FMLH Electrophysiology Rotation Curriculum

Description of Rotation or Educational Experience
The Electrophysiology Service rotation provides trainees the opportunity to develop skills in clinical care and judgment in the management of patients with cardiac arrhythmias, and cardiac implantable devices (pacemakers and ICDs). The rotation consists of at minimum two formal months during a typical three year cardiology fellowship. These months may or may not be consecutive, and will ordinarily occur during the second or third year of cardiology fellowship. In addition to this rotation, all fellows will throughout the academic year attend weekly electrophysiology conferences consisting of case-based analysis of common and uncommon electrophysiological problems with an emphasis on interpretation of surface and intracardiac electrograms, hands-on experience with programmers for pacemakers and ICDs, and didactic lectures covering a broad range of EP topics. The structure of the curriculum with limited time spent on the electrophysiology service does not lend itself to specific goals according to year of training, and will instead be outlined as educational objectives to be achieved during the span of cardiology fellowship training.

Priorities during the Electrophysiology rotation:

1) The primary priority of general cardiology fellows rotating on the EP service will be inpatient EP responsibilities.
   a. The cardiology fellow should see all inpatient EP consults and staff with the EP attending of the day.
   b. The fellow should round daily on any patients on the EP service and organize daily rounds with the cardiology residents and interns and the EP attending of the day.

2) As time allows after all inpatient EP patient care is completed (see #1), the cardiology fellow may choose one of the two areas to spend time in.
   a. The electrophysiology laboratory – the general fellow will “scrub in” on cases that they have become familiar, interviewing the patient and reviewing the records prior to the procedure, and discuss the case with the EP attending performing. The fellow will also provide follow-up care with the patient the next day if they stay as an inpatient.
   b. The electrophysiology clinic – the general fellow will choose to participate in the EP clinic, either with one of the EP attending, or in the device clinic with the EP nurses or nurse practitioners. The fellow should also “pre-read” the holter monitors and event monitors of the day. Pre-interpretation by the fellow can be placed non-permanently with a post-it-note, and then reviewed with the EP attending responsible.
## Patient Care

### Goal
Fellows must be able to provide patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health. Fellows are expected to:

### Competencies
- Understand typical presentation and management of patients presenting acutely with arrhythmias.
- Understand the indications and contraindications of commonly performed procedures in electrophysiology.
- Understand the long term management of patients with arrhythmias.
- Understand the basic physiology and pathology leading to arrhythmias.

### Objectives
- Gain proficiency in evaluation and management of patients with acute and chronic cardiovascular problems complicated by tachy- and brady-arrhythmias.
- Understand the appropriate preoperative evaluation and management of patients scheduled to undergo electrophysiological procedures, and gain proficiency in their postoperative management, including the recognition and management of post surgical complications.
- Demonstrate skill in doing a thorough cardiovascular examination and understanding in applying these findings appropriately in patient management.
- Fellows will understand both short-term and long-term management of device patients with cardiac arrhythmias, with exposure to clinic and remote follow-up.
- Learn indications, contraindications, limitations, sensitivity, specificity, and appropriate techniques for the evaluation and treatment, medical and interventional, of a variety of rhythm disorders, including sinoatrial dysfunction, AV and intraventricular block, supraventricular arrhythmias including atrial fibrillation and flutter, ventricular arrhythmias, unexplained syncope, sudden death, WPW syndrome.
- Gain understanding of the pathophysiologic principles of arrhythmias and apply this understanding to the management of tachy- and brady-arrhythmias.

## Medical Knowledge

### Goal
Fellows must demonstrate knowledge of established and evolving biomedical, clinical, epidemiological, and social-behavioral sciences, as well as the application of this knowledge to patient care. Fellows are expected to:

### Competencies
- Gain clinical experience and demonstrate competence in the performance of the following: elective cardioversion; insertion and management of temporary pacemakers, including transvenous and transcutaneous; programming and follow-up surveillance of permanent pacemakers.
- Gain clinical experience and demonstrate competence in the interpretation of the
following: electrocardiograms and ambulatory ECG recordings.

- Obtain formal instruction and gain clinical experience in performing the following: intracardiac electrophysiologic studies; programming and follow-up surveillance of ICDs.
- Gain clinical experience and demonstrate competence in performance of head up tilt table studies and cardioversion.
- Understand indications and contraindications to common EP procedures.
- Obtain in-depth knowledge of the pathophysiology of arrhythmias.

**Objectives:**

- Perform and interpret head up tilt table studies.
- Interpret Holter and loop recorder studies.
- Perform cardioversions with minimal supervision.
- Place central venous and peripheral arterial catheters with minimal supervision.
- Place temporary transvenous pacing wire with minimal supervision.
- Fellows will have the opportunity to place and manipulate catheters in the right atrium, right ventricle and His Bundle.
- Perform permanent pacemaker and ICD interrogations independently, perform device reprogramming independently.
- Fellow will have the opportunity to assist in pacemaker and nonthoracotomy defibrillator implantation, and will have the opportunity to under direct faculty supervision place pacemaker leads in the right atrium and right ventricle.
- Display proficiency in determining the necessity of ordering specific cardiovascular testing including noninvasive and invasive electrophysiological evaluations, including Holter monitoring, loop recorders, signal average electrocardiography, stress testing, echocardiography, cardiac catheterization, electrophysiological studies, and implantable loop recorders.
- Basic competency in analyzing data from pacemaker and defibrillator device interrogations will be expected at the conclusion of the two month rotation. The fellows will demonstrate recognition of normal and abnormal device function and understand strategies for troubleshooting abnormalities in device function.
- Fellow will become proficient in the understanding and physiological and pharmacological basis of cardiac antiarrhythmic drugs, with understanding of drug classification, electrophysiological effects, pharmacokinetics, indications, side-effects, drug interactions, and drug monitoring.
- Through didactic, clinical and hands-on training, fellows will acquire an understanding of normal and abnormal cardiac electrophysiology. Specific areas of emphasis will include sinus node function and methods of EP evaluation, AV node function, dual AV node physiology and mechanisms of SVTs dependent on AV nodal conduction, His-Purkinje Conduction, intervals, aberrancy, bundle branch block and bundle branch reentrant VT, intraatrial and intraventricular conduction, refractoriness, automaticity, mechanisms of arrhythmogenesis including reentry, normal and abnormal automaticity, triggered activity, activation and pace mapping, overt and concealed entrainment, and AV preexcitation.

**Practice- Based Learning and Improvement**
Goal
Fellows must demonstrate the ability to investigate and evaluate their care of patients, to appraise and assimilate scientific evidence, and to continuously improve patient care based on constant self-evaluation and life long learning. Fellows are expected to develop skills and habits to be able to:

**Competencies**
- Identify strengths, deficiencies and limits in one’s knowledge and expertise.
- Set learning and improvement goals.
- Incorporate formative evaluation feedback into daily practice.
- Locate, appraise and assimilate evidence from scientific studies related to their patients’ health problems.
- Use information technology to optimize learning.
- Participate in the education of patients, families, students, residents and other health professionals, as documented by evaluations of the fellow’s teaching abilities by faculty and/or learners.

**Objectives**
- Learn the resources available to obtain information necessary for optimal patient care under the direction of faculty. This will include but is not limited to technological support for implantable devices, and understanding how to access remote transmissions for implantable devices, and remote access for ambulatory monitoring transmissions.
- Become familiar with the key literature important in the practice of electrophysiology.
- Set learning and improvement goals at the beginning of the month.
- Independently use available resources to quickly and efficiently obtain critical information vital to optimal patient care.

**Systems Based Practice**

**Goal**
Fellows must demonstrate an awareness of and responsiveness to the larger context and system of health care, as well as the ability to call effectively on other resources in the system to provide optimal health care. Fellows are expected to:

**Competencies**
- Work effectively in various health care delivery settings and systems relevant to cardiovascular medicine.
- Coordinate patient care within the health care system relevant to cardiovascular medicine.
- Incorporate considerations of cost awareness and risk-benefit analysis in patient care.
- Advocate for quality patient care and optimal patient care systems.
- Work in interprofessional teams to enhance patient safety and improve patient care quality.

**Objectives**
- Coordinate with electrophysiological nurses, nurse practitioners, and in-house services (respiratory, pharmacy, consult services) for optimal delivery of care and
• Understand the continuous quality improvement process as it pertains to delivery of electrophysiological services.
• Coordinate clear communication between the EP team and consulting services to enhance patient care and safety.

### Professionalism

**Goal**
Fellows must demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles. Fellows are expected to demonstrate:

**Competencies**
- Compassion, integrity, and respect for others.
- Responsiveness to patient needs that supersedes self-interest.
- Respect for patient privacy and autonomy.
- Accountability to patients, society, and the profession.
- Sensitivity and responsiveness to a diverse patient population, including but not limited to diversity in gender, age, culture, race, religion, disabilities, and sexual orientation.

**Objectives: First Year Fellows**
- Demonstrate sound judgment in clinical decision-making.
- Fellows will demonstrate high ethical standards when managing patients.
- Practice sound evidence based medicine.
- Continue to treat patients and peers with the utmost respect.

### Interpersonal and Communication Skills

**Goal**
Fellows must demonstrate interpersonal and communication skills that result in the effective exchange of information and teaming with patients, their families, and professional associates. Fellows are expected to:

**Competencies**
- Communicate effectively with patients and families across a broad range of socioeconomic and cultural backgrounds.
- Communicate effectively with physicians, other health professionals, and health related agencies.
- Work effectively as a member of leader of a health care team or other professional group.
- Maintain comprehensive, timely, and legible medical records.

**Objectives**
- Fellows will communicate effectively with faculty.
- Fellows will communicate effectively with patients and families.
- Fellows will develop teaching skills through contact with residents and students, and preparation of formal presentations.

### Teaching Methods
Fellows will interact on a daily basis with 1 to 3 attendings on the electrophysiology
This interaction will provide the primary modality of teaching for the fellows. These faculty will supervise the cardiology fellow assigned to the service in the performance of inpatient consultation, outpatient clinics, and in the electrophysiology laboratory. The fellow will have primary responsibility for evaluating and following patients on the consultation service, and will assess patients and formulate a management plan prior to faculty evaluation, with the management plan then finalized by the faculty. In emergency cases, the fellow will contact the faculty immediately for input regarding initial management. The fellow will have an opportunity to interact with several electrophysiological faculty in each of these care settings. Fellows will have an electrophysiology faculty mentor assigned to them in their preparation of didactic lecture for weekly electrophysiological meetings.

The fellow will be expected to practice sound evidence based medicine and will be given access to resources to be utilized to enhance this practice. Resources include citations of important literature and use of hospital and MCW-based information technology.

### Assessment Method (Fellows)

Fellows are given verbal feedback on their performance by the faculty throughout the rotation. Final evaluations by each attending will be based on the general ACGME competencies of patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, systems-based practice, and professionalism. A formal written evaluation will be entered by the faculty into New Innovations. It will then be reviewed and signed by the fellow.

Fellows are also evaluated through use of the 360 evaluation system, where feedback from nursing, social work, case management, patients, and others can be used to assess and refine performance. Specifically communication, systems-based practice, and professionalism can be further assessed.

### Assessment Method (Program Evaluation)

Fellows will assess the rotation overall as well as their attending physicians. These will be written evaluations which will be shared with the Chair of the Division as well as the Fellowship Program Director. Feedback from the fellows will allow for correction of any perceived deficiencies in learning opportunities on this rotation.

### Level of Supervision

Fellows will on a daily basis interact with 1 to 3 attendings on the electrophysiology service. These faculty will supervise the cardiology fellow assigned to the service in the performance of inpatient consultation, outpatient clinics, and in the electrophysiology laboratory.

### Educational Resources

The fellow will be expected to practice sound evidence based medicine and will be given access to resources to be utilized to enhance this practice. Resources include citations of important literature and use of hospital and MCW-based information technology.
Guidelines:


Textbooks:
Braunwald’s Heart Disease: A Textbook of Cardiovascular Medicine, 7th ed.

Chou’s Electrocardiography in Clinical Practice; Surawicz/Knilans, 5th ed.

Antiarrhythmic Drugs – A Practical Guide; Fogoros 2nd ed.

Handbook of cardiac electrophysiology; By Francis D. Murgatroyd, Andrew D. Krahn, George J. Klein, Raymond K. Yee, Allan C. Skanes

AGREEMENT

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Signature of Fellow          Date          Signature of Attending          Date

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Printed Name of Fellow