

Prerequisite Training/ Selection Criteria: Fellows are selected from among eligible applicants on the basis of their ability, academic credentials, aptitude, communication skills, intellectual and humanistic qualities, personal attributes (such as motivation and integrity), preparedness, and their ability to benefit from the program. These qualities may be assessed through review of academic records, letters of recommendation, standardized test scores and other means, including interviews. Selection of fellows will not discriminate with regard to age, color, gender, national origin, race, religion, sexual orientation, disability or veteran status. Fellows must have completed three years of General Cardiology training prior to entering the program.

Goals and Objectives for Training: The program exposes the trainee to managing patients with complex cardiac arrhythmia, performing a wide range of invasive and noninvasive cardiac electrophysiologic and pacing procedures. Recently, with the advent of new and technologically advanced cardiac mapping and catheter ablation technologies, far more complex electrophysiologic procedures are becoming the standard of care. Our program offers additional advanced training in complex procedure such as biventricular pacemaker placement, laser extraction of cardiac devices, pulmonary vein isolation for ablation of atrial fibrillation, endo and epicardial transcatheter ablation for ventricular tachycardia, and cryothermal ablation for supraventricular tachycardias and atrial fibrillation. Several of these advanced catheter ablation procedures, in particular pulmonary vein isolation for atrial fibrillation, epicardial ablation of ventricular tachycardia, and cryothermal ablation, are not currently offered and available in many of the cardiac electrophysiology fellowship training programs in the United States and elsewhere. The Massachusetts General Hospital is only one of a small number of referral centers with high volume expertise in pulmonary vein isolation for atrial fibrillation and epicardial catheter ablation procedures for ventricular tachycardia.

Resources

Teaching Staff: Dr. Kevin Heist is the Program Director and assumes responsibility of administration of the program. Dr. Patrick Ellinor is the Director of the Cardiac Arrhythmia Service, Dr. Conor Barrett is the Clinical Director of the Cardiac Arrhythmia Service at the Massachusetts General Hospital. Dr. Theofanie Mela is the Director of the ICD and Pacemaker Laboratory. Dr.'s Jeremy Ruskin, Moussa Mansour, Saumya Das, David Milan, Jagmeet Singh, Leon Ptaszek, Steven Lubitz, Dan Blendea and Farouk Pirzada are also staff physicians. The vast majority of patients are referred to the staff physicians. The Clinical Cardiac Electrophysiology fellows, under direct supervision of the Program Director, Dr. Kevin Heist and the staff, care for a large referral base of patients with complex arrhythmias. All patients referred to the Cardiac Arrhythmia Service are assigned to the care of the CCEP fellows.

Facilities: The Clinical Cardiac Electrophysiologic Laboratory is located on the first floor of the Gray Building with three working laboratories for invasive intracardiac electrophysiologic studies, catheter ablation procedures and device implantation. The tenth floor of the Ellison Building houses the Step Down Unit, a thirty six-bed telemetry unit for patients referred for diagnosis and management of complex cardiac arrhythmias. The clinical cardiac fellow also works closely with residents in the Coronary Care Unit, a sixteen-bed acute care unit located on the ninth floor of the Ellison Building. An outpatient clinic for care of patients with pacemakers and implantable cardioverter-defibrillators is also located on the first floor of the Gray Building.

Educational Program – Basic Curriculum

Clinical and Research Components

Research

Individual research projects will be developed for the fellow and they are encouraged to develop their own interests.

In addition to the Clinical Cardiac Electrophysiology Laboratory, an Experimental Electrophysiology Laboratory dedicated to basic cardiac electrophysiology research is located on the third floor of the Edwards Research Building. The Experimental Electrophysiology Laboratory is fully staffed and equipped with advanced imaging, mapping and ablation technologies for research in animal models of atrial fibrillation and ventricular tachyarrhythmias.

There are additional research laboratories located primarily in the Simches Building (directly adjacent to the hospital) where basic science investigation in cardiac electrophysiology is performed, which is available to fellows interested in basic science in collaboration with the Cardiac Electrophysiology faculty.

Electrophysiology Laboratory Rotation

During the electrophysiology laboratory rotation the Clinical Cardiac Electrophysiology fellows perform and interpret all invasive cardiac electrophysiology procedures under the supervision of a senior staff electrophysiologist. Wide ranges of electrophysiologic studies are performed to diagnose and treat complex cardiac rhythm disturbances. Fellows are involved in all transcatheter diagnostic and ablation procedures. During the first year of training the fellow becomes proficient at interpreting intracardiac electrograms, performing programmed atrial and ventricular stimulation, obtaining vascular access, performing intra-cardiac echocardiography, and appropriately placing intracardiac catheters. The fellow also becomes proficient in common ablation procedures (including AV nodal reentry, accessory pathway localization and ablation, and AV nodal ablation). During the additional second year of advanced training, the fellow builds upon skills obtained during the first year of training, and becomes proficient and independent at performing complex ablation procedures such as pulmonary vein isolation for curative ablation of atrial fibrillation, endocardial and epicardial transcatheter ablation for ventricular tachycardia, and cryothermal ablation for supraventricular tachycardias.

Pacemaker Laboratory Rotation

During the pacemaker and defibrillator laboratory rotation the clinical cardiac electrophysiology fellows perform all pacemaker implants as well as implantation, assessment and testing of implantable cardioverter-defibrillators under the supervision of a senior staff physician. At the end of the first year of training the fellow becomes independent at pacemaker and defibrillator implantation. During the second year of the fellowship training program, the trainee becomes proficient in dealing with the clinical and device problems that may arise during and after device implantation, including laser extraction of implanted cardiac devices. Moreover, the fellow will acquire skills to allow him/her to become proficient at bi-ventricular pacemaker and defibrillator implantation. This exceptional training only results from the high volumes that they will be exposed to in 2 years of training. Other responsibilities during this rotation include interpretation of the ambulatory ECG recordings on a daily basis.

Clinical Cardiac Electrophysiology Service

Clinical cardiac electrophysiology fellows on the clinical cardiac electrophysiology service rotation are responsible for the assessment and management of inpatients on the Cardiac Arrhythmia Service of the Massachusetts General Hospital. The fellows are responsible

for the initial evaluation of arrhythmia service patients and development and implementation of a diagnostic and therapeutic plan in close collaboration with the senior staff physician. They provide inpatient consultations during this rotation. Consultation requests are submitted either in writing or by telephone. After evaluating the patient the fellow discusses the problem personally with the senior staff physician responsible for the care of the patient who then sees the patient with the fellow. After evaluation of the case with the senior staff faculty member, the fellow writes a consultation report in the medical record setting forth opinions on diagnosis and suggestions for further evaluation and treatment. A note follows this from the senior staff physician. Consults are provided on an average of three to six patients each day.

Outpatient Experience

The clinical cardiac electrophysiology fellows staff the Cardiac Arrhythmia Service Outpatient Clinic performing new arrhythmia consultations on patients referred for diagnosis and management of complex cardiac arrhythmias under the supervision of a senior staff physician. The fellows also carry out follow up visits with cardiac arrhythmia patients as well as trouble shoot for the outpatient ICD and pacemaker clinics under supervision of a senior staff physician.

Participant's Supervisory and Patient Care Responsibilities

Most patients referred for diagnosis and management of complex cardiac arrhythmia are admitted to the Arrhythmia step-down unit. The primary responsibility for care of the patients on the step-down unit resides with the cardiac electrophysiology fellows. The fellows manage the patients on the Arrhythmia Service under the supervision of the senior staff. The fellows provide direct inpatient care to patients admitted to the service for diagnostic and therapeutic procedures and also provide arrhythmia consultations to all other services in the hospital. The fellow also rounds regularly with the house staff and general cardiology fellow and is responsible for formal teaching presentations as well as informal supervision and advice on management issues. These rounds are used to review each patient's status and to plan further diagnostic and therapeutic interventions. As a result of the high volume and wide variety of cases, as well as the close supervision and daily teaching from staff physician in the 2 years of training, the fellows become highly proficient in diagnosing and managing all types of clinical problems in the field of cardiac arrhythmias.

Formal Instruction

An ongoing program of formal instruction provides the fellows opportunities to acquire knowledge in a wide range of subjects in the field of cardiac arrhythmias and clinical electrophysiology. The program includes a series of lectures with other scholarly activities including presentations, medical grand rounds, journal clubs and other conferences. Clinical cardiac electrophysiology case review rounds are held formally on Mondays and Thursdays and informally with individual staff members daily. The fellow on the Clinical Cardiac Arrhythmia service presents case histories on all patients admitted to the service and all new consultations. Management of each patient is discussed with all fellows. The faculty members review tracings from the cardiac electrophysiology laboratory at this time and mechanisms of the tachycardia or conduction abnormalities are determined with a treatment plan formulated. All complications related to procedures are reviewed at these rounds. On Wednesday mornings, an additional conference is held to review complex intracardiac electrogram tracings. Journal club is held monthly and the medical literature relevant to cardiac arrhythmias is reviewed. A formal lecture series on broad range of topics in cardiac electrophysiology are held on Mondays and Thursdays as well.

Evaluation

The clinical cardiac electrophysiology fellows are evaluated semi-annually by the program director. All fellows are evaluated on their progress in meeting the curriculum goals and are provided with appropriate counseling by the program director. The same review form is completed at the end of each training year, documenting proficiency in achieving all skills listed in the curriculum. All the evaluations become part of the fellows permanent record and may be used to substantiate future judgments provided to hospital credential committees, certifying boards and licensing agencies. Fellows are advanced to positions of higher responsibility only on the basis of evidence of their satisfactory progressive scholarship and professional growth. Additional evaluation methods include 360-degree evaluations, patient surveys and procedure checklists for documentation of procedural technique. Fellows are also formally evaluated by the staff on their presentations at rounds and conferences. Outpatient clinic skills are evaluated using the Clinical Cardiac Electrophysiology Mini – CEX form which documents care of a clinic patient. The cardiac electrophysiology fellows evaluate the program annually. This anonymous typewritten evaluation allows the fellows to evaluate the quality of the curriculum as well as the extent to which educational goals have been met by the program. The faculty are evaluated semiannually by the fellows. The results of this anonymous, typewritten evaluation are used for modifications in the curriculum, faculty counseling and the selection of faculty members for specific teaching assignments.