Rotation: Arrhythmia Consultation Service

General fellows complete at least two months of the arrhythmia rotation, which provides consultation services to the VUMC inpatient and ER services. This includes evaluation and management of a variety of ventricular and supra ventricular arrhythmias, evaluation and management of patients with bradycardia, evaluation of patients with heart failure for ICD and/or BiV pacing, and appropriate and timely evaluation of implanted pacemakers, defibrillators and loop recorders with the assistance of device nurses and technicians.

Core Curriculum (in accordance with COCATS level 1 training requirements)

The EP rotation is designed to acquire knowledge, skills, and experience in the diagnosis and management of arrhythmias. Training focuses on the value of the clinical history in the diagnosis of cardiac arrhythmias and the ECG interpretation of arrhythmias, including differentiation of supraventricular from ventricular tachycardia. Also important for training is exposure to the noninvasive diagnosis of cardiac arrhythmias, including ambulatory ECG monitoring, event recorders, ILRs, exercise testing for arrhythmia assessment, and tilt-table testing. Exposure to invasive EP studies (including measurements of AH and HV intervals, and basic activation sequences) is provided to allow understanding of the role of invasive EP testing in diagnosis of cardiac arrhythmias.

Fellow are exposed to the basic concepts of catheter ablation, including indications, contraindications, techniques, and potential complications. Similarly, they are expected to understand the basic concepts of CIEDs, including the indications, techniques, and potential complications of ICDs and biventricular pacemakers.

Knowledge of the fundamentals of cardiac pacing is reinforced by recognition of normal and abnormal pacemaker function; pacing modes; and techniques of interrogation, programming, and surveillance of pacemakers and ICDs. Instructions in cardiac pacing emphasizes the indications, cost-effective use, and limitations of these devices. In addition, fellows are instructed in and gain experience with the indications for insertion, management, and follow-up of temporary pacemakers, including measurement of pacing and sensing thresholds, recording of intracardiac electrograms, and recognition of procedure-related complications. Fellows on EP service are also instructed in and gain experience with cardioversion and cardiac defibrillation. Temporary pacemaker and cardioversion procedures may be performed in the cardiac catheterization laboratory, electrophysiology laboratory, cardiac care unit, or other critical care settings.

Fellows are also exposed to the proper use of anticoagulant and antiarrhythmic agents, including their toxicity and drug–drug and drug–device interactions. These experiences and skills are to be obtained throughout the cardiovascular clinical training period and be integrated with formal didactic ECG conferences, core curriculum sessions, and rotation on the arrhythmia consultation service.

Requirements

1. Daily work expectations:
    a. Initial triage of consultation requests alerting the "On Service" attending when a consultation request is urgent or an emergency.
    b. Notifying EP attendings when a physician-specific or non-teaching service consultation is requested and staffing such consultations with said attending on an as needed basis.
2. Managing Pre/Post Procedure Patients
    a. The fellow is responsible for an initial pre-op assessment of consultation patients on whom EP lab procedures will be performed. This includes a review of relevant labs, assuring that the patient is on the schedule, addressing any obstacles to obtaining consent and notifying the primary patient care team that a procedure has been scheduled or completed.
    b. The fellow will document any known/observed procedure complications in the electronic medical record and notify the EP fellow and attendings who performed the procedure as needed.
3. Presentations at conferences
    a. The fellow(s) are responsible for case presentations at the Thursday Arrhythmia conference. Cases should be reviewed with the "On Service" attending when appropriate.
4. Optional EP Lab Experience

During months when there are 2 general fellows on the EP rotation, each may go to the EP lab 1 week during the rotation (not during the same week).

Learning Objectives

Patient Care	
Objective	**Teaching Methods**
1. Obtain pertinent medical histories, including review of patient medical records, and perform accurate examinations with an emphasis on cardiac rhythm interpretation	- Clinical Teaching, - Clinical Experiences - Performance feedback
2. Learn the proper technique for interrogating implantable pacemakers and defibrillators.	- Hands on experience with device nurses, senior EP fellows and device technicians - Clinical teaching - Performance feedback
3. Perform all procedures maintaining patient comfort, privacy and safety	- Hands on experience with EP attendings, senior EP fellows, and

	EP NP/PA staff. - Clinical teaching - Performance feedback
4. Recognize and provide initial management of complications associated with invasive EP lab procedures such as device implantations, EP studies and ablations.	- Clinical experience with attending supervision - Clinical teaching - Performance feedback
5. Complete accurate consultation notes.	- Clinical experience with attending supervision - Clinical teaching - Performance feedback

Medical Knowledge	
Objective	**Teaching Methods**
1. Learn to diagnose common arrhythmias	- Hands on experience with ECGs, rhythm strips and implantable device diagnostics - Clinical Teaching - Didactics - Performance feedback
2. Learn proper operation of pacemaker and defibrillator programmers	- Hands on experience with attendings, senior EP fellows, device nurses and device technicians. - Performance feedback
3. Master core areas of arrhythmia management including but not limited to: a. Indications, contra-indications and complications for pacemaker and defibrillator implantation b. Indications, contra-indications and complications for electrophysiology studies and ablations c. Indications, contra-indications and complications for antiarrhythmic drugs	- Clinical Teaching - Didactics - Performance feedback

Professionalism	
Objective	**Teaching Methods**
Demonstrate accountability and professional behavior towards patients, family members, and members of the health care team and adherence to ethical principles	- Clinical Teaching - Clinical Experiences - Role Models
Demonstrate compassion and respect for others, including patients from a diverse cultural, social, and religious backgrounds	- Clinical Teaching - Clinical Experiences - Role Models

Interpersonal and Communication Skills	
Objective	**Teaching Methods**
Communicate effectively with patients, families, and members of the health care team, including findings and diagnoses when appropriate to both patients and referring physicians	- Clinical Teaching - Clinical Experiences - Role Models
Consultation reports will be available for review in the computerized medical record the same day the consultation is performed.	- Clinical Teaching - Clinical Experiences - Role Models

Practice Based Learning and Improvement	
Objective	**Teaching Methods**
Identify both strengths and gaps in knowledge and expertise and set appropriate learning goals. Accept constructive criticism in order to improve skills and knowledge set	- Independent reading - Clinical teaching - Didactics - Attending evaluation and feedback
Utilize information technology to effectively locate, appraise, and utilize evidence based medicine with in current literature to improve patient care	- Independent reading - Attending evaluation and feedback
Utilize quality improvement methods to implement changes within the practice environment	- Independent reading - Clinical teaching - Didactics - Attending evaluation and feedback

Systems Based Practice	
Objective	**Teaching Methods**
Work effectively as a member of the arrhythmia service and the health care team, including coordination of patient care, performance of examination and reporting of results	- Clinical teaching - Role models - Attending evaluation and feedback

Demonstrate understanding of cost-effectiveness and risk-benefit analysis in the management of heart rhythm disorders.	- Clinical teaching - Role models - Attending evaluation and feedback
Advocate for and work towards patient safety and improved quality of care	- Clinical teaching - Role models - Attending evaluation and feedback

Suggested Reading

PALPITATIONS
http://content.nejm.org/cgi/reprint/338/19/1369.pdf
SVT
http://content.nejm.org/cgi/reprint/354/10/1039.pdf
SYNCOPE
http://content.nejm.org/cgi/content/full/343/25/1856
NMS
http://content.nejm.org/cgi/reprint/352/10/1004.pdf
PM / BRADY
http://content.nejm.org/cgi/reprint/334/2/89.pdf
http://content.nejm.org/cgi/reprint/342/10/703.pdf
PACE, VOL12 APRIL 1989 pp555-562
SCD
http://content.nejm.org/cgi/reprint/345/20/1473.pdf
ICD
http://content.nejm.org/cgi/reprint/349/19/1836.pdf
JAMA 2006;295:809-818
JAMA 2006;296;2839-2847
BIV PACING/ICD
http://content.nejm.org/cgi/reprint/355/3/288.pdf
LONG QT
http://content.nejm.org/cgi/reprint/358/2/169.pdf
http://content.nejm.org/cgi/reprint/350/25/2618.pdf
ACC/AHA GUIDELINES
Atrial Fibrillation: ACC/AHA/ESC 2006 Guidelines for Management of Patients With (J Am Coll Cardiol 2006;48:854-906)

Device-Based Therapy of Cardiac Rhythm Abnormalities: J Am Coll Cardiol, 2008; 51:1-62, doi:10.1016/j.jacc.2008.02.032 (Published online 15 May 2008).

Tilt Table Testing for Assessing Syncope: Expert Consensus Document (J Am Coll Cardiol 1996; 28: 263-75)
Ventricular Arrhythmias and Sudden Cardiac Death: ACC/AHA/ESC 2006 Guidelines for Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death (J Am Coll Cardiol 2006;48:1064-1108)
Invasive Electrophysiology Studies, Catheter Ablation, and Cardioversion: American College of Cardiology/American Heart Association 2006 update of the Clinical Competence Statement On. (J Am Coll Cardiol 2006;48:1503–17)