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WELCOME TO THE CARDIOVASCULAR FELLOWSHIP PROGRAM

Welcome to the Hennepin County Medical Center/Abbott-Northwestern Hospital Fellowship Training Program in Cardiovascular Disease. We are confident you will have an outstanding experience in this program over the next 3 years. Our faculty and staff are looking forward to working with you as you develop your career as a cardiologist and pursue a life-long passion for learning and scholarly inquiry. This manual should answer many of the basic questions you may have about the general organization of the training program. However, please ask Cheryl Christenson, the Program Coordinator, or Brad Bart, MD, the Program Director if you have any remaining questions after reviewing this manual. You are expected to understand and adhere to all the policies and guidelines contained in this manual.

MISSION STATEMENT

The mission of the Hennepin County Medical Center/Abbott-Northwestern Hospital Fellowship Training Program in Cardiovascular Disease is to provide outstanding clinical training in cardiology. We aim to train cardiovascular disease specialists with superb clinical skills, a life-long commitment to learning, and the ability to function as leaders in their local medical communities.

The educational goals are to provide fellows with:

1. Comprehensive knowledge in the area of general cardiovascular disease
2. Technical expertise in performing and interpreting standard cardiovascular diagnostic studies
3. A foundation of evidence based best practices
4. An ability to critically appraise published reports
5. A compassionate approach to a diverse patient population
6. A lifelong desire to engage in scholarly activities

PROGRAM DESCRIPTION

FELLOW RESPONSIBILITIES FOR PATIENT CARE

Fellows will be responsible for all aspects of patient care under the supervision of a faculty member. These aspects of patient care include:

- Obtaining the history of the present illness and performing a physical examination.
- Collecting materials relevant to the patient’s past medical history including prior test results.
- Formulating a diagnostic and treatment plan.
- Coordinating an inter-professional effort to enact the diagnostic and treatment plan.
• Communicating with patients, families, and other health professionals to facilitate patient care.
• Documenting all activities in the patient chart completely and in a timely fashion
• Teaching patients, families, other trainees and health professionals about cardiovascular disease, diagnosis and treatment.
• Using information technology to access relevant information regarding a patient’s medical condition including published trials, basic science, epidemiology, and guidelines.
• Conducting oneself in a professional, humane and ethical manner.

PROGRESSIVE RESPONSIBILITY FOR PATIENT MANAGEMENT

FIRST YEAR FELLOWS:

• Will be able to obtain a complete history and perform a comprehensive physical examination
• Will be able to quickly identify critically ill patients with cardiovascular disease
• Will be able to develop a plan for evaluation and management of common cardiovascular conditions
• Will begin to understand the risks, benefits, indications for and clinical implications of commonly ordered cardiovascular invasive and noninvasive studies
• Will begin to understand the importance of preventive cardiovascular medicine

SECOND YEAR FELLOWS:

• Will be able to obtain a focused history and perform a focused cardiovascular physical examination
• Will be able to formulate a logical and scholarly treatment and evaluation plan for critically ill patients
• Will be able to develop and implement the evaluation and management of common cardiovascular conditions
• Will have a detailed understanding of the risks, benefits, indications for and clinical implications of commonly ordered cardiovascular invasive and noninvasive studies.
• Will be able to perform commonly ordered cardiovascular invasive and noninvasive studies competently
• Will be able to apply preventive strategies directly to individual patient care

THIRD YEAR FELLOWS:

• Will demonstrate mastery of taking a detailed and focused history and performing a focused cardiovascular physical examination
• Will be able to formulate and implement a logical and scholarly treatment and evaluation plan for critically ill patients
- Will be demonstrate mastery in the evaluation and management of common cardiovascular conditions
- Will have expert understanding of the risks, benefits, indications for and clinical implications of commonly ordered cardiovascular invasive and noninvasive studies.
- Will be able to perform commonly ordered cardiovascular invasive and noninvasive studies with expertise
- Will continue to apply preventive strategies directly to patients and understand how these strategies can be applied to larger populations

**KEY CONTACTS**

**HCMC**

Program Director - Brad Bart, MD 612-873-2875
Program Coordinator - Cheryl Christenson 612-873-9990
Echocardiography Rotation Director - Charles Herzog, MD 612-873-2875
Cardiac Catheterization Rotation Director - Fouad Bachour, MD 612-873-2962
Inpatient Consultations Rotation Director - Steve Goldsmith, MD 612-873-2875
Cardiovascular Disease/Prevention Rotation Director - Woubeshet Ayenew, MD 612-873-2875
HCMC Continuity Clinic Coordinator - Woubeshet Ayenew, MD 612-873-2875
Hospital Main Operator - 612-873-3000
Echo lab - 612-873-2885
Cath lab - 612-873-2962
Nuclear lab - 612-873-2764
ECG lab - 612-873-2880
Emergency Department - (STAB Room) 612-873-3136 (ED backline) 53041
Radiology - 612-873-2089
EPIC help line - 612-873-7485
Cardiology Clinic - 612-873-3459
New Innovations - Kelly Napolitano - 612-873-4093
Amion.com - 612-873-2875

**ABBOTT NORTHWESTERN HOSPITAL (ANW)**

Site Director - Dr. Kevin Harris - 612-863-3900
Site Coordinator - Meghan Hoover - 612-863-3779
Inpatient Consultations Rotation Director - Dr. Rino Orlandi - 612-863-3900
Echo Lab Rotation Director - Dr. Kevin Harris - 612-863-3900
Advanced Heart Failure Rotation Director - Dr. Kasia Hryniewicz - 612-863-3900
Cardiovascular Disease/Prevention Rotation Director - Dr. Tom Knickelbine - 612-863-3900
Hospital Main Operator - 612-863-4000
Echo lab - 612-775-4262
Cath lab - 612-775-3733
Nuclear lab - 612-775-4274
ECG lab - 612-775-4200
Emergency Department - 612-863-4238
Radiology - 612-863-4261
EPIC help line - 612-262-1900

**ROTATIONS**

- Advanced Heart Failure – Abbott Northwestern Hospital
- Advanced Imaging – Abbott Northwestern Hospital
- Advanced Imaging – Hennepin County Medical Center
- Cardiac Catheterization – HCMC
- Cardiac Catheterization – Abbott Northwestern Hospital
- Cardiovascular Prevention and Vascular Disease
- Continuity Clinic
- Echocardiography – HCMC
- Electrophysiology
- Electrophysiology
- Inpatient Cardiology Consultations – HCMC
- Inpatient Cardiology Consultation – Abbott Northwestern Hospital
- Research Elective Rotation
ADVANCED HEART FAILURE – ANW

CONTACTS

Rotation Director
Kasia Hryniewicz, M.D. 612-863-3900 Katarzyna.hryniewicz@allina.com 612-654-2356

ANW - Site Coordinator
Meghan Hoover 612-873-3779

Important Phone Numbers
Special Diagnostics 612-775-4200

LOCATION

Minneapolis Heart Institute Building, 3rd Floor, Suite 300

HOURS

Hours: Mon – Fri 8:00am to 6:00pm

GENERAL DESCRIPTION

Fellows will round five days a week on the inpatient Advanced Heart Failure service. Working directly with a faculty member, the fellow will be exposed to patients with severe heart failure and the multidisciplinary team approach needed to manage these complex patients. Fellows will participate in team rounds each morning. They will be responsible for 4-6 patients on the inpatient service and will work directly with faculty on the management of these patients. The fellow will be expected to attend Monday morning Cardiology Grand Rounds conference, a weekly Heart Failure conference, and weekly core curriculum conferences. Fellows will also attend Transplant and VAD (Ventricular Assist Device) Clinics.

CONFERENCES

General Required Conferences
Monday Minneapolis Heart Institute Foundation Grand Rounds
7:00-8:00 AM, ANW Education Building, Watson Room
Tuesday HCMC Cardiac Catheterization Laboratory Conference
7:30-8:30 AM, HCMC, R5.252
Thursday Core Curriculum Conference
3:00-5:00 PM, HCMC or ANW as scheduled

Rotation Specific Conferences
Heart Failure conference (time and location to be announced)

LINES OF RESPONSIBILITY

Supervising Physician: The faculty physician will assign specific fellow duties based on the individual fellow’s level of training and expertise. The faculty physician will verbally review the rotation expectations at the beginning of the month. The faculty physician will provide verbal feedback and a written evaluation at the end of the month. The faculty physician will provide concise focused teaching sessions during weekly conferences or during performance and interpretation of laboratory studies.
The faculty physician and/or the fellow will discuss testing results with the patient and the patient’s family and provide appropriate documentation.

**Fellow:** The fellow will perform all required pre-procedure duties (ensure appropriate consent obtained, review labs, write pre-procedure orders, etc). The faculty physician and/or the fellow will discuss testing results with the patient and the patient’s family and provide appropriate documentation.

## LEARNING OBJECTIVES

### Year 1

- **Patient Care**
  - Be able to recognize the signs and symptoms of heart failure and be able to perform a thorough differential diagnosis and physical examination aimed at both alternative diagnoses and the various etiologies of heart failure. Know how to employ appropriate invasive and noninvasive studies in the evaluation and treatment of patients with heart failure. Be able to initiate and oversee, with appropriate supervision, the basic management of heart failure patients in both the acute and chronic settings.

- **Medical Knowledge**
  - Become familiar with the basic pathophysiologic processes underlying congestive heart failure, including myocellular structure and function, hemodynamics, disturbances of neurohormonal regulation and renal function. Become knowledgeable about the core studies on which the evidence base for treating heart failure is founded, including both pharmacologic and device therapy. Understand the mechanisms by which pharmacologic therapies provide benefit. Understand the limitations of current evidence as it is applied to patient with a broader spectrum of disease. Know the indications for placement of implanted defibrillators and resynchronization therapy.

- **Systems-based practice**
  - Understand the importance of incorporating appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  - Understand the importance of working effectively with support staff and coworkers
  - Understand the importance of identifying and addressing financial, cultural, and social barriers to diagnostic and treatment recommendations

- **Practice-based learning and improvement**
  - Understand the importance of locating, appraising, and assimilating information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment
  - Understand the importance of developing familiarity with research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods

- **Professionalism**
  - Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  - Understand the importance of practicing within the scope of personal technical skills or expertise
  - Understand the importance of exhibiting sensitivity to patient preference and end-of-life issues

- **Interpersonal and communication skills**
Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner.

Understand the importance of communicating diagnostic test results in a timely manner to primary and referring physicians.

Understand the importance of engaging in shared decision-making with patients about their heart condition and the options for diagnosis and treatment.

Year 2

- **Patient Care**
  - Be able to independently manage both hospitalized and clinic patients with heart failure other than those with Stage D disease, recognizing the limits of pharmacologic, antiarrhythmic and resynchronization therapy. Become familiar with the indications for referral for advanced therapies such as ventricular assist devices and transplant.

- **Medical Knowledge**
  - Become familiar with the literature supporting the use of ventricular device therapy and transplantation in the management of patients with advanced heart failure. Know the indications for both ventricular device therapy and transplant. Become familiar with the major limitations of each therapy.

- **Systems-based practice**
  - Demonstrate an ability to access and incorporate appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making.
  - Demonstrate an ability to work effectively with support staff and coworkers.
  - Demonstrate an ability to identify and address financial, cultural, and social barriers to diagnostic and treatment recommendations.

- **Practice-based learning and improvement**
  - Demonstrate an ability to locate, appraise, and assimilate information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment.
  - Demonstrate a familiarity with research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods.

- **Professionalism**
  - Demonstrate an ability to communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner.
  - Demonstrate an ability to practice within the scope of personal technical skills or expertise.
  - Demonstrate an ability to exhibit sensitivity to patient preference and end-of-life issues.

- **Interpersonal and communication skills**
  - Demonstrate an ability to communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner.
  - Demonstrate an ability to communicate diagnostic test results in a timely manner to primary and referring physicians.
  - Demonstrate an ability to engage in shared decision-making with patients about their heart condition and the options for diagnosis and treatment.

Year 3
• **Patient Care**
  - Be able to independently manage the Stage D patient, and to evaluate patients for advanced therapies such as ventricular assist devices and transplant. Be able to carry out evaluation and management of patients with ventricular assist devices, and those with transplants, including the performance of endomyocardial biopsy.

• **Medical Knowledge**
  - Become aware of and knowledgeable about ongoing clinical research aimed at the development of new therapies for heart failure, including advances in both device and transplant medicine. Continue to refine basic knowledge relating to evolving concepts of pathophysiology, evaluation, and treatment. Become knowledgeable concerning key principles of the evolving socio-economic aspects of heart failure as they affect both patients and providers.

• **Systems-based practice**
  - Consistently apply appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  - Consistently work effectively with support staff and coworkers
  - Consistently identify and address financial, cultural, and social barriers to diagnostic and treatment recommendations

• **Practice-based learning and improvement**
  - Consistently locate, appraise, and assimilate information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment
  - Consistently apply research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods

• **Professionalism**
  - Consistently communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  - Consistently practice within the scope of personal technical skills or expertise
  - Consistently exhibit sensitivity to patient preference and end-of-life issues

• **Interpersonal and communication skills**
  - Consistently communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  - Consistently communicate diagnostic test results in a timely manner to primary and referring physicians
  - Consistently engage in shared decision-making with patients about their heart condition and the options for diagnosis and treatment

### Milestones

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<td>1. Know the pathophysiology, differential diagnosis, stages, and natural histories of heart failure</td>
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<td>2. Know the indications and clinical pharmacology of intravenous vasoactive and inotropic drugs used for circulatory support and advanced/refractory heart failure</td>
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<td>3. Know the types of and indications for mechanical circulatory support</td>
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<td>4. Know the indications for referral for cardiac transplantation or assist devices</td>
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### Patient care

#### Skill to:

1. Appropriately select and incorporate data from diagnostic and laboratory testing in the evaluation and management of heart failure  
2. Identify candidates for palliative care and hospice, heart transplantation and ventricular assist devices  
3. Participate in the management of patients with heart transplantation and mechanical circulatory assist devices

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### System based practice

1. Utilize a multidisciplinary coordinated approach for patient management, including transfer of care and employment related issues

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### Practice-based learning and improvement

1. Utilize decision support tools for accessing guidelines and pharmacologic information at the point of care for patients with heart failure

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### Professionalism

1. Exhibit sensitivity to patient preference and end-of-life issues  
2. Promote adherence to heart failure guidelines

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### Interpersonal and communication skills

1. Engage in shared decision-making with patients about their advanced heart failure and the options for diagnosis and treatment

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### ADVANCED IMAGING - ANW

#### CONTACTS

**Rotation Director**  
Marc Newell, M.D.  
612-863-3900  
marc.newell@allina.com  
p612-654-2909

**ANW - Site Coordinator**  
Meghan Hoover  
612-873-3779  
meghan.hoover@allina.com

**Important Phone Numbers**  
David Caye  
612-775-4195

#### LOCATION

Abbott Northwestern – Heart Hospital, 2nd Floor, Room H2134
HOURS
Fellows are expected to help with patient preparation questions, which can be answered from home/en route via text or page after 6:30 AM (d/w David Caye on starting rotation). Fellows are expected to be in the lab from 8 am until review of the last scan. Call will be per fellowship protocol for MHI.

GENERAL DESCRIPTION
Cardiac computer tomography (CT) and MRI
Fellows in Cardiovascular Disease have the opportunity to learn the fundamentals and clinical applications of cardiac computed tomography (CT) and cardiac magnetic resonance imaging (MRI). They gain experience in the interpretation of cardiac CT and MRI by working with faculty experienced in the use and interpretation of these imaging modalities. For cardiac CT and MRI, fellows will be involved in:

1) Patient Preparation
   a. Patients require close observation before, during, and after their scan. A nurse is in charge of these aspects, but often will require the input of the fellow
   b. Fellows may be asked to call in metoprolol dosing for inpatients prior to their scan
   c. Please review the “board” with the patient information in the scanner room upon arrival in the morning. Please review any potential questions or concerns from the technicians or nurses regarding upcoming patients.

2) Scan interpretation
   a. It is highly recommended to spend the first few days of the rotation in the scanner room learning EKG gating, scan protocols, and pitfalls.
   b. The attending physician will teach often while reviewing, please be attentive and feel free to ask questions.
   c. When there are no active scans to review, please use this time to become more familiar with the software and manipulation of images. Also, interesting past cases will be loaded and available for review

3) Communication/Documentation
   a. Any abnormal CT angiogram should be discussed with the ordering physician
   b. Any inpatient scan should also have documentation in the chart
   c. All inpatient scan results should be promptly communicated to the ordering physician

4) Case Documentation
   a. It is the fellow’s responsibility to keep track of their cases through the month (David Caye can help tabulate at the end of the month if questions arise).
   b. Please keep track of the cardiac/coronary cases and peripheral cases separately, especially if you desire certification in both areas.
   c. A formal letter will be composed at the end of the rotation, signed by Dr Newell.

5) Recommended Reading: At the start of your rotation, please ask about obtaining a copy of the chapter on CT imaging written by Dr Newell, Schwartz, and Lesser (on the desktop next to the reading station).

   Many fellows have liked the textbook by Budoff et al, as well as his handbook.

   Many articles are of importance in cardiac CT. Dr Newell is planning on placing a “Fellows Folder” on the desktop in the back of the reading room with these articles in place.

Your feedback will be vital in helping shape the rotation going forward. Please make sure you speak with any attending, but ideally Dr Newell or Dr Lesser regarding feedback prior to the end of your month. We hope you have a positive experience.

Myocardial perfusion imaging
This rotation is designed to fulfill ACGME and COCATS level I training requirements by the end of the third year of fellowship training. Level II training in nuclear cardiac imaging will require advanced planning and should be discussed with the program director by the middle of the second year to insure that all the requirements can be met. For those fellows interested in level II training, 2 additional imaging months will be required in the third year along with a structured, self-directed curriculum in nuclear cardiac imaging.

Fellows will actively participate in nuclear cardiology study interpretation during the rotation. Self study involving the basic aspects of nuclear cardiology, radiation safety, reading, and viewing case files is required. Lectures on myocardial perfusion imaging will take place at imaging conferences and during the course curriculum.

Fellows should actively participate in nuclear cardiology study interpretation (minimum of 100 cases over 3 years of fellowship training). Live cases and a teaching file can be used to ensure experience with various imaging modalities and protocols. Fellow should perform 35 complete nuclear cardiology studies along with the technologists and other laboratory personnel. Under supervision, they should observe and participate in standard procedures and have experience in the practical aspects of radiation safety associated with performing clinical patient studies.

Images will be interpreted with the nuclear cardiology staff assigned to that duty for the day and all attempts should be made to correlate scan findings with other diagnostic testing such as ECGs, coronary angiograms, CT, MRI, and echocardiograms. Fellows are expected to become familiar with reporting standards and to assist in communicating the results of abnormal tests to the referring provider.

### CONFERENCES

#### General Required Conferences

- **Monday** Minneapolis Heart Institute Foundation Grand Rounds  
  7:00-8:00 AM, ANW Education Building, Watson Room
- **Tuesday** HCMC Cardiac Catheterization Laboratory Conference  
  7:30-8:30 AM, HCMC, R5.252
- **Thursday** Core Curriculum Conference  
  3:00-5:00 PM, HCMC or ANW as scheduled

#### Rotation Specific Conferences

- **Thursday** Valve/TAVR conference  
  7:00-8:00 AM, ANW, Room E1220

### LINES OF RESPONSIBILITY

**Supervising Physician:** The faculty physician is responsible for the supervision of all procedures performed in the cardiology laboratories. The faculty physician will assign specific fellow duties based on the individual fellow’s level of training and expertise. The faculty physician will verbally review the rotation expectations at the beginning of the month. The faculty physician will provide verbal feedback and a written evaluation at the end of the month. The faculty physician will monitor the fellow’s performance of procedures and review the fellow’s interpretation of all diagnostic tests. The faculty physician will provide concise focused teaching sessions during weekly conferences or during performance and interpretation of laboratory studies. The faculty physician and/or the fellow will discuss testing results with the patient and the patient’s family and provide appropriate documentation.
**Fellow:** The fellow will perform all required pre-procedure duties (ensure appropriate consent obtained, review labs, write pre-procedure orders, etc). Fellows will perform invasive procedures under the supervision of the faculty physician in accordance with their level of training and expertise. The fellow is responsible for any necessary post-procedure care. The faculty physician and/or the fellow will discuss testing results with the patient and the patient’s family and provide appropriate documentation.

### CASE OF THE WEEK

Fellows are expected to help compose case summaries – “Case of the Week” with Dr Schwartz while on rotation. Ideally one case per week will be composed, more than that will be welcome. If a case is of particular interest, it may be more formally written up for publication or presentation on the SCCT website.

The Advanced Imaging Lab performs active research. Please ask about ongoing projects if you have an interest.

### LEARNING OBJECTIVES

**Year 1**

- **Patient Care**
  - Understand common indications for advanced imaging modalities (myocardial perfusion scan, CT coronary angiogram, cardiac MRI) and applicability in the care of patients with established or suspected cardiovascular disease
  - Understand factors involved in the decision making to determine which test is appropriate for various clinical indications in individual patients.

- **Medical Knowledge**
  - Understand common indications for advanced imaging modalities (myocardial perfusion scan, CT coronary angiogram, cardiac MRI) and applicability in the care of patients with established or suspected cardiovascular disease
  - Observe advanced imaging modalities being performed to understand nuances and principles involved.

- **Systems-based practice**
  - Understand the importance of incorporating appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  - Understand the importance of working effectively with support staff and coworkers
  - Understand the importance of identifying and addressing financial, cultural, and social barriers to diagnostic and treatment recommendations

- **Practice-based learning and improvement**
  - Understand the importance of locating, appraising, and assimilating information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment
  - Understand the importance of developing familiarity with research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods

- **Professionalism**
  - Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  - Understand the importance of practicing within the scope of personal technical skills or expertise
Interpersonal and communication skills
- Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
- Understand the importance of communicating diagnostic test results in a timely manner to primary and referring physicians
- Understand the importance of engaging in shared decision-making with patients about their heart condition and the options for diagnosis and treatment

Year 2

- Patient Care
  - Participate in the actual performance of advanced imaging modalities (myocardial perfusion scan, CT coronary angiogram, cardiac MRI) to understand patient related factors and nuances involved for each modality.
  - Understand the appropriateness criteria for individual advanced imaging modalities (myocardial perfusion scan, CT coronary angiogram, cardiac MRI) and applicability in practice.

- Medical Knowledge
  - Work with the technicians to understand the technical factors involved in obtaining a CT coronary angiogram with special emphasis on gating/radiation dose exposure and post processing.
  - Work with the radiation technicians to understand the best use of radiotracers for myocardial perfusion imaging. Specifically related to handling of radiotracers, time of injection, factors related to best imaging techniques.
  - Work with cardiac MRI technicians to understand safety mechanisms, rooming of the individual patient, and various sequences involved in obtaining a complete cardiac MRI.

- Systems-based practice
  - Demonstrate an ability to access and incorporate appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  - Demonstrate an ability to work effectively with support staff and coworkers
  - Demonstrate an ability to identify and address financial, cultural, and social barriers to diagnostic and treatment recommendations

- Practice-based learning and improvement
  - Demonstrate an ability to locate, appraise, and assimilate information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment
  - Demonstrate a familiarity with research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods

- Professionalism
  - Demonstrate an ability to communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  - Demonstrate an ability to practice within the scope of personal technical skills or expertise
  - Demonstrate an ability to exhibit sensitivity to patient preference and end-of-life issues

- Interpersonal and communication skills
Demonstrate an ability to communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner

Demonstrate an ability to communicate diagnostic test results in a timely manner to primary and referring physicians

Demonstrate an ability to engage in shared decision-making with patients about their heart condition and the options for diagnosis and treatment

Year 3

• Patient Care
  o Understand the translation of abnormal findings on CT coronary angiogram to patient care, need for further invasive or non-invasive evaluation.
  o Understand the role of abnormal calcium score in the realm of preventive management of patients without established coronary artery disease
  o Understand the interpretation of abnormal findings on myocardial perfusion imaging, to determine need for further patient care, including invasive evaluation.

• Medical Knowledge
  o Understand radiation physics and determine applicability pertaining to patient safety and practical application to nuclear medicine and coronary CTA.
  o Understand principles of magnetic resonance imaging, and determine applicability in practical applications to cardiac MRI.
  o Consistently demonstrate ability to accurately interpret CT coronary angiograms for structural and functional abnormalities
  o Consistently demonstrate ability to accurately interpret cardiac MRI for structural and functional abnormalities.
  o Consistently demonstrate ability to accurately interpret myocardial perfusion scans and applicability to practical use
  o Understand the artifacts involved that can affect interpretation using advanced imaging modalities (myocardial perfusion scan, CT coronary angiogram, cardiac MRI)

• Systems-based practice
  o Consistently apply appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  o Consistently work effectively with support staff and coworkers
  o Consistently identify and address financial, cultural, and social barriers to diagnostic and treatment recommendations

• Practice-based learning and improvement
  o Consistently locate, appraise, and assimilate information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment
  o Consistently apply research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods

• Professionalism
  o Consistently communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  o Consistently practice within the scope of personal technical skills or expertise
Interpersonal and communication skills
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- Consistently communicate diagnostic test results in a timely manner to primary and referring physicians
- Consistently engage in shared decision-making with patients about their heart condition and the options for diagnosis and treatment

### Milestones

#### Medical Knowledge

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<td>2. Know the properties and use of standard myocardial perfusion tracers</td>
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<td>3. Know the principles of radiation safety and how to minimize radiation exposure</td>
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<tr>
<td>4. Know the principles behind the performance of gated coronary CT angiography</td>
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#### Patient care and procedural skills

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<td>2. Identify results on stress imaging studies that indicate a high risk state</td>
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<td>3. Identify basic coronary anatomy and common anomalies seen during coronary CT angiography</td>
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<td>4. Recognize the role of coronary CT angiography in the evaluation of chest pain</td>
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#### Systems-based practice

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Practice-based learning and improvement

<table>
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<tr>
<th>1. Identify competency gaps and engage in opportunities to achieve focused education and performance improvement in the clear and CT imaging</th>
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Professionalism

<table>
<thead>
<tr>
<th>1. Promote adherence to guidelines and appropriate use criteria</th>
<th>12 months</th>
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Interpersonal and communication skills

<table>
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<tr>
<th>1. Communicate imaging test results in a timely manner to primary and referring physicians</th>
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ADVANCED IMAGING - HCMC

CONTACTS

Rotation Director
Bradley Bart, M.D. 612-873-2875 bartx006@umn.edu

HCMC - Site Coordinator
Cheryl Christenson 612-873-9990 Cheryl.christenson@hcmed.org

Important Phone Numbers
Echo lab 612-873-2885
Nuclear reading Rm 612-873-4677
Nuclear Medicine 612-873-2764

LOCATION
HCMC – Stress laboratory, Orange building, 5th floor

HOURS
Fellows are expected to help with patient preparation questions, which can be answered from home/en route via text or page after 7:00 AM

Fellows are expected to be in the lab from 8 am until 4 pm Monday through Friday except for the Thursday afternoon core curriculum, other mandatory conferences and/or meetings, and continuity clinic.
There is no call duty associated with this rotation. However, the general call schedule will be maintained. Vacations and time away must be approved prior to the rotation by the course director and with the knowledge of the fellowship program director.

GENERAL DESCRIPTION

Myocardial perfusion imaging general overview

This rotation is designed to fulfill ACGME and COCATS level I training requirements by the end of the third year of fellowship for basic training in nuclear cardiology. Level II training in nuclear cardiac imaging will require advanced planning and should be discussed with the program director by the middle of the second year to insure that all the requirements can be met. For those fellows interested in level II training, 2 additional months dedicated to nuclear cardiology will be required in the third year along with a structured, self-directed curriculum in nuclear cardiac imaging.

Fellows will actively participate in nuclear cardiology study interpretation during the rotation. Self study involving the basic aspects of nuclear cardiology, radiation safety, reading, and viewing case files is required. Lectures on myocardial perfusion imaging will take place at imaging conferences and during the course curriculum.

Fellows should participate in nuclear cardiology study interpretation (minimum of 100 cases over 3 years of fellowship training). Live cases and a teaching file can be used to ensure experience with various imaging modalities and protocols. Fellow should perform 35 complete nuclear cardiology studies along with the technologists and other laboratory personnel. Under supervision, they should observe and participate in standard procedures and have experience in the practical aspects of radiation safety associated with performing clinical patient studies.

Images will be interpreted with the nuclear cardiology staff assigned to that duty for the day and all attempts should be made to correlate scan findings with other diagnostic testing such as ECGs, coronary angiograms, CT, MRI, and echocardiograms. Fellows are expected to become familiar with reporting standards and to assist in communicating the results of abnormal tests to the referring provider.

Specific expectations

1. Interview and obtain a brief history for every patient scheduled for myocardial perfusion imaging
2. Understand the indication for the test
3. Be physically present in the room during all stress tests-assist the nurse as needed
4. Independently interpret the stress ECG and the SPECT, gated SPECT, and MUGA studies
5. Review your interpretation with the staff member assigned to read nuclear cardiac imaging studies for the day
6. Communicate the results of all inpatient studies to the responsible physician
7. Communicate results of all studies showing the presence of ischemia with the responsible physician for both inpatient and outpatient studies
8. Document all cases performed in RMS
9. Understand the functioning of the high lab, dosimetry, and quality control procedures - spend one week reviewing these procedures in nuclear medicine-you will need to come to work early during this week and accompany the nuclear medicine technologist
10. Work with the technologists on image acquisition and processing of at least 10 myocardial perfusion imaging studies and document this experience
11. Establish/maintain a teaching database of myocardial perfusion imaging studies with pertinent history and additional imaging modalities as appropriate

12. Pursue independent study
   a. Textbooks and CDs
   b. Internet resources
      i. American Society of nuclear cardiology
      ii. Certification board of nuclear cardiology
   c. Journals such as the Journal of nuclear cardiology

13. Prepare an assigned topic for a 30 minute lecture to be presented during core curriculum as part of a rotating didactic curriculum
   a. Radiopharmaceuticals/tracer kinetics
   b. Instrumentation
      i. SPECT to processing, quantification and display
      ii. Artifacts and correction
      iii. PET imaging
   c. Gated SPECT and ventricular function
   d. Gated blood pool imaging
   e. Perfusion imaging
      i. Exercise stress this etiology and protocols
      ii. Pharmacologic stress physiology and protocols
      iii. Diagnoses of CAD and prognosis
   f. Specific issues
      i. Imaging in women
      ii. Preoperative risk assessment
      iii. Diabetes
      iv. Heart failure/ cardiomyopathy is
      v. Imaging after revascularization
   g. Acute coronary syndromes
      i. Use in ED/ chest pain units
      ii. Post-STEMI risk stratification
      iii. Unstable angina/ non-ST elevation MI risk stratification
   h. Viability testing

**CONFERENCES**

**General Required Conferences**

Monday Minneapolis Heart Institute Foundation Grand Rounds
7:00-8:00 AM, ANW Education Building, Watson Room

Tuesday HCMC Cardiac Catheterization Laboratory Conference
7:30-8:30 AM, HCMC, R5.252

Thursday Core Curriculum Conference
3:00-5:00 PM, HCMC or ANW as scheduled
LINES OF RESPONSIBILITY

**Supervising Physician:** The faculty physician is responsible for the supervision of all procedures performed in the cardiology laboratories. The faculty physician will assign specific fellow duties based on the individual fellow’s level of training and expertise. The faculty physician will verbally review the rotation expectations at the beginning of the month. The faculty physician will provide verbal feedback and a written evaluation at the end of the month. The faculty physician will monitor the fellow’s performance of procedures and review the fellow’s interpretation of all diagnostic tests. The faculty physician will provide concise focused teaching sessions during weekly conferences or during performance and interpretation of laboratory studies. The faculty physician and/or the fellow will discuss testing results with the patient and the patient’s family and provide appropriate documentation.

**Fellow:** The fellow will perform all required pre-procedure duties (ensure appropriate consent obtained, review labs, write pre-procedure orders, etc). The fellow will complete all the listed expectations for the rotation as described above.

LEARNING OBJECTIVES

Year 1 – Not applicable as this is a rotation for 2nd and 3rd year fellows

Year 2

- **Patient Care**
  - Directly participate in the performance of myocardial perfusion imaging to understand patient related factors and nuances involved
  - Understand and be familiar with appropriateness criteria as they applied to myocardial perfusion imaging
  - Recognize the role of myocardial perfusion imaging in the evaluation of chest pain
- **Medical Knowledge**
  - Be familiar with the common indications for myocardial perfusion imaging and their applicability in the care of patients with established or suspected cardiovascular disease
  - Know the indications for myocardial perfusion imaging and the appropriate selection of exercise versus pharmacologic stress testing
  - Know the standard display for myocardial perfusion imaging and which segments correspond to standard coronary anatomy
  - Know the properties and use of thallium and technetium 99 based myocardial perfusion tracers
  - Identify results on stress imaging studies that indicate a high risk state
- **Systems-based practice**
  - Demonstrate an ability to access and incorporate appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  - Demonstrate an ability to work effectively with support staff and coworkers
  - Demonstrate an ability to identify and address financial, cultural, and social barriers to diagnostic and treatment recommendations
- **Practice-based learning and improvement**
• Professionalism
  o demonstrate an ability to communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  o demonstrate an ability to practice within the scope of personal technical skills or expertise

• Interpersonal and communication skills
  o demonstrate an ability to communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  o demonstrate an ability to communicate diagnostic test results in a timely manner to primary and referring physicians

Year 3

• Patient Care
  o Understand and be able to process raw images
  o Consistently apply appropriateness criteria as they relate to myocardial perfusion imaging
  o Recognize the advantages and disadvantages of different imaging protocols including dual isotope perfusion imaging

• Medical Knowledge
  o Recognize imaging artifacts that can adversely affect the accuracy of interpreting myocardial perfusion studies
  o Formulate an evidence-based treatment plan incorporating patient features and study results
  o Consistently demonstrate an ability to accurately interpret myocardial perfusion scans

• Systems-based practice
  o consistently apply appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  o Consistently work effectively with support staff and coworkers
  o Consistently identify and address financial, cultural, and social barriers to diagnostic and treatment recommendations

• Practice-based learning and improvement
  o Consistently locate, appraise, and assimilate information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment
  o consistently apply research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods

• Professionalism
  o Consistently communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  o Consistently practice within the scope of personal technical skills or expertise

• Interpersonal and communication skills
- Consistently communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
- Consistently communicate diagnostic test results in a timely manner to primary and referring physicians.

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1. Promote adherence to guidelines and appropriate use criteria

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**CARDIAC CATHETERIZATION – ANW**

**CONTACTS**

Rotation Director  
Ivan Chavez, M.D.  
612-863-3900  
p612-654-0223

ANW - Site Coordinator  
Meghan Hoover  
612-863-3779  
Meghan.hoover@allina.com

Important Phone Numbers  
CV Operations  
612-775-3133

**LOCATION**

3rd Floor Heart Hospital – Cardiovascular Operations

**HOURS**

Mon – Fri: 730am-5pm.  
Sat – Sun and major holidays: per on call schedule.

**GENERAL DESCRIPTION**

Fellows will be directly involved in diagnostic cases in the cardiac catheterization at HCMC including coronary angiography, left ventriculography, right heart catheterization, invasive hemodynamic monitoring, assessment of valvular heart disease and pericardiocentesis. There is an opportunity for some exposure to peripheral arterial angiography.

The rotation is divided into three parts: Pre-cath, Cath - the Procedure, and Post cath.

1. **Pre cath:**

   A. Reading – it is expected that fellows will read from a basic textbook on coronary angiography as well as look up pertinent articles related to interesting cases that occur through the course of the month.

   B. All start with one question: Why am I doing this procedure? The answer to this question is the indication for the procedure – this is perhaps the most important learning objective of the entire rotation. The ACC/AHA task force guidelines for
diagnostic angiography are included an indication class should be stated. Understanding the indication for referring patients to the cath lab is of utmost importance and the fellow should have a firm understanding of why each patient is referred for an angiogram, what information is expected to be gained and how that will influence management. The fellow is assuming the role of the cardiologist for these cases and needs to be comfortable with appropriateness and indications for the procedure that has been requested. You should include all the results of stress imaging studies that may be available at the time of the procedure. There is no absolute contra-indication for coronary angiography. Relative contraindication should be addressed according to the risk benefit ratio.

C. Know the patient completely:
1) The History – all aspects of the patient’s presentation and past medical history should be known intimately by the fellow. This includes all recent cardiac diagnostic tests that have been performed on the patient including echocardiograms, prior heart catheterizations, prior percutaneous interventions, and bypass surgery including the details of grafted vessels. Co-morbid conditions that may affect the outcome and the risk of the procedure should be listed. (Pertinent positive and negative)
2) The Examination: all pertinent physical exam findings should be noted by the fellow prior to the procedure including: the lung exam, the cardiac exam and the exam that relates to vascular access including peripheral pulses, femoral pulses and the presence or absence of bruit.
3) The Data: Preparation for cases planned on the following day – it is expected that fellows perform a pre-catheterization assessment on all patients prior to the anticipated procedure. If patients are on the cath schedule for the following day, the fellow should communicate with the referring physician and obtain all pertinent historical information regarding the patient. Laboratory evaluation prior to angiography includes electrolytes, renal function, CBC and platelets, PT/INR. There are protocols for contrast allergies and renal insufficiency that the fellow is responsible for initiating when appropriate.
4) The Consent: The fellow is responsible for consenting the PT and addressing all concerns the PT and family may have. Risk of the procedure must be discussed.

II. Cath —The Procedure:
The faculty physician is responsible for the supervision of all procedures performed in the cardiac cath lab. Procedure will start only when staff is in the room. The fellow is expected to learn and make progress with respect to all technical aspects including vascular access, selection of contrast agents, sedation, catheter selection, catheter manipulation, Anatomy, views etc. The fellow will be educated in all aspects of radiation physics and safety and be required to demonstrate proficiency in managing the radiation field during the rotation.

III. Post Cath:
A. Communicating with the patient and family members is of the utmost importance and it is expected that the fellow discuss the procedure results after the recommendation is formulated.
B. Post cath orders must be completed before the PT leaves the cath lab area. These orders and findings should be clearly communicated to the referring physician (Staff, fellow, and or resident)
C. The primary care physician – most of these patients have primary care physicians who may or may not be aware that the patient is in the hospital or having an angiogram. Communicating the results of the study is an important part of the care we provide.
D. Generating a final report – the final reports is the responsibility of the fellow. The cath lab staff can assist in learning the reporting system. Final report is generated only after the angiogram is fully reviewed by the fellow and the staff together. This is the best time for the fellow to learn angiography.
E. Cath lab fellow is responsible for all out patient cath till discharge. Also you are responsible for all in patients’ cath regarding post cath management and post procedure complication. Immediate response to any post cath complication is standard of care.

CONFERENCES

General Required Conferences
Monday Minneapolis Heart Institute Foundation Grand Rounds
7:00-8:00 AM, ANW Education Building, Watson Room
Tuesday HCMC Cardiac Catheterization Laboratory Conference
7:30-8:30 AM, HCMC, R5.252
Wednesday Abbott Northwestern Cardiac Catheterization Conference
12:00-1:00pm, H3226
Thursday Abbott Northwestern Cardiac Catheterization Conference
7:00-8:00am, E1220
Core Curriculum Conference
3:00-5:00 PM, HCMC or ANW as scheduled

**LINES OF RESPONSIBILITY**

**Supervising Physician:** The faculty physician is responsible for the supervision of all procedures performed in the cardiology laboratories. The faculty physician will assign specific fellow duties based on the individual fellow’s level of training and expertise. The faculty physician will verbally review the rotation expectations at the beginning of the month. The faculty physician will provide verbal feedback and a written evaluation at the end of the month. The faculty physician will monitor the fellow’s performance of procedures and review the fellow’s interpretation of all diagnostic tests. The faculty physician will provide concise focused teaching sessions during weekly conferences or during performance and interpretation of laboratory studies. The faculty physician and/or the fellow will discuss testing results with the patient and the patient’s family and provide appropriate documentation.

**Fellow:** The fellow will perform all required pre-procedure duties (ensure appropriate consent obtained, review labs, write pre-procedure orders, etc). Fellows will perform invasive procedures under the supervision of the faculty physician in accordance with their level of training and expertise. The fellow is responsible for any necessary post-procedure care. The faculty physician and/or the fellow will discuss testing results with the patient and the patient’s family and provide appropriate documentation.

**LEARNING OBJECTIVES**

**Year 1**

- **Patient Care**
  - Skill to performance pre-procedural evaluation
  - Perform basic patient heart catheter with direct supervision
  - Perform basic coronary angiography with direct supervision

- **Medical Knowledge**
  - Know medications and contra-indications of coronary angiography
  - Know and understand comorbidities affecting outcome post coronary angiography
  - Understand coronary anatomy
  - Basic understanding of x-ray operations

- **Systems-based practice**
  - Understand the importance of incorporating appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  - Understand the importance of working effectively with support staff and coworkers
  - Understand the importance of identifying and addressing financial, cultural, and social barriers to diagnostic and treatment recommendations
• Practice-based learning and improvement
  o Understand the importance of locating, appraising, and assimilating information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment
  o Understand the importance of developing familiarity with research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods

• Professionalism
  o Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  o Understand the importance of practicing within the scope of personal technical skills or expertise
  o Understand the importance of exhibiting sensitivity to patient preference and end-of-life issues

• Interpersonal and communication skills
  o Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  o Understand the importance of communicating diagnostic test results in a timely manner to primary and referring physicians
  o Understand the importance of engaging in shared decision-making with patients about their heart condition and the options for diagnosis and treatment

Year 2

• Patient Care
  o Perform venous and arterial access with supervision
  o Manage complications of angiography with supervision
  o Perform complicated coronary angiography with direct supervision

• Medical Knowledge
  o Know graft anatomy
  o Know indications and contra-indications for PCI
  o Know anatomy variations and physiologic assessment of lesions

• Systems-based practice
  o Demonstrate an ability to access and incorporate appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  o Demonstrate an ability to work effectively with support staff and coworkers
  o Demonstrate an ability to identify and address financial, cultural, and social barriers to diagnostic and treatment recommendations

• Practice-based learning and improvement
  o Demonstrate an ability to locate, appraise, and assimilate information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment
  o Demonstrate a familiarity with research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods

• Professionalism
 Demonstrating an ability to communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner

Demonstrate an ability to practice within the scope of personal technical skills or expertise

Demonstrate an ability to exhibit sensitivity to patient preference and end-of-life issues

• Interpersonal and communication skills

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Year 3

• Patient Care

Perform right and left heart catheterization with coronary angiography independently

Perform graft study independently

Skills to perform arterial closure

• Medical Knowledge

Full understanding of x-ray operation and panning to acquire images

Full knowledge of post PCI management of complications

• Systems-based practice

Consistently apply appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making

Consistently work effectively with support staff and coworkers

Consistently identify and address financial, cultural, and social barriers to diagnostic and treatment recommendations

• Practice-based learning and improvement

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### Systems-based practice

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**CARDIAC CATHETERIZATION – HCMC**

**CONTACTS**

- **Rotation Director**
  - Fouad Bachour, M.D.
  - 612-873-2962
  - Bach003@umn.edu
  - p612-530-3750

- **Cardiology Program Coordinator**
  - Cheryl Christenson
  - 612-873-9990
  - Cheryl.christenson@hcmmed.org

- **Important Phone Numbers**
  - Cath Lab Front Desk: 612-873-2962
  - Room 1: 612-873-2967
  - Room 2: 612-873-2966

**LOCATION**

- HCMC Red 5.250
- (Red building, 5th floor. Skyway over Chicago Avenue)

**HOURS**

- Mon – Fri: 730am-5pm.
- Sat – Sun and major holidays: per on call schedule.

**GENERAL DESCRIPTION**

Fellows will be directly involved in diagnostic cases in the cardiac catheterization at HCMC including coronary angiography, left ventriculography, right heart catheterization, invasive hemodynamic monitoring, assessment of valvular heart disease and pericardiocentesis. There is an opportunity for some exposure to peripheral arterial angiography.
The rotation is divided into three parts: Pre-cath, Cath-The Procedure, and Post cath.

I. Pre cath:
A. Reading – it is expected that fellows will read from a basic textbook on coronary angiography as well as look up pertinent articles related to interesting cases that occur through the course of the month.

B. All start with one question: Why am I doing this procedure? The answer to this question is the indication for the procedure – this is perhaps the most important learning objective of the entire rotation. The ACC/AHA task force guidelines for diagnostic angiography are included an indication class should be stated. Understanding the indication for referring patients to the cath lab is of utmost importance and the fellow should have a firm understanding of why each patient is referred for an angiogram, what information is expected to be gained and how that will influence management. The fellow is assuming the role of the cardiologist for these cases and needs to be comfortable with appropriateness and indications for the procedure that has been requested. You should include all the results of stress imaging studies that may be available at the time of the procedure. There is no absolute contra-indication for coronary angiography. Relative contraindication should be addressed according to the risk benefit ratio.

C. Know the patient completely:
   5) The History – all aspects of the patient’s presentation and past medical history should be known intimately by the fellow. This includes all recent cardiac diagnostic tests that have been performed on the patient including echocardiograms, prior heart catheterizations, prior percutaneous interventions, and bypass surgery including the details of grafted vessels. Co-morbid conditions that may affect the outcome and the risk of the procedure should be listed. (Pertinent positive and negative)
   6) The Examination: all pertinent physical exam findings should be noted by the fellow prior to the procedure including: the lung exam, the cardiac exam and the exam that relates to vascular access including peripheral pulses, femoral pulses and the presence or absence of bruit.
   7) The Data: Preparation for cases planned on the following day – it is expected that fellows perform a pre-catheterization assessment on all patients prior to the anticipated procedure. If patients are on the cath schedule for the following day, the fellow should communicate with the referring physician and obtain all pertinent historical information regarding the patient. Laboratory evaluation prior to angiography includes electrolytes, renal function, CBC and platelets, PT/INR. There are protocols for contrast allergies and renal insufficiency that the fellow is responsible for initiating when appropriate.
   8) The Consent: The fellow is responsible for consenting the PT and addressing all concerns the PT and family may have. Risk of the procedure must be discussed.

II. Cath –The Procedure:
The faculty physician is responsible for the supervision of all procedures performed in the cardiac cath lab. Procedure will start only when staff is in the room. The fellow is expected to learn and make progress with respect to all technical aspects including vascular access, selection of contrast agents, sedation, catheter selection, catheter manipulation, Anatomy, views etc.

III. Post Cath:
A. Communicating with the patient and family members is of the utmost importance and it is expected that the fellow discuss the procedure results after the recommendation is formulated.
B. Post cath orders must be completed before the PT leaves the cath lab area. These orders and findings should be clearly communicated to the referring physician (Staff, fellow, and or resident)
C. The primary care physician – most of these patients have primary care physicians who may or may not be aware that the patient is in the hospital or having an angiogram. Communicating the results of the study is an important part of the care we provide.
D. Generating a final report – the final reports is the responsibility of the fellow. The cath lab staff can assist in learning the reporting system. Final report is generated only after the angiogram is fully reviewed by the fellow and the staff together. This is the best time for the fellow to learn angiography.
E. Cath lab fellow is responsible for all out pt cath till discharge. Also you are responsible for all in patients’ cath regarding post cath management and post procedure complication. Immediate response to any post cath complication is standard of care.
CONFERENCES

General Required Conferences

Monday  Minneapolis Heart Institute Foundation Grand Rounds
   7:00-8:00 AM, ANW Education Building, Watson Room
Tuesday  HCMC Cardiac Catheterization Laboratory Conference
   7:30-8:30 AM, HCMC, R5.252
Thursday Core Curriculum Conference
   3:00-5:00 PM, HCMC or ANW as scheduled

LINES OF RESPONSIBILITY

Supervising Physician: The faculty physician is responsible for the supervision of all procedures performed in the cardiology laboratories. The faculty physician will assign specific fellow duties based on the individual fellow’s level of training and expertise. The faculty physician will verbally review the rotation expectations at the beginning of the month. The faculty physician will provide verbal feedback and a written evaluation at the end of the month. The faculty physician will monitor the fellow’s performance of procedures and review the fellow’s interpretation of all diagnostic tests. The faculty physician will provide concise focused teaching sessions during weekly conferences or during performance and interpretation of laboratory studies. The faculty physician and/or the fellow will discuss testing results with the patient and the patient’s family and provide appropriate documentation.

Fellow: The fellow will perform all required pre-procedure duties (ensure appropriate consent obtained, review labs, write pre-procedure orders, etc). Fellows will perform invasive procedures under the supervision of the faculty physician in accordance with their level of training and expertise. The fellow is responsible for any necessary post-procedure care. The faculty physician and/or the fellow will discuss testing results with the patient and the patient’s family and provide appropriate documentation.

LEARNING OBJECTIVES

Year 1

- Patient Care
  - Skill to performance pre-procedural evaluation
  - Perform basic patient heart catheter with direct supervision
  - Perform basic coronary angiography with direct supervision
- Medical Knowledge
  - Know medications and contra-indications of coronary angiography
  - Know and understand comorbidities affecting outcome post coronary angiography
  - Understand coronary anatomy
  - Basic understanding of x-ray operations
- Systems-based practice
  - Understand the importance of incorporating appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  - Understand the importance of working effectively with support staff and coworkers
Understand the importance of identifying and addressing financial, cultural, and social barriers to diagnostic and treatment recommendations

- **Practice-based learning and improvement**
  - Understand the importance of locating, appraising, and assimilating information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment
  - Understand the importance of developing familiarity with research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods

- **Professionalism**
  - Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  - Understand the importance of practicing within the scope of personal technical skills or expertise
  - Understand the importance of exhibiting sensitivity to patient preference and end-of-life issues

- **Interpersonal and communication skills**
  - Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
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**Year 2**

- **Patient Care**
  - Perform venous and arterial access with supervision
  - Manage complications of angiography with supervision
  - Perform complicated coronary angiography with direct supervision

- **Medical Knowledge**
  - Know graft anatomy
  - Know indications and contra-indications for PCI
  - Know anatomy variations and physiologic assessment of lesions

- **Systems-based practice**
  - Demonstrate an ability to access and incorporate appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
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Skills to perform arterial closure

Medical Knowledge

Full understanding of x-ray operation and panning to acquire images

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Systems-based practice

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CARDIAC MRI - ANW

CONTACTS
Rotation Director
David Lin, MD 612-863-3900 david.lin@allina.com
ANW - Site Coordinator
Meghan Hoover 612-863-4649 meghan.hoover@allina.com
Lead MRI Technician
Jana Lindberg 612-775-4294 jana.lindberg@allina.com
Important Phone Numbers
CMR suite 612-775-4240

LOCATION
ANW – Cardiac MRI suite, H3.2130A

HOURS
Fellows are expected to help with patient preparation questions, which can be answered from home/en route via text or page after 7:30 AM

Fellows are expected to be in the lab from 8 am until 5 pm Monday through Friday except for the Thursday afternoon core curriculum, other mandatory conferences and/or meetings, and continuity clinic.

There is no call duty associated with this rotation. However, the general call schedule will be maintained.
Vacations and time away must be approved prior to the rotation by the course director and with the knowledge of the fellowship program director.

**GENERAL DESCRIPTION**

This rotation is designed to fulfill ACGME and COCATS level I training requirements by the end of the third year of fellowship for basic training in cardiovascular magnetic resonance imaging. Level II training in cardiovascular magnetic resonance imaging will require advanced planning and should be discussed with the program director by the middle of the second year to insure that all the requirements can be met. For those fellows interested in level II training, 2 additional months dedicated to cardiovascular magnetic resonance imaging will be required in the third year along with a structured, self-directed curriculum.

Fellows will actively participate in cardiovascular magnetic resonance imaging study acquisition and interpretation during the rotation. Self study involving the basic aspects of magnetic resonance imaging, reading, and viewing case files is required. Lectures on cardiovascular magnetic resonance imaging will take place during the course curriculum and through online learning.

Fellows should participate in cardiovascular magnetic resonance imaging study interpretation (minimum of 25 mentored cases for level I or 125 mentored cases for level II). Live cases and a teaching file (up to 50 cases) can be used to ensure experience with various magnetic resonance protocols, and techniques. Fellow should be present for, direct acquisition of, and be the primary interpreter of 50 complete cardiovascular magnetic resonance imaging studies along with the technologists and other laboratory personnel. Under supervision, they should observe and participate in standard procedures and have experience in the practical aspects of magnetic resonance imaging associated with performing clinical patient studies.

Images will be interpreted with the cardiovascular magnetic resonance imaging staff assigned to that duty for the day and all attempts should be made to correlate scan findings with other diagnostic testing such as ECGs, coronary angiograms, CT, nuclear studies, and echocardiograms. Fellows are expected to become familiar with reporting standards and to assist in communicating the results of abnormal tests to the referring provider.

**Specific expectations**

14. Obtain a brief history for every patient scheduled for cardiovascular magnetic resonance imaging
15. Understand the indication for the test
16. Be physically present during all stress tests and assist the nurse as needed
17. Independently interpret the cardiovascular magnetic resonance studies
18. Review your interpretation with the staff member assigned to read cardiovascular magnetic resonance studies for the day
19. Communicate the results of all inpatient studies to the responsible physician
20. Communicate results of all studies showing the presence of ischemia or other significant findings with the responsible physician for both inpatient and outpatient studies
21. Document all cases performed in RMS
22. Understand the functioning of the magnetic resonance lab
23. For level II, work with the technologists on image acquisition and processing of at least 50 cardiovascular magnetic resonance imaging studies and document this experience
24. Establish/maintain a teaching database of cardiovascular magnetic resonance imaging studies with pertinent history and additional imaging modalities as appropriate
25. Pursue independent study
   a. Textbooks and CDs
   b. Internet resources such as Society for Cardiovascular Magnetic Resonance
c. Journals such as the Journal of Cardiovascular Magnetic Resonance

26. Prepare an assigned topic for a 30 minute lecture to be presented during core curriculum as part of a rotating didactic curriculum

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**LINES OF RESPONSIBILITY**

**Supervising Physician:** The faculty physician is responsible for the supervision of all procedures performed in the cardiology laboratories. The faculty physician will assign specific fellow duties based on the individual fellow’s level of training and expertise. The faculty physician will verbally review the rotation expectations at the beginning of the month. The faculty physician will provide verbal feedback and a written evaluation at the end of the month. The faculty physician will monitor the fellow’s performance of procedures and review the fellow’s interpretation of all diagnostic tests. The faculty physician will provide concise focused teaching sessions during weekly conferences or during performance and interpretation of laboratory studies. The faculty physician and/or the fellow will discuss testing results with the patient and the patient’s family and provide appropriate documentation.

**Fellow:** The fellow will perform all required pre-procedure duties (ensure appropriate consent obtained, review labs, write pre-procedure orders, etc.). The fellow will complete all the listed expectations for the rotation as described above.

**LEARNING OBJECTIVES**

- **Medical Knowledge**
  - Know the principles of safety and contraindications for cardiovascular magnetic resonance imaging.
  - Know the uses, potential side effects, and contraindications of using gadolinium-based contrast agents in cardiovascular magnetic resonance imaging.
  - Know the principles of cardiovascular magnetic resonance image acquisition.
  - Know the indications for cardiovascular magnetic resonance to assess left and right heart chamber sizes and function.
  - Know the cardiovascular magnetic resonance indications for assessment of myocardial viability.
  - Know the cardiovascular magnetic resonance indications and characteristic findings of myocardial ischemia.
  - Know the cardiovascular magnetic resonance indications and characteristic findings of acute myocardial infarction.
  - Know the cardiovascular magnetic resonance indications and characteristic findings of acute coronary syndromes and other causes of myocardial injury.
  - Know the cardiovascular magnetic resonance indications and differential findings in cardiomyopathies of uncertain cause.
- Know the cardiovascular magnetic resonance indications to assess diseases of the pericardium.
- Know the cardiovascular magnetic resonance indications to evaluate valvular heart disease.
- Know the cardiovascular magnetic resonance indications for left atrial and pulmonary vein mapping prior to ablation of atrial fibrillation.
- Know the cardiovascular magnetic resonance indications and characteristic findings of myocardial masses and thrombi.
- Know the cardiovascular magnetic resonance indications for evaluation of adult congenital heart disease including identification of coronary artery anomalies.
- Know the cardiovascular magnetic resonance indications to detect and evaluate diseases of the aorta and peripheral arteries.

**Patient Care and Procedural Skills**
- Skill to appropriately order and integrate the results of cardiovascular magnetic resonance testing with other clinical findings in the evaluation and management of patients.
- Skill to interpret cardiovascular magnetic resonance tissue characterization (late gadolinium enhancement) to distinguish the etiology of cardiomyopathy and acute myocardial injury.
- Skill to interpret regional and global left and right ventricular wall motion and ejection fraction. II
- Skill to interpret vascular diseases of the aorta (e.g., intramural hematoma, dissection, coarctation, and aneurysm).
- Skill to identify and characterize myocardial masses.
- Skill to identify and characterize pericardial disease.
- Skill to identify and diagnose basic congenital heart disease in adults.
- Skill to identify and diagnose complex adult congenital heart disease, including quantification of intracardiac shunting, and anomalous coronary arteries.
- Skill to perform and interpret cardiovascular magnetic resonance stress testing.

**Systems-Based Practice**
- Incorporate risk/benefit and cost considerations in the use of cardiovascular magnetic resonance testing.
- Participate in cardiovascular magnetic resonance quality monitoring and initiatives.

**Practice-Based Learning and Improvement**
- Identify knowledge and performance gaps and engage in opportunities to achieve focused education and performance improvement.

**Professionalism**
- Practice within the scope of expertise and technical skills.
- Know and promote adherence to guidelines and appropriate use criteria.

**Interpersonal and Communication Skills**
- Communicate testing results to physicians and patients in an effective and timely manner.

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**MILESTONES**

<table>
<thead>
<tr>
<th>Medical Knowledge</th>
<th>12 months</th>
<th>24 months</th>
<th>36 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Know the principles of safety and contraindications for cardiovascular magnetic resonance imaging and gadolinium-based contrast agents.</td>
<td>I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Know the principles of cardiovascular magnetic resonance image acquisition.</td>
<td></td>
<td>I</td>
<td></td>
</tr>
</tbody>
</table>
3. Know the cardiovascular magnetic resonance indications and characteristic findings of myocardial ischemia, acute myocardial infarction, and cardiomyopathies of uncertain cause.

4. Know the cardiovascular magnetic resonance indications to assess diseases of the pericardium, myocardial viability, and valvular heart disease.

5. Know the cardiovascular magnetic resonance indications and characteristic findings of myocardial masses and thrombi.

6. Know the cardiovascular magnetic resonance indications for evaluation of adult congenital heart disease including identification of coronary artery anomalies.

7. Know the cardiovascular magnetic resonance indications to detect and evaluate diseases of the aorta and peripheral arteries.

**Patient Care and Procedural Skills**

<table>
<thead>
<tr>
<th>Skill</th>
<th>12 months</th>
<th>24 months</th>
<th>36 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Appropriately order and integrate the results of cardiovascular magnetic resonance testing with other clinical findings in the evaluation and management of patients.</td>
<td>I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Interpret cardiovascular magnetic resonance tissue characterization (late gadolinium enhancement) to distinguish the etiology of cardiomyopathy and acute myocardial injury.</td>
<td>I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Interpret regional and global left and right ventricular wall motion and ejection fraction.</td>
<td>II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Interpret vascular diseases of the aorta (e.g., intramural hematoma, dissection, coarctation, and aneurysm), pericardial disease, and myocardial masses.</td>
<td>II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Identify and diagnose basic and complex adult congenital heart disease, including quantification of intracardiac shunting, and anomalous coronary arteries.</td>
<td>II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Perform and interpret cardiovascular magnetic resonance stress testing.</td>
<td>II</td>
<td></td>
<td></td>
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</tbody>
</table>

**Systems-Based Practice**

<table>
<thead>
<tr>
<th>Skill</th>
<th>12 months</th>
<th>24 months</th>
<th>36 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Incorporate risk/benefit and cost considerations in the use of cardiovascular magnetic resonance testing.</td>
<td>I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Participate in cardiovascular magnetic resonance quality monitoring and initiatives.</td>
<td>II</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Practice-Based Learning and Improvement**

<table>
<thead>
<tr>
<th>Skill</th>
<th>12 months</th>
<th>24 months</th>
<th>36 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Identify knowledge and performance gaps and engage in opportunities to achieve focused education and performance improvement.</td>
<td>I</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Professionalism**

<table>
<thead>
<tr>
<th>Skill</th>
<th>12 months</th>
<th>24 months</th>
<th>36 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Practice within the scope of expertise and technical skills.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Know and promote adherence to guidelines and appropriate use criteria.

<table>
<thead>
<tr>
<th>Interpersonal and Communication Skills</th>
<th>12 months</th>
<th>24 months</th>
<th>36 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Communicate testing results to physicians and patients in an effective and timely manner.</td>
<td>II</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CARDIOVASCULAR PREVENTION AND VASCULAR DISEASE

CONTACTS

Rotation Director
Woubeshet Ayenew, M.D. 612-873-2875 waydoc@gmail.com p612-336-0536

Cardiology Program Coordinator
Cheryl Christenson 612-873-9990 Cheryl.christenson@hcmed.org

ANW – Site Coordinator
Meghan Hoover 612-863-3779 Meghan.hoover@allina.com

LOCATION
Activities based at both HCMC and ANW

HOURS
Hours: Mon – Fri (hours variable)

GENERAL DESCRIPTION

The Cardiovascular Prevention and Vascular Disease rotation will include a variety of clinic experiences split between HCMC and ANW. At HCMC, there will be experience in phase I and phase II cardiac rehabilitation 1.5/week and experience in smoking cessation clinic 1-2 half days/week. At ANW, there will be prevention clinic 1-3 half days/week, vascular clinic 1-2 half days/week and a Friday case discussion lead by the fellow. In the course of these clinics, laboratory and imaging studies will be ordered and reviewed. Fellows will be expected to attend Cardiology Grand Rounds and Core Curriculum Conference.

CONFERENCES

General Required Conferences

Monday Minneapolis Heart Institute Foundation Grand Rounds

7:00-8:00 AM, ANW Education Building, Watson Room

Tuesday HCMC Cardiac Catheterization Laboratory Conference
Rotation Specific Conferences

None

LINES OF RESPONSIBILITY

Supervising Physician: The faculty physician will assign specific fellow duties based on the individual fellow’s level of training and expertise. The faculty physician will verbally review the rotation expectations at the beginning of the month. The faculty physician will provide verbal feedback and a written evaluation at the end of the month. The faculty physician will monitor the fellow and review the fellow’s performance. The faculty physician will provide concise focused teaching sessions during weekly conferences or during performance and interpretation of laboratory studies. The faculty physician and/or the fellow will discuss testing results with the patient and the patient’s family and provide appropriate documentation.

Fellow: The faculty physician and/or the fellow will discuss testing results with the patient and the patient’s family and provide appropriate documentation.

LEARNING OBJECTIVES

Year 1

- Patient Care
  - Perform appropriate history and physical examination focused on vascular disease management.
  - Perform appropriate history and physical examination focused on identification of traditional and nontraditional cardiovascular risk factors in diverse populations.
  - Gain experience with the diagnosis and treatment of peripheral vascular disease.
  - Begin using multidisciplinary approach to vascular disease management and cardiovascular disease prevention including engagement of clinical educators and primary care physicians.
  - Develop skills to interpret limb segmental blood pressure measurements, volume recordings and treadmill vascular tests.
  - Develop skills to identify patients for whom referral for revascularization is indicated.
  - Develop skills to identify asymptomatic patients who may benefit from intensive risk reduction management strategies.
- Medical Knowledge
  - Know the anatomy of the peripheral arterial and venous systems.
  - Develop understanding for the etiology and epidemiology of peripheral vascular disease including the incidence and prevalence, sex and ethnic differences, and the influence of traditional risk factors and demographics on outcomes.
  - Develop understanding for the cardinal symptoms and physical findings of peripheral vascular disease.
  - Understand the indications for advanced imaging in patients with suspected or known peripheral vascular disease.
  - Learn the indications, risks, outcomes and long term follow up for surgical and percutaneous revascularization of peripheral vascular disease.
- Understand the premise, value and implementation of Phase I and Phase II cardiac rehabilitation.
- Develop understanding for the evidence based medicine surrounding primary and secondary cardiovascular prevention.

- Systems-based practice
  - Understand the importance of incorporating appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  - Understand the importance of working effectively with support staff and coworkers
  - Understand the importance of identifying and addressing financial, cultural, and social barriers to diagnostic and treatment recommendations

- Practice-based learning and improvement
  - Understand the importance of locating, appraising, and assimilating information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment
  - Understand the importance of developing familiarity with research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods

- Professionalism
  - Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  - Understand the importance of practicing within the scope of personal technical skills or expertise
  - Understand the importance of exhibiting sensitivity to patient preference and end-of-life issues

- Interpersonal and communication skills
  - Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  - Understand the importance of communicating diagnostic test results in a timely manner to primary and referring physicians
  - Understand the importance of engaging in shared decision-making with patients about their heart condition and the options for diagnosis and treatment

Year 2

- Patient Care
  - Incorporate advanced imaging in the management of patients with suspected or known peripheral vascular disease.
  - Develop proficiency in discussing with the patient the indications, risks, outcomes and long term follow up for surgical and percutaneous revascularization of peripheral vascular disease.
  - Develop proficiency with the diagnosis and treatment of peripheral vascular disease.
  - Develop competence to interpret limb segmental blood pressure measurements, volume recordings and treadmill vascular tests independently.
  - Develop competence to identify patients for whom referral for revascularization is indicated.
Develop competence to identify asymptomatic patients who may benefit from intensive risk reduction management strategies and recommend evidence based interventions.

- **Medical Knowledge**
  - Demonstrate depth in the understanding for the etiology and epidemiology of peripheral vascular disease including the incidence and prevalence, sex and ethnic differences, and the influence of traditional risk factors and demographics on outcomes.
  - Develop competence to interpret limb segmental blood pressure measurements, volume recordings and treadmill vascular tests independently.
  - Demonstrate depth in the understanding for the cardinal symptoms and physical findings of peripheral vascular disease.
  - Recognize abnormalities in advanced imaging modalities used for evaluation of patients with suspected or known peripheral vascular disease.
  - Develop proficiency surrounding the premise, value and implementation of Phase I and Phase II cardiac rehabilitation.
  - Develop proficiency for the evidence based medicine surrounding primary and secondary cardiovascular prevention.

- **Systems-based practice**
  - Demonstrate an ability to access and incorporate appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  - Demonstrate an ability to work effectively with support staff and coworkers
  - Demonstrate an ability to identify and address financial, cultural, and social barriers to diagnostic and treatment recommendations

- **Practice-based learning and improvement**
  - Demonstrate an ability to locate, appraise, and assimilate information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment
  - Demonstrate a familiarity with research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods

- **Professionalism**
  - Demonstrate an ability to communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  - Demonstrate an ability to practice within the scope of personal technical skills or expertise
  - Demonstrate ability to exhibit sensitivity to patient preference and end-of-life issues

- **Interpersonal and communication skills**
  - Demonstrate an ability to communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  - Demonstrate an ability to communicate diagnostic test results in a timely manner to primary and referring physicians
  - Demonstrate an ability to engage in shared decision-making with patients about their heart condition and the options for diagnosis and treatment

**Year 3**

- **Patient Care**
  - Demonstrate proficiency with the diagnosis and treatment of peripheral vascular disease.
Demonstrate proficiency with the use of advanced imaging in the management of patients with suspected or known peripheral vascular disease.

- Demonstrate proficiency in discussing with the patient the indications, risks, outcomes and long term follow up for surgical and percutaneous revascularization of peripheral vascular disease.
- Work effectively as a team member or leader to implement multidisciplinary approach to vascular disease management, cardiac rehabilitation and evidence based primary and secondary cardiovascular prevention.
- Demonstrate proficiency in the proper selection of patients who will benefit from referral for revascularization.
- Demonstrate proficiency in the identification of asymptomatic patients who may benefit from intensive risk reduction and implement interventions to effect evidence based primary cardiovascular prevention.

- Medical Knowledge
  - Demonstrate proficiency in the understanding for the etiology and epidemiology of peripheral vascular disease including the incidence and prevalence, sex and ethnic differences, and the influence of traditional risk factors and demographics on outcomes.
  - Demonstrate proficiency in the understanding of the cardinal symptoms and physical findings of peripheral vascular disease.
  - Demonstrate proficiency for the evidence based medicine surrounding primary and secondary cardiovascular prevention.

- Systems-based practice
  - Consistently apply appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  - Consistently work effectively with support staff and coworkers
  - Consistently identify and address financial, cultural, and social barriers to diagnostic and treatment recommendations

- Practice-based learning and improvement
  - Consistently locate, appraise, and assimilate information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment
  - Consistently apply research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods

- Professionalism
  - Consistently communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  - Consistently practice within the scope of personal technical skills or expertise
  - Consistently exhibit sensitivity to patient preference and end-of-life issues

- Interpersonal and communication skills
  - Consistently communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  - Consistently communicate diagnostic test results in a timely manner to primary and referring physicians
  - Consistently engage in shared decision-making with patients about their heart condition and the options for diagnosis and treatment

### Milestones

<table>
<thead>
<tr>
<th>Medical Knowledge</th>
<th>12 months</th>
<th>24 months</th>
<th>36 months</th>
</tr>
</thead>
</table>
1. Know the anatomy of the peripheral arterial and venous systems

2. Know the causes and clinical epidemiology of peripheral arterial disease, including the incidence and prevalence, sex and ethnic differences, and the influence of traditional risk factors and demographics on outcomes

3. Know the cardinal symptoms and physical findings of carotid, aorta, renal artery, and of upper and lower extremity arterial diseases

4. Know the indications for CT and MR angiography and patients with suspected vascular disease

5. Know the indications and risks for surgical and percutaneous interventional treatments for peripheral vascular diseases; and, the expected outcomes

### Patient care

<table>
<thead>
<tr>
<th>Description</th>
<th>12 months</th>
<th>24 months</th>
<th>36 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Skill to interpret limb segmental blood pressure measurements, plus volume recordings, and treadmill vascular exercise tests</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Skill to interpret and integrate clinical findings and testing results in the evaluation and management of patients with peripheral vascular disease</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>3. Skill to identify patients for whom referral for revascularization is indicated</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>4. Skill to identify asymptomatic patients who may benefit from intensive risk reduction management strategies</td>
<td></td>
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<td>X</td>
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</tbody>
</table>

### Systems-based practice

<table>
<thead>
<tr>
<th>Description</th>
<th>12 months</th>
<th>24 months</th>
<th>36 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Incorporate appropriate use criteria, risk-benefit, safety, and cost containment considerations and the use of peripheral diagnostic studies and treatments</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

### Practice-based learning and improvement

| | 12 months | 24 months | 36 months |
| | | | |
1. Identify competency gaps and engage in opportunities to achieve focused education and performance improvement in the area of prevention and vascular medicine

**Professionalism**

<table>
<thead>
<tr>
<th>1. Promote adherence to guidelines and appropriate use criteria in the areas of prevention and vascular medicine</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 months</td>
</tr>
<tr>
<td>X</td>
</tr>
</tbody>
</table>

**Interpersonal and communication skills**

<table>
<thead>
<tr>
<th>1. Engage in shared decision-making with patients about their prevention and vascular medicine issues and the options for diagnosis and treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 months</td>
</tr>
<tr>
<td>X</td>
</tr>
</tbody>
</table>

## CONTINUITY CLINIC

### CONTACTS

<table>
<thead>
<tr>
<th>Rotation Director</th>
<th>Phone</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woubeshet Ayenew, M.D.</td>
<td>612-873-2875</td>
<td><a href="mailto:waydoc@gmail.com">waydoc@gmail.com</a></td>
</tr>
<tr>
<td>Cheryl Christenson</td>
<td>612-873-9990</td>
<td><a href="mailto:Cheryl.christenson@hcmed.org">Cheryl.christenson@hcmed.org</a></td>
</tr>
<tr>
<td>Meghan Hoover</td>
<td>612-863-3779</td>
<td><a href="mailto:Meghan.hoover@allina.com">Meghan.hoover@allina.com</a></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Important Phone Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCMC – Clinic Back Line</td>
</tr>
<tr>
<td>HCMC – Clinic Front Desk</td>
</tr>
<tr>
<td>ANW – Heart Hospital Clinic</td>
</tr>
<tr>
<td>ANW – Work Room B</td>
</tr>
<tr>
<td>ANW – Work Room D</td>
</tr>
</tbody>
</table>

### LOCATION

HCMC, 5th floor, Orange building, cardiology clinic

ANW, 3rd Floor Minneapolis Heart Institute Building Suite 300

### HOURS

Variable as assigned – ½ day per week
GENERAL DESCRIPTION

All fellows will participate in a continuity clinic one half day each week throughout the three year training program. These clinics will be staffed by faculty to provide supervision and teaching. Through clinical teaching, role modeling, mentoring and case-based teaching, fellows will learn some of the key principles of patient care in the ambulatory setting, professional behavior, and ethical principles.

Fellows will:

- Learn to treat patients with respect, compassion and integrity
- Take responsibility for being on time and arrange make-up clinic days in the event that their clinic must be canceled
- Respond appropriately to patient questions
- Review the results of diagnostic tests and communicate those results with patients families
- Treat their patients and families with honesty, confidentiality and accountability
- Adhere to ethical principles
- Respect the continuity of care they provide in a clinic setting
- Participate in an Ambulatory Patient Self Review Activity (APSRA) annually

CONFERENCES

General Required Conferences

Monday Minneapolis Heart Institute Foundation Grand Rounds
7:00-8:00 AM, ANW Education Building, Watson Room
Tuesday HCMC Cardiac Catheterization Laboratory Conference
7:30-8:30 AM, HCMC, R5.252
Thursday Core Curriculum Conference
3:00-5:00 PM, HCMC or ANW as scheduled

Rotation Specific Conferences
None

LINES OF RESPONSIBILITY

Supervising Faculty Physician: The faculty physician will supervise the management of all cardiology clinic patients. All new patients and follow up patients will be presented to the faculty physician and written documentation of the encounter will be entered into the EHR. The faculty physician will provide verbal feedback and a written evaluation twice a year.

Fellow: The fellow is responsible for evaluating, managing, and providing follow-up care for their assigned cardiology clinic patients under the supervision of the faculty physician in the clinic. The fellow is responsible for providing appropriate documentation on all patient encounters. The fellow is expected to answer clinic staff and patient phone calls in a timely fashion.

LEARNING OBJECTIVES

Year 1

- Patient Care
Perform appropriate history and physical examination focused on cardiovascular disease management with minimal supervision.

Gain experience with the diagnosis and treatment of ischemic heart disease, dysrhythmias, heart failure, valvular disease as well as all cardiovascular risk factors.

Develop understanding of behavioral and psychosociological aspects of cardiovascular disease management in diverse populations.

Understand the value of using multidisciplinary approach to cardiovascular disease management including engagement of clinical educators and primary care physicians.

Develop the written and verbal communication skills to allow for optimization of multidisciplinary approach to cardiovascular disease management.

Develop understanding for the use of clinic resources to enhance cardiovascular care and reduce hospitalization.

- Medical Knowledge
  - Develop understanding of principles of clinical epidemiology for cardiovascular disease.
  - Gain experience with the pathophysiology of ischemic heart disease, dysrhythmias, heart failure, valvular disease as well as all cardiovascular risk factors.
  - Develop understanding of behavioral and psychosociological aspects of cardiovascular disease management in diverse populations.

- Systems-based practice
  - Understand the importance of incorporating appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making.
  - Understand the importance of working effectively with support staff and coworkers.
  - Understand the importance of identifying and addressing financial, cultural, and social barriers to diagnostic and treatment recommendations.

- Practice-based learning and improvement
  - Understand the importance of locating, appraising, and assimilating information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment.
  - Understand the importance of developing familiarity with research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods.

- Professionalism
  - Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner.
  - Understand the importance of practicing within the scope of personal technical skills or expertise.
  - Understand the importance of exhibiting sensitivity to patient preference and end-of-life issues.

- Interpersonal and communication skills
  - Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner.
  - Understand the importance of communicating diagnostic test results in a timely manner to primary and referring physicians.
  - Understand the importance of engaging in shared decision-making with patients about their heart condition and the options for diagnosis and treatment.
• **Patient Care**
  - Perform appropriate history and physical examination focused on cardiovascular disease management.
  - Develop competence with the diagnosis and treatment of ischemic heart disease, dysrhythmias, heart failure, valvular disease as well as all cardiovascular risk factors.
  - Develop competence in the understanding of behavioral and psychosociological aspects of cardiovascular disease management in diverse populations.
  - Begin using multidisciplinary approach to cardiovascular disease management including engagement of clinical educators and primary care physicians.
  - Demonstrate the use written and verbal communications skills to allow for optimization of multidisciplinary approach to cardiovascular disease management.
  - Demonstrate proper use of clinic resources to enhance cardiovascular care and reduce hospitalization.

• **Medical Knowledge**
  - Demonstrate depth in the understanding of principles of clinical epidemiology for cardiovascular disease.
  - Develop proficiency with the pathophysiology of ischemic heart disease, dysrhythmias, heart failure, valvular disease as well as all cardiovascular risk factors.
  - Develop proficiency with identification and management of behavioral and psychosociological aspects of cardiovascular disease in diverse populations.

• **Systems-based practice**
  - Demonstrate an ability to access and incorporate appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  - Demonstrate an ability to work effectively with support staff and coworkers
  - Demonstrate an ability to identify and address financial, cultural, and social barriers to diagnostic and treatment recommendations

• **Practice-based learning and improvement**
  - Demonstrate an ability to locate, appraise, and assimilate information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment
  - Demonstrate a familiarity with research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods

• **Professionalism**
  - Demonstrate an ability to communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  - Demonstrate an ability to practice within the scope of personal technical skills or expertise
  - Demonstrate an ability to exhibit sensitivity to patient preference and end-of-life issues

• **Interpersonal and communication skills**
  - Demonstrate an ability to communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  - Demonstrate an ability to communicate diagnostic test results in a timely manner to primary and referring physicians
  - Demonstrate an ability to engage in shared decision-making with patients about their heart condition and the options for diagnosis and treatment

Year 3
• **Patient Care**
  o Demonstrate competency in history and physical examination focused on cardiovascular disease management.
  o Demonstrate proficiency with the diagnosis and treatment of ischemic heart disease, dysrhythmias, heart failure, valvular disease as well as all cardiovascular risk factors.
  o Demonstrate competence in the understanding of behavioral and psychosociological aspects of cardiovascular disease management in diverse populations.
  o Work effectively as a team member or leader in the multidisciplinary approach to cardiovascular disease management including engagement of clinical educators and primary care physicians.
  o Demonstrate proficiency in the use of written and verbal communications skills to allow for optimization of multidisciplinary approach to cardiovascular disease management.
  o Demonstrate competency in the use of clinic resources to enhance cardiovascular care and reduce hospitalization.

• **Medical Knowledge**
  o Demonstrate competency in the understanding of principles of clinical epidemiology for cardiovascular disease.
  o Demonstrate proficiency in the pathophysiology of ischemic heart disease, dysrhythmias, heart failure, valvular disease as well as all cardiovascular risk factors.
  o Demonstrate proficiency with identification and management of behavioral and psychosociological aspects of cardiovascular disease in diverse populations.

• **Systems-based practice**
  o Consistently apply appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making.
  o Consistently work effectively with support staff and coworkers.
  o Consistently identify and address financial, cultural, and social barriers to diagnostic and treatment recommendations.

• **Practice-based learning and improvement**
  o Consistently locate, appraise, and assimilate information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment.
  Consistently apply research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods.

• **Professionalism**
  o Consistently communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner.
  o Consistently practice within the scope of personal technical skills or expertise.
  o Consistently exhibit sensitivity to patient preference and end-of-life issues.

• **Interpersonal and communication skills**
  o Consistently communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner.
  o Consistently communicate diagnostic test results in a timely manner to primary and referring physicians.
  o Consistently engage in shared decision-making with patients about their heart condition and the options for diagnosis and treatment.
ECHOCARDIOGRAPHY – ANW

CONTACTS

Rotation Director
Kevin Harris, M.D. 612-863-3900 Kevin.harris@allina.com p612-654-7864

ANW - Site Coordinator
Meghan Hoover 612-863-3779 Meghan.hoover@allina.com

Important Phone Numbers
Echo Lab 612-775-4201

LOCATION

Echo Lab location: 2nd Floor, ANW Heart Hospital

The ANW/MHI echo lab is one of the largest in the country, annually performing over 26,000 echoes including more than 1000 TEE’s and 4000 stress echoes.

HOURS

Mon-Fri 7:30 am to 6:30 pm, variable

Monday: Participation in all aspects of Echo Lab activities (performing and interpreting studies—see below)
Tuesday: Cath conference at 7:30-8:30am which includes Echo/cath correlation (rest of day as noted below)
Wednesday: Echo Lab activities (as noted below)
Thursday: Echo Lab activities (as noted below)

Friday: Echocardiography conference (one Friday/month) 7:30am-8:30am

Monthly: Echo QA 7:30am-8:30am (at least one conference/month)

Echo Lab activities (as noted below)

GENERAL DESCRIPTION

The fellow should advance their skills in transthoracic (TTE), transesophageal (TEE) and stress echocardiography in a high volume echo lab. They are expected to participate in the performance and interpretation of all 3 modalities.

The fellow is expected in the echo lab at 7:30am each day and is expected to stay until the work for the day is done. Given the daily volume in the lab, each day the fellow will not participate in more than 3 TEE’s but is able to observe selected cases. Interesting cases are shared and the motivated fellows will not miss any learning experiences.

A) TTE performance and interpretation: The fellow is expected to continue skills developed in earlier rotations by performing one echo/day. The fellow will independently review 5 ANW echoes daily at the reading station located near the fellows’ room. Preliminary interpretations will be handwritten. After the preliminary echo interpretation has been committed, the echo will be reviewed with the MCA reader and a final report will be generated.
B) **TEE performance and interpretation**: The fellow will review the indications prior to the performance of a TEE and will appropriately discuss the procedure with the patient and look for contraindications to the test. The fellow will review the TTE prior to performing the TEE. They will participate in the sedation and application of topical anesthesia to the patient. The fellow will, with appropriate supervision perform the TEE as the primary operator after observing the passing of the probe in five cases. The fellow will write a note and communicate the results to the primary physician. The attending will dictate the results after reviewing the images with the fellow. The fellow will be performing no more than 3 TEE’s/day.

C) **Stress echo**: The fellow is expected to be involved in all of the stress echoes. The fellow will review indications and contraindications to the test. The fellow will review images for the tests and preliminary decisions regarding the suitability for echo images and the possible use of contrast agents. If a different type of stress test (or other evaluation) is indicated, the fellow will make appropriate arrangements after clearing this with the appropriate attending. The fellow should be physically present in the room during the performance of the stress/dobutamine test. The fellow will be available to monitor the blood pressure during the stress test as needed. The fellow will help the sonographer in choosing final images and will review the images prior to discussing the case with the attending. The fellow will come to an independent decision regarding the test result and will then review the findings with the attending. The fellow, with the supervision of the echo attending, is in charge of the care of the patient having the stress echo. This will include the medical management and clinical disposition of outpatients in case of complications or need to cancel the studies.

**Professionalism:**

The fellow is expected to interact well and with courtesy with all members of the echo team including the echo lab nurses, EKG and cardiac ultrasound technicians. They are expected to communicate the results of tests to the patients after review with the staff physician. In some cases, they will communicate with the primary physician. Professional dress attire is expected. This may include a tie for males. At no time are jeans or tennis shoes appropriate. Gowns should be worn for TEE’s. The primary goal of the lab is to take care of patients with compassion and care. The quality of the care, rather than the volume of TEE’s is emphasized.

The fellow may use the internet to view medical literature but other use of internet or hand held devices, conference preparation and other non ANW lab activities will not be tolerated.

### CONFERENCES

**General Required Conferences**

- **Monday** Minneapolis Heart Institute Foundation Grand Rounds  
  7:00-8:00 AM, ANW Education Building, Watson Room
- **Tuesday** HCMC Cardiac Catheterization Laboratory Conference  
  7:30-8:30 AM, HCMC, R5.252
- **Thursday** Core Curriculum Conference  
  3:00-5:00 PM, HCMC or ANW as scheduled

**Rotation Specific Conferences**

- **Wednesday** AM echo conference at ANW – bi-monthly

Case based and Didactic Discussion: Attendance at the bi-monthly Wednesday AM Echo meeting is required. The fellow will be asked to prepare the discussion for one of the sessions.
**LINES OF RESPONSIBILITY**

**Supervising Physician:** The faculty physician is responsible for the supervision of all procedures performed in the cardiology laboratories. The faculty physician will assign specific fellow duties based on the individual fellow’s level of training and expertise. The faculty physician will verbally review the rotation expectations at the beginning of the month. The faculty physician will provide verbal feedback and a written evaluation at the end of the month. The faculty physician will monitor the fellow’s performance of procedures and review the fellow’s interpretation of all diagnostic tests. The faculty physician will provide concise focused teaching sessions during weekly conferences or during performance and interpretation of laboratory studies. The faculty physician and/or the fellow will discuss testing results with the patient and the patient’s family and provide appropriate documentation.

**Fellow:** The fellow will perform all required pre-procedure duties (ensure appropriate consent obtained, review labs, write pre-procedure orders, etc). The fellow will supervise all non-invasive testing and remain in the lab area to be available for emergencies. Fellows will perform invasive procedures under the supervision of the faculty physician in accordance with their level of training and expertise. The fellow is responsible for any necessary post-procedure care. The faculty physician and/or the fellow will discuss testing results with the patient and the patient’s family and provide appropriate documentation.

**LEARNING OBJECTIVES**

**Year 1**

- **Patient Care**
  - Understand appropriate criteria for ordering transthoracic echocardiograms
  - Understand appropriate criteria for stress tests
  - Understand appropriate criteria for transesophageal echocardiograms
  - Develop an understanding of risks and benefits of stress testing
  - Develop an understanding of risks and benefits of transesophageal echocardiograms

- **Medical Knowledge**
  - Develop a basic understanding of cardiac anatomy by 2D imaging
  - Develop understanding of fundamentals of Doppler imaging
  - Develop understanding of basic principles of stress imaging
  - Develop understanding of fundamental imaging planes for transesophageal echocardiogram
  - Demonstrate competence in performing a basic echocardiogram

- **Systems-based practice**
  - Understand the importance of incorporating appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  - Understand the importance of working effectively with support staff and coworkers
  - Understand the importance of identifying and addressing financial, cultural, and social barriers to diagnostic and treatment recommendations

- **Practice-based learning and improvement**
  - Understand the importance of locating, appraising, and assimilating information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment
  - Understand the importance of developing familiarity with research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods
• **Professionalism**
  o Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner.
  o Understand the importance of practicing within the scope of personal technical skills or expertise.
  o Understand the importance of exhibiting sensitivity to patient preference and end-of-life issues.

• **Interpersonal and communication skills**
  o Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner.
  o Understand the importance of communicating diagnostic test results in a timely manner to primary and referring physicians.
  o Understand the importance of engaging in shared decision-making with patients about their heart condition and the options for diagnosis and treatment.

**Year 2**

• **Patient Care**
  o Demonstrate competence in performing a basic transesophageal echocardiogram including intubation, obtaining basic planes.
  o Demonstrate competence in assessment of preprocedural and post procedural safety of patients undergoing transesophageal echocardiography.
  o Demonstrate competence in supervising exercise and pharmacological stress tests with a focus on recognition of factors that would influence patient safety (symptoms, arrhythmias, hemodynamic compromise etc.).

• **Medical Knowledge**
  o Develop competence in evaluation of cardiac conditions using transthoracic echocardiograms for common indications (valvular disease, cardiomyopathy etc.).
  o Develop competence in evaluation of cardiac conditions using transesophageal echocardiography for common indications.
  o Develop an understanding of basic interpretation of stress testing, including identification of inducible regional wall motion abnormalities.
  o Develop an understanding of use of Doppler for identification of valvular disease, pericardial disease, shunt physiology.

• **Systems-based practice**
  o Demonstrate an ability to access and incorporate appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making.
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- Demonstrate an ability to communicate well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
- Demonstrate an ability to communicate diagnostic test results in a timely manner to primary and referring physicians
- Demonstrate an ability to engage in shared decision-making with patients about their heart condition and the options for diagnosis and treatment

**Year 3**

**Patient Care**
- Demonstrate competence in performance of entire transthoracic echocardiogram.
- Demonstrate competence in performance of entire transesophageal echocardiogram (with supervision) including preprocedural assessment, intubation, and acquisition of imaging planes to address appropriate indication.
- Demonstrate proficiency in supervising stress tests, including preprocedural evaluation, assessment of factors affecting safety of stress tests, and interpretation of results.

**Medical Knowledge**
- Demonstrate consistent ability to accurately interpret an entire transthoracic echocardiogram (including Doppler assessment) and correlate findings with the patient’s clinical condition, and the question being asked by the referring provider.
- Demonstrate proficiency in accurate assessment of prosthetic valves, congenital heart disease conditions, right heart function
- Demonstrate proficiency in accurately interpreting findings from a transesophageal echocardiogram relative to the patient’s clinical condition
- Demonstrate ability to accurately interpret stress echocardiograms, and correlate findings with cardiac catheterization anatomy.

**Systems-based practice**
- Consistently apply appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
- Consistently work effectively with support staff and coworkers
- Consistently identify and address financial, cultural, and social barriers to diagnostic and treatment recommendations

**Practice-based learning and improvement**
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**Patient care and procedural skills**

Skill to:

| 1. Performed and interpreted basic TTE exam | X |
| 2. Integrate echo findings with clinical and other testing results in the evaluation and management of patients | X |

**Systems-based practice**
<table>
<thead>
<tr>
<th>Objective</th>
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<td>1. Work effectively with the echo laboratory staff</td>
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**Practice-based learning and improvement**

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<th>Objective</th>
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**Professionalism**

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<td>1. Promote adherence to echo guidelines and appropriate use criteria</td>
<td>X</td>
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</table>

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**ECHOCARDIOGRAPHY - HCMC**

**CONTACTS**

- **Rotation Director**
  - Charles Herzog, M.D.
  - 612-873-2875
  - cherzog@usrds.org
  - p612-336-0069
  - Gautam Shroff, M.D.
  - 612-873-2875
  - gautam.shroff@hcmc.org
  - p612-510-9036

- **Cardiology Program Coordinator**
  - Cheryl Christenson
  - 612-873-9990
  - Cheryl.christenson@hcmed.org

- **Important Phone Numbers**
  - Echo Lab
    - 612-873-2885
  - Reading Room
    - 612-873-8522

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**LOCATION**

HCMC 5th Floor, Orange Building
HOURS

Mon-Fri 7:30 am to 6:30 pm, variable

Monday: Participation in all aspects of Echo Lab activities (performing and interpreting studies—see below)
Tuesday: Cath conference at 7:30-8:30am which includes Echo/cath correlation (rest of day as noted below)
Wednesday: Echo Lab activities (as noted below)
Thursday: Echo Lab activities (as noted below)

Friday: Echocardiography conference (one Friday/month) 7:30am-8:30am

Monthly: Echo QA 7:30am-8:30am (at least one conference/month)

Echo Lab activities (as noted below)

GENERAL DESCRIPTION

The fellow should advance their skills in transthoracic (TTE), transesophageal (TEE) and stress echocardiography in a high volume echo lab. They are expected to participate in the performance and interpretation of all 3 modalities.

The fellow is expected in the echo lab at 7:30am each day and is expected to stay until the work for the day is done. Given the daily volume in the lab, each day the fellow will not participate in more than 3 TEE’s but is able to observe selected cases. Interesting cases are shared and the motivated fellows will not miss any learning experiences

*The fellow is expected to be familiar with hospital policy on Procedural Sedation.
https://infooncall/Policies/002227?dDocName=002227&parentID=160128&isSearch=1

CONFERENCES

General Required Conferences

Monday Minneapolis Heart Institute Foundation Grand Rounds
7:00-8:00 AM, ANW Education Building, Watson Room

Tuesday HCMC Cardiac Catheterization Laboratory Conference
7:30-8:30 AM, HCMC, R5.252

Thursday Core Curriculum Conference
3:00-5:00 PM, HCMC or ANW as scheduled

Rotation Specific Conferences

Friday Echo conference (1 Friday/month)
7:30-8:30 AM, HCMC, R5.252

LINES OF RESPONSIBILITY

Supervising Physician: The faculty physician is responsible for the supervision of all procedures performed in the cardiology laboratories. The faculty physician will assign specific fellow duties based on the individual fellow’s level of training and expertise. The faculty physician will verbally review the rotation expectations at the beginning of the month. The faculty
physician will provide verbal feedback and a written evaluation at the end of the month. The faculty physician will monitor the fellow’s performance of procedures and review the fellow’s interpretation of all diagnostic tests. The faculty physician will provide concise focused teaching sessions during weekly conferences or during performance and interpretation of laboratory studies. The faculty physician and/or the fellow will discuss testing results with the patient and the patient’s family and provide appropriate documentation.

**Fellow:** The fellow will perform all required pre-procedure duties (ensure appropriate consent obtained, review labs, write pre-procedure orders, etc). The fellow will supervise all non-invasive testing and remain in the lab area to be available for emergencies. Fellows will perform invasive procedures under the supervision of the faculty physician in accordance with their level of training and expertise. The fellow is responsible for any necessary post-procedure care. The faculty physician and/or the fellow will discuss testing results with the patient and the patient’s family and provide appropriate documentation. The fellow should not administer/order procedural sedation without direct supervision of the supervising physician.

**A. First-year fellows/no previous echo rotations (or one outside of HCMC)**

1. It is an expectation that the fellow will be able to perform a complete two-dimensional echocardiographic exam and basic Doppler imaging by the end of his/her rotation. Fellows with little or no previous echo experiences are strongly encouraged to spend hands-on imaging time with the HCMC sonographers for one-on-one training in the performance of echocardiographic examinations. At the end of the rotation, the fellows should be able to perform a complete two dimensional exam and include basics of Doppler imaging (estimation of pulmonary artery pressure by tricuspid insufficiency velocity using the modified Bernoulli equation, qualitative assessment of severity of AV and semi-lunar valve insufficiency, and estimation of aortic stenosis gradient and aortic valve area). Fellows should be comfortable in the performance of an exam in the middle of the night, particularly for the assessment of left ventricular function and other causes of impaired cardiac output, including significant pericardial effusions, to assist in the immediate care of the patient.

2. At the end of the rotation, the fellow should be able to demonstrate an understanding of cardiac anatomy identified by 2-D imaging.

3. At the end of the rotation, the fellow should demonstrate an understanding of fundamentals of Doppler imaging, including use of the modified Bernoulli equation for estimation of intracardiac pressure gradients, continuity equation for estimation of aortic valve area (including pitfalls), qualitative assessment of AV and semi-lunar valve insufficiency (particularly, mitral insufficiency and aortic insufficiency, including *The Doppler of Death*, and assessment of pericardial tamponade physiology.

4. **Fundamentals of stress imaging:** The beginning echo fellow should become familiar during his/her first rotation at HCMC with the basic principles of stress imaging including assessment of development of large regional wall motion abnormalities, change in LV geometry, and ejection fraction.

5. **Fundamentals of transesophageal echocardiography:** The beginning fellow should become familiar with standard image planes and assessment of cardiac function and pathology. During their introductory rotation at HCMC, the fellow will obtain hands-on experience with the transesophageal probe, but will concentrate more on imaging than intubation.

6. **Outside** reading of basic echo texts and literature

**B. Advanced Echo Fellows (Previous HCMC echo rotation or at least two previous lab rotations in other labs).**

1. It is assumed that at the beginning of the rotation that the fellow is competent to perform a complete echocardiographic exam independently. During their first week at HCMC, the fellow is encouraged to do independent imaging for feedback from echo faculty.
2. At the end of this rotation, the fellow should be competent in the assessment and diagnosis of a wide variety of disease states that are identifiable by two-dimensional echocardiography. These include intracardiac masses, valvular disease, valvular vegetations, pericardial disease, and congenital heart disease. As part of their rotation, outside reading and review of existing teaching files is encouraged. As part of their rotation, the fellow is encouraged to participate in the development of further teaching materials with the assistance of the HCMC sonographers and lab director.

3. Advanced Doppler Imaging/Non-invasive left and right heart cath. At the end of the rotation the fellows should be proficient in the use of Doppler imaging for assessment of a wide variety of pathologic cardiac states, including pulmonary hypertension, left and right sided valvular insufficiency and stenosis, pericardial disease, congenital heart disease, and intracardiac shunts. The fellow should understand the echocardiographic assessment of LV diastolic function and be able to assess right and left-sided filling pressures by 2D and Doppler echocardiography. An understanding of how to perform assessment of RV systolic function should be demonstrable by the end of the rotation. The fellow should demonstrate a high level of understanding of the specific pitfalls present in Doppler imaging (i.e., continuity equation, MR assessment, etc).

4. Stress Imaging
   At the end of this rotation the advanced Echo fellow should become reasonably proficient in the identification of single or multiple exercise or pharmacologically-induced regional wall motion abnormalities. This would include the difficult area of stress imaging in ESRD patients.

5. Trans-esophageal Echo
   During his/her rotation, the echo fellow should be able (with supervision) to perform a complete transesophageal echocardiogram, including assessment of the patient pre-procedure regarding safety and premedication, esophageal intubation, and adequate imaging in a reasonable time frame. The performance of a transesophageal exam includes the pre-procedure assessment, intubation and acquisition of appropriate image planes and imaging to address the clinical indication for that particular procedure.

6. Fellows are encouraged to pursue projects of interest in the echo lab utilizing the HCMC echo lab database. The assistance of technical support staff will be available for project of this type. Interested fellows are encouraged to discuss their ideas with Echo Lab faculty.

**LEARNING OBJECTIVES**

Year 1

- **Patient Care**
  - Understand appropriate criteria for ordering transthoracic echocardiograms
  - Understand appropriate criteria for stress tests
  - Understand appropriate criteria for transesophageal echocardiograms
  - Develop an understanding of risks and benefits of stress testing
  - Develop an understanding of risks and benefits of transesophageal echocardiograms

- **Medical Knowledge**
  - Develop a basic understanding of cardiac anatomy by 2D imaging
  - Develop understanding of fundamentals of Doppler imaging
  - Develop understanding of basic principles of stress imaging
  - Develop understanding of fundamental imaging planes for transesophageal echocardiogram
  - Demonstrate competence in performing a basic echocardiogram

- **Systems-based practice**
o Understand the importance of incorporating appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
o Understand the importance of working effectively with support staff and coworkers
o Understand the importance of identifying and addressing financial, cultural, and social barriers to diagnostic and treatment recommendations

• Practice-based learning and improvement
  o Understand the importance of locating, appraising, and assimilating information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment
  o Understand the importance of developing familiarity with research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods

• Professionalism
  o Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  o Understand the importance of practicing within the scope of personal technical skills or expertise
  o Understand the importance of exhibiting sensitivity to patient preference and end-of-life issues

• Interpersonal and communication skills
  o Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  o Understand the importance of communicating diagnostic test results in a timely manner to primary and referring physicians
  o Understand the importance of engaging in shared decision-making with patients about their heart condition and the options for diagnosis and treatment

Year 2

• Patient Care
  o Demonstrate competence in performing a basic transesophageal echocardiogram including intubation, obtaining basic planes.
  o Demonstrate competence in assessment of preprocedural and post procedural safety of patients undergoing transesophageal echocardiography
  o Demonstrate competence in supervising exercise and pharmacological stress tests with a focus on recognition of factors that would influence patient safety (symptoms, arrhythmias, hemodynamic compromise etc.)

• Medical Knowledge
  o Develop competence in evaluation of cardiac conditions using transthoracic echocardiograms for common indications (valvular disease, cardiomyopathy etc.)
  o Develop competence in evaluation of cardiac conditions using transesophageal echocardiography for common indications
  o Develop an understanding of basic interpretation of stress testing, including identification of inducible regional wall motion abnormalities.
  o Develop an understanding of use of Doppler for identification of valvular disease, pericardial disease, shunt physiology.

• Systems-based practice
• Demonstrate an ability to access and incorporate appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  
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• Demonstrate an ability to engage in shared decision-making with patients about their heart condition and the options for diagnosis and treatment

Year 3

• Patient Care
  
• Demonstrate competence in performance of entire transthoracic echocardiogram.
  
• Demonstrate competence in performance of entire transesophageal echocardiogram (with supervision) including preprocedural assessment, intubation, and acquisition of imaging planes to address appropriate indication.
  
• Demonstrate proficiency in supervising stress tests, including preprocedural evaluation, assessment of factors affecting safety of stress tests, and interpretation of results.

• Medical Knowledge
  
• Demonstrate consistent ability to accurately interpret an entire transthoracic echocardiogram (including Doppler assessment) and correlate findings with the patient’s clinical condition, and the question being asked by the referring provider.
  
• Demonstrate proficiency in accurate assessment of prosthetic valves, congenital heart disease conditions, right heart function
  
• Demonstrate proficiency in accurately interpreting findings from a transesophageal echocardiogram relative to the patient’s clinical condition
  
• Demonstrate ability to accurately interpret stress echocardiograms, and correlate findings with cardiac catheterization anatomy.

• Systems-based practice
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Patient care and procedural skills
1. Performed and interpreted basic TTE exam

2. Integrate echo findings with clinical and other testing results in the evaluation and management of patients

### Systems-based practice

1. Work effectively with the echo laboratory staff

2. Incorporate appropriate use criteria, risk-benefit, safety, and cost containment considerations in the use of ultrasound techniques

### Practice-based learning and improvement

1. Identify competency gaps and engage in opportunities to achieve focused education and performance improvement in echocardiography

### Professionalism

1. Promote adherence to echo guidelines and appropriate use criteria

### Interpersonal and communication skills

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**ELECTROPHYSIOLOGY- ANW**

**CONTACTS**

<table>
<thead>
<tr>
<th>Rotation Directors</th>
<th>612-863-3900</th>
<th><a href="mailto:Raed.abdelhadi@allina.com">Raed.abdelhadi@allina.com</a></th>
</tr>
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<tbody>
<tr>
<td>Raed Abdelhadi, M.D.</td>
<td>p612-654-0450</td>
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<tr>
<td>Rehan Karim, M.D.</td>
<td>612-873-2875</td>
<td><a href="mailto:Rehan.karim@hcmed.org">Rehan.karim@hcmed.org</a></td>
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<tr>
<td></td>
<td>p612-589-7532</td>
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<tr>
<td>Cardiology Program Coordinator</td>
<td>612-873-9990</td>
<td><a href="mailto:Cheryl.christenson@hcmed.org">Cheryl.christenson@hcmed.org</a></td>
</tr>
</tbody>
</table>
ANW – Site Coordinator
Meghan Hoover 612-863-3779 Meghan.hoover@allina.com

Important Phone Numbers
HCMC – Cath Lab 612-873-2962
ANW – EP Work Room 612-775-3221
ANW – EP Work Room 612-775-3219

LOCATION
Each rotation will primarily be based at the Minneapolis Heart Institute (MHI) of Abbott Northwestern Hospital with EP outpatient / device clinic exposure at Hennepin County Medical Center.

ANW
3rd floor of the Heart Hospital at MHI, room 3120 (EP work room)

HCMC
R5.250 (Red building, 5th floor. Skyway over Chicago Avenue)

HOURS
The device / EP clinic will be on Tuesdays at Hennepin County Medical Center and / or MHI.
EP case conference – Thursday 7:00-8:00 am ANW

GENERAL DESCRIPTION
Fellows are introduced to EP during the first half of the second year and again during the third year of their training. The rotations are composed of consultative electrophysiology, involvement in cardioversions, tilt table testing, pacemaker and implantable defibrillator interrogation and follow up in a dedicated pacemaker clinic setting, diagnostic electrophysiology studies and ablations, as well as insertion of temporary pacemakers.

Each Thursday morning, fellows are expected to participate in the didactic EP meeting where fellows will have a chance to present and discuss cases with the EP staff.

Also fellows are expected to present a Journal club during their rotation.

The EP service has a work-list on EPIC and the fellows will have access to that. The fellows will be assigned to see and follow patients by the EP attending on service.

Early during their rotation, fellows will be introduced to pacemaker and implantable defibrillator interrogation and follow up in a dedicated pacemaker clinic. This will allow fellows to feel comfortable with these devices during the rest of their rotation.

During their 3 weeks at the Minneapolis Heart Institute fellows will be primarily on the consultation service with the expectation that the fellows will follow their assigned patients throughout their hospitalization and participate in any procedure performed on these patients.
Fellows will have direct interaction with the EP staff on the consultation service as well as the EP staff performing any procedure on their patients.

Fellows will participate in Holter monitor reading.

Fellows are expected to observe at least 2-3 device implantations.

**CONFERENCES**

**General Required Conferences**
- Monday Minneapolis Heart Institute Foundation Grand Rounds
  7:00-8:00 AM, ANW Education Building, Watson Room
- Tuesday HCMC Cardiac Catheterization Laboratory Conference
  7:30-8:30 AM, HCMC, R5.252
- Thursday Core Curriculum Conference
  3:00-5:00 PM, HCMC or ANW as scheduled

**Rotation Specific Conferences**
- Thursday EP case conference
  7:00-8:00 AM, ANW

**LINES OF RESPONSIBILITY**

**Supervising Physician:** The faculty physician will assign specific fellow duties based on the individual fellow’s level of training and expertise. The faculty physician will verbally review the rotation expectations at the beginning of the month. The faculty physician will provide verbal feedback and a written evaluation at the end of the month. The faculty physician will monitor the fellow and review the fellow’s performance. The faculty physician will provide concise focused teaching sessions during weekly conferences or during performance and interpretation of laboratory studies, electrophysiology studies and pacemaker interrogation. The faculty physician and/or the fellow will discuss testing results with the patient and the patient’s family and provide appropriate documentation.

**Fellow:** The fellow will perform all required pre-procedure duties (ensure appropriate consent obtained, review labs, write pre-procedure orders, etc). The fellow will participate in cardioversions and tilt table tests as well as device interrogations depending on their level of training. Fellows will observe and perform invasive procedures under the supervision of the faculty physician in accordance with their level of training and expertise. The fellow is responsible for any necessary post-procedure care.

**LEARNING OBJECTIVES**

**Year 1**

- **Patient Care**
  - Gather appropriate information from patients with focused history / physical examination during inpatient / outpatient clinical encounters.
  - Identify signs / symptoms related to cardiac rhythm abnormalities from the history / physical examination.
  - Order appropriate diagnostic tests / therapeutic interventions under faculty supervision.
  - Ability of perform electrical cardioversion under faculty supervision.
- **Medical Knowledge**
  - Understand basic pathophysiology and clinical presentations of brady-arrhythmias and tachy-arrhythmias
- Ability to identify cardiac rhythm abnormalities on EKG
- Understand clinical pharmacology of antiarrhythmic drugs
- Understand indications for Cardiac Implantable Electronic Devices (CIEDs)

- Systems-based practice
  - Understand the importance of incorporating appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  - Understand the importance of working effectively with support staff and coworkers
  - Understand the importance of identifying and addressing financial, cultural, and social barriers to diagnostic and treatment recommendations

- Practice-based learning and improvement
  - Understand the importance of locating, appraising, and assimilating information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment
  - Understand the importance of developing familiarity with research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods

- Professionalism
  - Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  - Understand the importance of practicing within the scope of personal technical skills or expertise
  - Understand the importance of exhibiting sensitivity to patient preference and end-of-life issues

- Interpersonal and communication skills
  - Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  - Understand the importance of communicating diagnostic test results in a timely manner to primary and referring physicians
  - Understand the importance of engaging in shared decision-making with patients about their heart condition and the options for diagnosis and treatment

Year 2

- Patient Care
  - Ability of interpret data from diagnostic tests for patients presenting with cardiac rhythm abnormalities
  - Formulate management plan for patients presenting with cardiac rhythm abnormalities under faculty supervision.
  - Ability to identify and manage any complications of patients post EP procedures.

- Medical Knowledge
  - Understand basic terminologies for Cardiac Implantable Electronic Devices.
  - Ability to identify intracardiac electrograms from different cardiac chambers during EP study.
  - Interpret data from non-invasive electrophysiology diagnostic tests including Holter monitoring, Event monitoring and Tilt table testing.

- Systems-based practice
  - Demonstrate an ability to access and incorporate appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  - Demonstrate an ability to work effectively with support staff and coworkers
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- Interpersonal and communication skills
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  - Demonstrate an ability to communicate diagnostic test results in a timely manner to primary and referring physicians
  - Demonstrate an ability to engage in shared decision-making with patients about their heart condition and the options for diagnosis and treatment

Year 3

- Patient Care
  - Evaluate and manage patients with cardiac rhythm abnormalities in inpatient and outpatient settings.
  - Ability to place and troubleshoot temporary pacemaker.
  - Ability to interrogate CIEDs using a programmer.

- Medical Knowledge
  - Ability to interpret data from the interrogation of CIEDs
  - Understand indications and limitations of invasive and non-invasive diagnostic and therapeutic interventions in the management of patients with cardiac rhythm abnormalities.

- Systems-based practice
  - Consistently apply appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  - Consistently work effectively with support staff and coworkers
  - Consistently identify and address financial, cultural, and social barriers to diagnostic and treatment recommendations

- Practice-based learning and improvement
  - Consistently locate, appraise, and assimilate information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment
  - Consistently apply research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods

- Professionalism
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- Interpersonal and communication skills
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  2. Consistently communicate diagnostic test results in a timely manner to primary and referring physicians
  3. Consistently engage in shared decision-making with patients about their heart condition and the options for diagnosis and treatment

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**Systems-based practice**

| 1. Utilize a multidisciplinary coordinated approach for patient management, including transfer of care and employment related issues | X |

**Practice-based learning and improvement**

| 1. Identify competency gaps and engage in opportunities to achieve focused education and performance improvement | X |
| 2. Utilize decision support tools for accessing guidelines and pharmacologic information that the point-of-care | X |

**Professionalism**

| 1. exhibit sensitivity to patient preference and end-of-life issues | X |
| 2. Practice within the scope of personal expertise or technical skills | X |

**Interpersonal and communication skills**

| 1. Communicate with and educate patients and families across a broad range of cultural, ethnic, and socioeconomic backgrounds | X |
| 2. Be engaged in shared decision-making with patient’s about their condition and the options for diagnosis and treatment | X |
ELECTROPHYSIOLOGY - HCMC

CONTACTS

Rotation Directors
Rehan Karim, M.D. 612-873-2875  Rehan.karim@hcmed.org
p612-589-7532

Cardiology Program Coordinator
Cheryl Christenson 612-873-9990  Cheryl.christenson@hcmed.org

Important Phone Numbers
Omer Iqbal, MD 612-873-2875  omer.iqbal@hcmed.org
P612-530-4862
HCMC – Cath Lab 612-873-2962

LOCATION

Rotation will primarily be based at Hennepin County Medical Center.

HCMC
R5.250 (Red building, 5th floor. Skyway over Chicago Avenue)

HOURS

8:00am – 5:00 pm, Monday – Friday (hours variable)

GENERAL DESCRIPTION

Fellows are introduced to EP during the first half of the second year and again during the third year of their training. The rotations are composed of consultative electrophysiology, involvement in cardioversions, tilt table testing, pacemaker and implantable defibrillator interrogation and follow up in a dedicated pacemaker clinic setting, diagnostic electrophysiology studies and ablations, as well as insertion of temporary pacemakers.

Rotation Structure

The fellow rotating through EP service should report to Cardiac EP Staff physician on EP Lab / consult service. The EP-consult patient list can be found on EPIC. The fellows will be assigned to see and follow patients by the EP attending on service.
Early during their rotation, fellows will be introduced to pacemaker and implantable defibrillator interrogation and follow up in a dedicated pacemaker clinic. This will allow fellows to feel comfortable with these devices during the rest of their rotation. The device / EP clinic will be on Tuesdays at Hennepin County Medical Center.

For inpatient EP consults, it is encouraged that the fellows follow their assigned patients throughout their hospitalization and participate in any procedure performed on these patients.

Fellows will have direct interaction with the EP staff on the consultation service as well as the EP staff performing any procedure on their patients.

Fellows will also participate in cardioversions and tilt table tests.

Fellows will participate in temporary pacemaker insertion.

Fellows will participate in Holter monitor reading.

Fellows are expected to attend and participate in some of the diagnostic electrophysiology studies and ablations performed on their patients.

Fellows are expected to observe at least 2-3 device implantations.

EP topics listed in the Medical Knowledge section below will be discussed during the rotation with the fellow. It is also expected that the fellow would refer to EP text / journals to enhance understanding of these topics.

Fellows will be asked to present a Journal club during their rotation.

**CONFERENCES**

**General Required Conferences**
- **Monday**  
  Minneapolis Heart Institute Foundation Grand Rounds  
  7:00-8:00 AM, ANW Education Building, Watson Room
- **Tuesday**  
  HCMC Cardiac Catheterization Laboratory Conference  
  7:30-8:30 AM, HCMC, R5.252
- **Thursday**  
  Core Curriculum Conference  
  12:30-3:30 PM, HCMC or ANW as scheduled

**Rotation Specific Conferences**
- **Friday**  
  EP Conference held in collaboration with University of Minnesota  
  7:30-9:30 AM, University of Minnesota Campus

**LINES OF RESPONSIBILITY**

**Supervising Physician**: The faculty physician will assign specific fellow duties based on the individual fellow’s level of training and expertise. The faculty physician will verbally review the rotation expectations at the beginning of the month. The faculty physician will provide verbal feedback and a written evaluation at the end of the month. The faculty physician will monitor the fellow and review the fellow’s performance. The faculty physician will provide concise focused teaching sessions during weekly conferences or during performance and interpretation of laboratory studies, electrophysiology studies and pacemaker interrogation. The faculty physician and/or the fellow will discuss testing results with the patient and the patient’s family and provide appropriate documentation.
**Fellow:** The fellow will perform all required pre-procedure duties (ensure appropriate consent obtained, review labs, write pre-procedure orders, etc). The fellow will participate in cardioversions and tilt table tests as well as device interrogations depending on their level of training. Fellows will observe and perform invasive procedures under the supervision of the faculty physician in accordance with their level of training and expertise. The fellow is responsible for any necessary post-procedure care.

**LEARNING OBJECTIVES**

**Year 1**

- **Patient Care**
  - Gather appropriate information from patients with focused history / physical examination during inpatient / outpatient clinical encounters.
  - Identify signs / symptoms related to cardiac rhythm abnormalities from the history / physical examination.
  - Order appropriate diagnostic tests / therapeutic interventions under faculty supervision.
  - Ability of perform electrical cardioversion under faculty supervision.

- **Medical Knowledge**
  - Understand basic pathophysiology and clinical presentations of brady-arrhythmias and tachy-arrhythmias
  - Ability to identify cardiac rhythm abnormalities on EKG
  - Understand clinical pharmacology of antiarrhythmic drugs
  - Understand indications for Cardiac Implantable Electronic Devices (CIEDs)

- **Systems-based practice**
  - Understand the importance of incorporating appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  - Understand the importance of working effectively with support staff and coworkers
  - Understand the importance of identifying and addressing financial, cultural, and social barriers to diagnostic and treatment recommendations

- **Practice-based learning and improvement**
  - Understand the importance of locating, appraising, and assimilating information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment
  - Understand the importance of developing familiarity with research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods

- **Professionalism**
  - Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  - Understand the importance of practicing within the scope of personal technical skills or expertise
  - Understand the importance of exhibiting sensitivity to patient preference and end-of-life issues

- **Interpersonal and communication skills**
  - Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  - Understand the importance of communicating diagnostic test results in a timely manner to primary and referring physicians
Understand the importance of engaging in shared decision-making with patients about their heart condition and the options for diagnosis and treatment.

### Year 2

- **Patient Care**
  - Ability of interpret data from diagnostic tests for patients presenting with cardiac rhythm abnormalities
  - Formulate management plan for patients presenting with cardiac rhythm abnormalities under faculty supervision.
  - Ability to identify and manage any complications of patients post EP procedures.

- **Medical Knowledge**
  - Understand basic terminologies for Cardiac Implantable Electronic Devices.
  - Ability to identify intracardiac electrograms from different cardiac chambers during EP study.
  - Interpret data from non-invasive electrophysiology diagnostic tests including Holter monitoring, Event monitoring and Tilt table testing.

- **Systems-based practice**
  - Demonstrate an ability to access and incorporate appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
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### Year 3

- **Patient Care**
  - Evaluate and manage patients with cardiac rhythm abnormalities in inpatient and outpatient settings.
  - Ability to place and troubleshoot temporary pacemaker.
  - Ability to interrogate CIEDs using a programmer.
• Medical Knowledge
  o Ability to interpret data from the interrogation of CIEDs
  o Understand indications and limitations of invasive and non-invasive diagnostic and therapeutic interventions in the management of patients with cardiac rhythm abnormalities.
• Systems-based practice
  o Consistently apply appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
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INPATIENT CARDIOLOGY CONSULTATIONS-ANW

CONTACTS

Rotation Directors
Quirino Orlandi, M.D. 612-863-3900 Quirino.orlandi@allina.com 612-654-7610
Kevin Harris, M.D. 612-873-3900 Kevin.harris@allina.com 612-654-7864

ANW - Site Coordinator
Meghan Hoover 612-863-3779 Meghan.hoover@allina.com

Important Phone Numbers
Minneapolis Heart Inst. 612-863-3900
Special Diagnostics 612-775-4200

LOCATION

Minneapolis Heart Institute, 3rd floor, suite 300

HOURS

Hours: Mon – Fri; (8- 6pm), Saturday (8-4pm), Sunday (8-4pm)

GENERAL DESCRIPTION

Fellows will round five days a week and on scheduled Saturdays on the inpatient consultative service. Working directly with a faculty member, the fellow will be exposed to a wide variety of cardiovascular disease representative for a typical inpatient consultative subspecialty service. In addition to rounding on the inpatient services, the fellow will be expected to attend Monday morning Cardiology Grand Rounds conference, a monthly valve conference, weekly echocardiography conference, and weekly core curriculum conferences.

The inpatient rotation at ANW provides a busy broad exposure to all aspects of cardiology. At any one time the patient mix will vary but in general would include approximately acute coronary care (40%), post-operative care (30%) and consultative cardiology (30%).

CONFERENCES

General Required Conferences

Monday Minneapolis Heart Institute Foundation Grand Rounds
7:00-8:00 AM, ANW Education Building, Watson Room

Tuesday HCMC Cardiac Catheterization Laboratory Conference
7:30-8:30 AM, HCMC, R5.252

Thursday Core Curriculum Conference
3:00-5:00 PM, HCMC or ANW as scheduled
Rotation Specific Conferences

Valve conference: (Monthly, Time Variable, Echo conference room)

Echo conferences: (weekly)

LINES OF RESPONSIBILITY

Supervising Physician: The faculty physician will assign specific fellow duties based on the individual fellow’s level of training and expertise. The faculty physician will verbally review the rotation expectations at the beginning of the month. The faculty physician will provide verbal feedback and a written evaluation at the end of the month. The faculty physician will provide concise focused teaching sessions during weekly conferences or during performance and interpretation of laboratory studies. The faculty physician and/or the fellow will discuss testing results with the patient and the patient’s family and provide appropriate documentation.

Fellow: The fellow will perform all required pre-procedure duties (ensure appropriate consent obtained, review labs, write pre-procedure orders, etc). The faculty physician and/or the fellow will discuss testing results with the patient and the patient’s family and provide appropriate documentation.

LEARNING OBJECTIVES

Acute coronary care: These patients are either patients referred from outlying hospitals or present to ANW with acute myocardial infarction or other acute coronary syndromes and congestive heart failure. The consultant’s role is the immediate stabilization of the patient in the intensive care unit or telemetry floor.

Procedures may include placement of pulmonary artery catheters, temporary pacemakers and cardioversions. Congestive heart failure and cardiac transplant patients may be directed towards the heart failure team under the direction of Dr. Feldman.

Post-operative care: All patients operated on at ANW are jointly seen by both the cardiology and cardiovascular surgery teams. The patients on this service include those with coronary artery bypass, valve and aortic surgery, including aortic dissection. General principles involved in post-operative care are stressed on this rotation. Fellows get exposure to the patients immediately post-operatively in the intensive care unit and on the telemetry floor.
Consultative cardiology: Patients on general medicine or general surgery services often require consultative advice. These patients may include pre-operative evaluation new diagnoses including chest pain, arrhythmias and congestive heart failure.

Year 1

- **Patient Care**
  - Evaluate and diagnose patients with ST elevation myocardial infarction, and initiate appropriate reperfusion therapy within guideline time limits under supervision
  - Risk stratify patients with non ST elevation myocardial infarction and initiate appropriated pharmacologic therapy under supervision
  - Evaluate and manage patients with new onset, chronic, and acute decompensated heart failure under supervision
  - Evaluate and manage patients with supraventricular arrhythmias including atrial fibrillation and flutter in a hemodynamically stable patient and identify potentially unstable patients
  - Appropriately apply and use Transcutaneous pacemaker for patients with unstable bradyarrhythmias for temporary stabilization under supervision

- **Medical Knowledge**
  - Understand the pathophysiology of ACS, know disorders that can simulate or mask ACS and the various risk assessment tools
  - Know the indications, contraindications, and risks of reperfusion therapies for ST elevation MI and the clinical, ECG, and angiographic signs of reperfusion
  - Know the characteristic history and physical exam findings-and their limitations - in evaluation of heart failure syndromes
  - Understand basic electrophysiology in the diagnosis of rhythm disturbances, know the pathophysiology, differential diagnosis, and clinical significance of narrow QRS tachycardia’s including atrial fibrillation and flutter

- **Systems-based practice**
  - Understand the importance of incorporating appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  - Understand the importance of working effectively with support staff and coworkers
  - Understand the importance of identifying and addressing financial, cultural, and social barriers to diagnostic and treatment recommendations

- **Practice-based learning and improvement**
  - Understand the importance of locating, appraising, and assimilating information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment
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- **Professionalism**
  - Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
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• Patient Care
  o Recognize and treat hemodynamic disturbances (including hypotension, low cardiac output, heart failure, acute pulmonary edema, mechanical complications of MI and shock) under supervision
  o Evaluate and manage patients with atrial fibrillation and flutter (including rate and rhythm control and anticoagulation strategies) in unstable patient using electrical and pharmacologic cardioversion under supervision.
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  o In non-ST elevation MI, appropriately risk stratify patient for an initial invasive versus ischemia guided strategy for angiography and revascularization under supervision
  o Select appropriate testing and integrate results with clinical findings in the evaluation and management of patients with valvular heart disease, particularly in the setting of heart failure
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### INPATIENT CARDIOLOGY CONSULTATIONS – HCMC

#### CONTACTS

**Rotation Director**  
Steven Goldsmith, M.D.  
612-873-2875  
spgoldsmithmd@gmail.com  
p612-336-0360

**Cardiology Program Coordinator**  
Cheryl Christenson  
612-873-9990  
Cheryl.christenson@hcmed.org

**Important Phone Numbers**  
- Echo Lab  
  612-873-2885
- Echo Reading Room  
  612-873-8522
- Cath Lab  
  612-873-2962
- Clinic  
  612-873-3459
- ECG  
  612-873-2880
- Nuclear Lab  
  612-873-2764
LOCATION

Rounds Location: Daily rounds will always involve the CARE and CMIC units as well as the MICU and SICU. Starting point will be determined by the dictates of the day.

HOURS

Rounds: The fellow should be in-house by 7:30 AM to meet with the resident team, triage new consults and organize the follow-up schedule for the old patients. Rounds will generally be at 9-9:30 with Staff, depending on volume and acuity of the service. On weekdays there will be a break from 11:30-1:30 for conferences, lunch and AM note preparation. Volume permitting, afternoon rounds should be 1:30 to 4:00PM to allow notes to be completed in a timely fashion. On weekends, rounds will simply continue until complete. Urgent consults requiring immediate decisions called in after rounds will be staffed the same day, others may be seen by the fellow and/or resident with staffing the next AM. All patients will be staffed within 24 hours of the consultation.

The objective of on-call activities is to provide fellows with continuity of patient care experiences throughout a 24-hour period. In-house call is defined as those duty hours beyond the normal workday when fellows are required to be immediately available at HCMC.

1. There is no in-house call.

2. The frequency of at-home call must not be so frequent as to preclude rest and reasonable personal time for each fellow. Fellows taking at-home call are provided with 1 day in 7 completely free from all educational and clinical responsibilities, averaged over a 4-week period.

3. When fellows are called into HCMC or the Abbott Northwestern site from home, the hours spent in-house are counted toward the 80-hour limit.

GENERAL DESCRIPTION

The Inpatient Cardiology Consultation Service at HCMC is responsible for providing comprehensive cardiovascular consultative services to all patients at HCMC. The consult team, supervised by a faculty member, rounds on a daily basis in the hospital seeing new consultations and following-up on old consultations. All patients on Medicine and other services have a primary attending physician. Consultative activity will, however, include active co-management in the cases where the patient’s primary or sole problem is cardiac, or in the setting of acute cardiovascular complications in patients ill with other problems or trauma. Diagnostic and treatment recommendations are made to the referring teams after thoroughly evaluating each patient. Fellows are responsible for making triage decisions about new consultations and assigning them to various members of the team. Each day, the fellow is responsible for organizing the team’s activities, assisting team members in assimilating information, establishing a problem list and developing a treatment plan. The fellow also helps prepare other team members for their oral presentation to the attending physician and is responsible for educational activities including bedside teaching, procedures, history taking, physical examination skills and didactic sessions on common problems encountered on the consult service. Coordination of inpatient care with cardiology laboratory procedures is also a key function of the inpatient consult fellows. Fellows will also be involved along with the ICU fellows in the placement of Swan-Ganz catheters and interpretation of bedside hemodynamic data on critically ill patients.

The faculty staff physician is ultimately responsible for the timeliness and quality of the cardiology consultations. In general, patients will be evaluated first by residents and/or students, but some may require initial evaluation by the fellow, alone or in tandem with residents. At times, acuity will dictate that the entire team be present from the point of initial contact (i.e. ED or ICU emergencies). In general, however, the fellow will triage the patient assignments, and make initial assessments and
plans, to be implemented pending discussion with staff. Depending on volume, fellows may prepare the written notes on some patients on their own, but most will be assigned to the resident seeing the patient. All patients will have a written, reviewed, finalized and signed consultation within 24 hours of the requested consultation. Daily notes will be made on follow-ups as needed.

**CONFERENCES**

**General Required Conferences**

- **Monday** Minneapolis Heart Institute Foundation Grand Rounds  
  7:00-8:00 AM, ANW Education Building, Watson Room
- **Tuesday** HCMC Cardiac Catheterization Laboratory Conference  
  7:30-8:30 AM, HCMC, R5.252
- **Thursday** Core Curriculum Conference  
  3:00-5:00 PM, HCMC or ANW as scheduled

**Rotation Specific Conferences**

- **Wednesday** Cardiology Clinical Conference – 4th Wednesday of each month  
  12:00-1:00 PM, RL.110
- **Friday** Cardiac Imaging Conference  
  TBA (HCMC)

**LINES OF RESPONSIBILITY**

**Supervising Faculty Physician:** The faculty physician is responsible for the assignment of patient care and for supervision of the fellow’s management of the patients. The faculty physician will review the rotation expectations at the beginning of the rotation. The faculty physician will provide verbal feedback and a written evaluation at the end of each rotation. The faculty physician will conduct daily management rounds which will include brief bedside focused discussion. The faculty physician will be readily available and easily contacted by the fellow to discuss patient care or other issues related to the rotation.

**Fellow:** The fellow is responsible for the daily management of all patients on the Cardiology Consultation Service. The fellow will review overnight issues and new admissions with the house staff on the Cardiology Consultation team prior to morning rounds. The fellow will also receive and triage all consult requests and begin the initial management of these patients. The fellow will assist the house staff in performing necessary procedures. The fellow will either provide adequate documentation of patient care or ensure that house staff notes are complete and accurate. The fellow will supervise all house staff members on his or her assigned team.

**LEARNING OBJECTIVES**

The general objective of this rotation is for the fellow to become well versed in the full range of consultative cardiology, as well as the active co-management(with primary care or ICU specialists) of those patients whose primary reason for admission is cardiac or who have severe cardiac problems complicating a non-cardiac illness or injury. Additional objectives include development of leadership skills in directing a consultative team, and development of teaching skills through interaction with house staff and students.

**Year 1**

- **Patient Care**
  - Evaluate and diagnose patients with ST elevation myocardial infarction, and initiate appropriate reperfusion therapy within guideline time limits under supervision
- Risk stratify patients with non ST elevation myocardial infarction and initiate appropriated pharmacologic therapy under supervision
- Evaluate and manage patients with new onset, chronic, and acute decompensated heart failure under supervision
- Evaluate and manage patients with supraventricular arrhythmias including atrial fibrillation and flutter in a hemodynamically stable patient and identify potentially unstable patients
- Appropriately apply and use Transcutaneous pacemaker for patients with unstable bradyarrhythmias for temporary stabilization under supervision

- **Medical Knowledge**
  - Understand the pathophysiology of ACS, know disorders that can simulate or mask ACS and the various risk assessment tools
  - Know the indications, contraindications, and risks of reperfusion therapies for ST elevation MI and the clinical, ECG, and angiographic signs of reperfusion
  - Know the characteristic history and physical exam findings-and their limitations - in evaluation of heart failure syndromes
  - Understand basic electrophysiology in the diagnosis of rhythm disturbances, know the pathophysiology, differential diagnosis, and clinical significance of narrow QRS tachycardia’s including atrial fibrillation and flutter

- **Systems-based practice**
  - Understand the importance of incorporating appropriate use criteria, risk-benefit, safety, and cost containment considerations in clinical decision-making
  - Understand the importance of working effectively with support staff and coworkers
  - Understand the importance of identifying and addressing financial, cultural, and social barriers to diagnostic and treatment recommendations

- **Practice-based learning and improvement**
  - Understand the importance of locating, appraising, and assimilating information from scientific studies, guidelines, and registries in order to identify knowledge and performance gaps related to patients referred for diagnostic evaluation and/or treatment
  - Understand the importance of developing familiarity with research methodology in cardiovascular disease including relevant clinical trials, outcomes research, and statistical methods

- **Professionalism**
  - Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  - Understand the importance of practicing within the scope of personal technical skills or expertise
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- **Interpersonal and communication skills**
  - Understand the importance of communicating well with other members of the health care team, families and patients across a broad range of cultural, ethnic, and socioeconomic backgrounds in a professional and compassionate manner
  - Understand the importance of communicating diagnostic test results in a timely manner to primary and referring physicians
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Year 2

- **Patient Care**
  - Recognize and treat hemodynamic disturbances (including hypotension, low cardiac output, heart failure, acute pulmonary edema, mechanical complications of MI and shock) under supervision
  - Evaluate and manage patients with atrial fibrillation and flutter (including rate and rhythm control and anticoagulation strategies) in unstable patient using electrical and pharmacologic cardioversion under supervision.
  - Evaluate and manage patients with ventricular arrhythmias including unstable patients under supervision
  - In non-ST elevation MI, appropriately risk stratify patient for an initial invasive versus ischemia guided strategy for angiography and revascularization under supervision.
  - Select appropriate testing and integrate results with clinical findings in the evaluation and management of patients with valvular heart disease, particularly in the setting of heart failure
  - Appropriately apply and use Transcutaneous pacemaker for patients with unstable bradyarrhythmias for temporary stabilization independently
  - Interpret hemodynamic data from Swan-Ganz catheter and make appropriate treatment changes with supervision

- **Medical Knowledge**
  - In non-ST elevation MI, Know the relative risks and benefits of an initial invasive versus and ischemia guided strategy for angiography and revascularization
  - Know the indications, clinical pharmacology and adverse effects of drugs used for the treatment of rhythm disturbances and know the pathophysiology, differential diagnosis, and clinical significance of Wide QRS tachycardia’s
  - Know the indications for, and clinical pharmacology of, drugs used for treatment of heart failure, including adverse effects and use in special populations
  - know the causes and distinguishing characteristics of acute versus chronic mitral and aortic regurgitation
  - Know the etiology, natural history, physical findings, differential diagnosis, complications and treatment of native valve and prosthetic valve endocarditis

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Year 3

• Patient Care
  o Recognize and treat hemodynamic disturbances (including hypotension, low cardiac output, heart failure, acute pulmonary edema, mechanical complications of MI and shock) independently
  o Evaluate and manage patients with atrial fibrillation and flutter (including rate and rhythm control and anticoagulation strategies) in unstable patient using electrical and pharmacologic cardioversion independently
  o Evaluate and manage patients with ventricular arrhythmias including unstable patients independently
  o Identify patient with acute valvular failures and promptly stabilize with medical therapy and IAABP as necessary until surgery
  o In non-ST elevation MI, appropriately risk stratify patient for an initial invasive versus ischemia guided strategy for angiography and revascularization independently
  o Appropriately apply and use Transcutaneous pacemaker for patients with unstable bradyarrhythmias for temporary stabilization independently
  o Interpret hemodynamic data from Swan-Ganz catheter and make appropriate treatment changes independently

• Medical Knowledge
  o Be proficient in the relative risks and benefits of an initial invasive versus ischemia guided strategy for non ST elevation myocardial infarction including landmark trials
  o Know beyond basic electrophysiology and have in-depth knowledge of clinical pharmacology and adverse effects of drugs used for the treatment of rhythm disturbances and know the various algorithms in the differential diagnosis of Wide QRS tachycardia’s including pre-excited atrial fibrillation
  o Know landmark trials in the pharmacologic management of chronic heart failure and their limitations
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  o Know the etiology, natural history, physical findings, differential diagnosis, complications and treatment of native valve and prosthetic valve endocarditis
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**ELECTIVE/QUALITY ROTATION**

**CONTACTS**

Rotation Director/Cardiology Program Director
Bradley Bart, M.D.  612-873-2875  Bartx006@umn.edu  p612-336-0934

Cardiology Program Coordinator
Cheryl Christenson  612-873-9990  Cheryl.christenson@hcmed.org

**LOCATION**
Activities based at both HCMC and ANW

**HOURS**
Variable

**GENERAL DESCRIPTION**
To be arranged individually

This elective rotation of the fellows to focus on clinical areas of interest and/or systems based problems. Schedules can be individualized to include experiences in specialty clinics and conferences. Computerized databases can be used as a resource to identify clinical practice or systems based problems and to develop improvement activities.

**CONFERENCES**
General Required Conferences

Monday Minneapolis Heart Institute Foundation Grand Rounds
7:00-8:00 AM, ANW Education Building, Watson Room

Tuesday HCMC Cardiac Catheterization Laboratory Conference
7:30-8:30 AM, HCMC, R5.252
**JOURNAL CLUB**

In this activity fellows will lead structured discussions related to scientific papers of importance related to cardiovascular disease and patient care. Fellows will be required to:

A. Locate information including scientific papers of importance related to cardiovascular disease and patient care - papers to be presented at Journal Club will be selected based on the fellows' review of recently reported studies at national conferences or current cardiology journals online or in the biomedical library.

B. Use information technology to prepare for the structured discussions related to papers that will be discussed in Journal Club. This may be accomplished by:
   - Performing data extractions from Hennepin County Medical Center’s electronic health record (EPIC) to describe the number, demographics and characteristics of patients with the condition to be discussed
   - Perform Medline searches to review other papers related to the paper to be discussed
   - Review best practices described by professional organization such as the American College of Cardiology and the American Heart Association on their websites

C. Appraise information from the scientific papers under discussion during Journal Club. Fellows will develop a systematic approach to reviewing the quality of a scientific paper including:
   - The paper’s novelty and relevance
   - Whether the study design was appropriate to answer the study question
   - Whether the methods and the intervention were appropriate
   - Whether the data were appropriately analyzed
   - The internal and external validity of the results
   - Ethically appropriate

Critical appraisal of papers discussed in Journal Club may be structured based on approaches published in JAMA's series "User's guide to the medical literature" or an online user’s guide developed by the Centre for Health Evidence in Canada (http://www.cche.net/main.asp)

D. Assimilate evidence information to place the scientific paper under review in the context of other publications. Fellows will use information technology to present the findings of the paper under review as they relate to other papers and current practices. This information will be assimilated from:
   - Online textbooks such as UpToDate
   - Medline searches of other related articles
Published guidelines and recommendations from professional organizations such as the American Heart Association and the American College of Cardiology

E. Apply information to patient care - based on the structured review of the chosen paper during Journal Club, fellows will discuss the appropriateness and applicability of the topic to patient care in their daily practice.

ECG REVIEW

ECGs will be reviewed individually and with faculty assistance. Tracings will include real-time clinical studies, archived tracings from a teaching file, and tracings from Board review materials.

CARDIAC AUSCULTATION

Sophisticated and expensive cardiac diagnostic technology has contributed to the ever-increasing cost of healthcare. The bedside skill of cardiac auscultation has become even more important with the advent of managed care and its search for more cost-effective use of technology. Far too often, this enjoyable, challenging and often rewarding skill is put aside by competing cardiac diagnostic technology, and too little time is spent teaching and testing it to physicians in training. Auscultation sessions are periodically provided using an infrared sound system to transmit recorded patient heart sounds to stethoscopes worn by each attendee.

Many sessions included classical music to demonstrate various cardiac lesions such as Mendelssohn’s Symphony No.4, Italian Symphony for aortic stenosis, and various parts of Delibes Ballet Coppelia for aortic insufficiency and mitral stenosis.

CARDIOLOGY GRAND ROUNDS

Fellows will be required to attend all cardiology grand Rounds conferences either in person or through videoconferencing. This is a clinically based conference with invited speakers who are experts in their fields. This conference takes place Mondays at 7 AM at ANW Hospital.

CARDIAC CATHETERIZATION CONFERENCE

This is a case based clinical conference every Tuesday morning at HCMC highlighting evidence based medicine and implementation of new guidelines in regards to treatment, outcome, and quality. Clinical cases and recent advancements from scanning the literature will be grouped into topics, and local experts in those topics will be identified and invited as speakers or moderators of discussion.

CONFERENCE SCHEDULE

General Required Conferences

<table>
<thead>
<tr>
<th>Day</th>
<th>Event</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>Minneapolis Heart Institute Foundation Grand Rounds</td>
<td>7:00-8:00 AM</td>
<td>ANW Education Building, Watson Room</td>
</tr>
<tr>
<td>Tuesday</td>
<td>HCMC Cardiac Catheterization Laboratory Conference</td>
<td>7:30-8:30 AM</td>
<td>HCMC, R5.252</td>
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<tr>
<td>Thursday</td>
<td>Core Curriculum Conference</td>
<td>12:30-2:30 PM</td>
<td>HCMC or ANW as scheduled</td>
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<td></td>
<td>Independent Study</td>
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</table>
Rotation Specific Conferences

In each rotation description.

RESEARCH

All fellows will be required to participate in scholarly activities. The schedule allows for research performed concurrently with clinical activities as well as up to six months dedicated research time split between years two and three. The Program Director will assign research advisers for all fellows during their first year. These advisers will meet with their fellows semiannually and these meetings will be recorded by the fellowship coordinator. The Program Director's office will also record the nature of all scholarly activities and academic productivity in terms of projects, clinical trials, grants, abstracts, presentations, papers and book chapters.

In addition to specific research activities, all fellows will participate in a Journal Club and a Research Conference held during the Thursday core sessions. Research skills taught as part of the curriculum include critical review of the literature, clinical trial design, hypothesis testing and ethical concerns in human subject research.

There are many opportunities for scholarly activities based at both clinical sites.

HCMC site

HCMC has its own research foundation (the Minneapolis Medical Research Foundation). MMRF was established in 1952, is the third largest non-profit research institution in Minnesota and ranks in the top 7 percent nationally of all institutions receiving research grants from the NIH. The MMRF supports the work of more than 200 investigators, including MDs, MD/PhDs, and PhDs, and administers approximately $20 million in research funds annually. The Human Subjects Research Committee serves as the Institutional Review Board (IRB) for the MMRF and HCMC. The MMRF has an Office of Grants and Contracts as well as a Clinical Trials Training Office (CTTO). The CTTO provides a centralized office for the guidance and facilitation of the clinical research process. Fellows and faculty have access to the resources of the CTTO and all the offices of MMRF to enhance opportunities in the area of clinical research.

The cardiology faculty at HCMC has a long tradition of research. Many clinical trials have been performed or are ongoing in the areas of acute coronary syndromes, atrial fibrillation, acute and chronic heart failure, lipid management, hypertension, and sleep apnea. The Chronic Disease Research Group (CDRG) is also based at MMRF and has experience in claims data analysis and expertise in the area of cardiovascular disease in patients with chronic kidney disease.

HCMC is the coordinating center for the Minnesota Heart Failure Consortium. This group represents 11 major cardiology practices across the state. It coordinates clinical trials and educational activities and served as one of 9 Regional Coordinating Centers (RCCs) for the NHLBI Heart Failure Clinical Trials Network.

Abbott Northwestern Hospital (ANW) site.

In 1982, the cardiologists of the Minneapolis Heart Institute at Abbott-Northwestern Hospital established their own research foundation (the Minneapolis Heart Institute Foundation - MHI) to improve heart health through research that evaluates leading-edge therapy and diagnostic methods. Currently, the Minneapolis Heart Institute Foundation has established ten Centers of Distinction focusing on specific heart health issues. These Centers of Distinction have produced many significant advancements in patient care. For example, the Level One program provided data to develop a standardized protocol for patients that present in the emergency room with an ongoing heart attack. Upon implementation, this protocol resulted in one of the highest survival rates in the country. The MHI Foundation cardiologists also participated in establishing American College of Cardiology guidelines for the diagnosis of hypertrophic cardiomyopathy and peripheral arterial disease as well as the guidelines for cardiovascular screening of athletes.

The MHI Foundation is at the forefront of emerging stem cell technology and was designated by the National Institute of Health as a Cardiovascular Stem Cell Research Center, a distinction shared by only four other institutions.
The MHI Foundation researchers conduct over 100 studies annually and input information into 24 databases and registries. Additionally, Minneapolis Heart Institute Foundation researchers have reported results in over 100 peer reviewed publications and in more than 130 presentations at major conferences.

**EVALUATIONS**

The weekly staff cardiologist will monitor the fellow and review the fellow’s performance with ad hoc feedback as necessary. Formal review of the fellow’s performance will occur by the rotation director at the end of the month after consultation with all faculty working with the fellow that month.

<table>
<thead>
<tr>
<th>Assessment Tool</th>
<th>PC</th>
<th>MK</th>
<th>PBLI</th>
<th>ICS</th>
<th>PR</th>
<th>SBP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direct Observation of Procedural Skills – DOPS</strong> -Echocardiography rotations (1/year) -Cardiac Catheterization rotations (1/year)</td>
<td>X</td>
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<tr>
<td><strong>Global Assessment</strong></td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>-End of rotation evaluation (every month) -achievement of milestones</td>
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<tr>
<td><strong>Case/procedure Log Book (2/year)</strong></td>
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<tr>
<td><strong>Simulation Models (once during Fellowship)</strong></td>
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<tr>
<td>-Temporary pacemaker placement</td>
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<tr>
<td>-Swan Ganz Catheter placement</td>
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<tr>
<td>-Pericardiocentesis</td>
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<tr>
<td><strong>In Service Training Examination</strong></td>
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<tr>
<td>- (years two and three)</td>
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<tr>
<td><strong>Record/Chart review</strong></td>
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<tr>
<td>-Continuity Clinic (1/year)</td>
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<tr>
<td><strong>Direct Observation of Presenting Skills</strong></td>
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<tr>
<td>-Journal Club Evaluation (at least 2/year)</td>
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<tr>
<td><strong>Mini-CEX</strong></td>
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<tr>
<td>-Continuity Clinic (2/year)</td>
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<tr>
<td>-Inpatient Cardiology Consultation rotation (2/year)</td>
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</tbody>
</table>
### Multisource Assessment

- Continuity Clinic (2/year)  
- Echocardiography rotations (2/year)  
- Cardiac Catheterization rotations (2/year)

### Role Play/Simulation

- Communication bad news (once during Fellowship)

### Project Assessment

- Program Improvement Activity (once during fellowship)

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#### PERFORMANCE IMPROVEMENT ACTIVITY

**Performance Improvement Activity**

Fellows will serve for at least one year on either the acute myocardial infarction core measures working group or the heart failure core measures working group. These working groups report to the hospital Medical Executive Committee and the Interdisciplinary Quality/Systems Committee semiannually and work to improve quality through achieving targeted goals for core measures in the specified patient populations. Fellows will attend the working group meetings. In addition, they will actively participate in the review of core measures data and assist in implementing plans to improve performance measures.

The acute myocardial infarction and heart failure core measures working groups meet on a monthly to quarterly basis. Their main function is to improve overall care by providing the best medical practices. Aggregate data from HCMC and other academic medical centers are provided by the University HealthSystem Consortium (UHC). UHC tracks performance on core measures for over 100 participating academic medical centers and over 240 affiliated hospitals.

Measurable improvements will be recorded and tracked by the Performance Management Improvement hospital team. This group abstracts key elements from patient charts and submits them to the University Hospital Consortium. These data are compiled every quarter and are reviewed by the heart failure and acute myocardial infarction core measures working groups.

**Acute myocardial infarction, core measures include:**

1. Aspirin Prescribed at Discharge
2. ACEI or ARB for LVSD
3. Smoking Cessation Advice/Counseling
4. Beta-Blocker Prescribed at Discharge
5. Median Time to Fibrinolysis
6. Fibrinolytic Therapy Received Within 30 Minutes of Hospital Arrival
7. Median Time to Primary PCI
8. Primary PCI Received Within 90 Minutes of Hospital Arrival
9. Inpatient Mortality
10. Statin Prescribed at Discharge

For heart failure, the key performance measure assessed is the percentage of heart failure patients readmitted within 30 days of discharge from a heart failure admission.

The Performance Measurement Improvement Department generates reports in such a way that trends over time can be tracked and the influence of various interventions can be directly related to changes in performance measures. Improvements in patient care are easily identified by the tracking system and will be of great value to the fellows with respect to exposing them to systems based approaches.

**AMBULATORY PATIENT SELF REVIEW ACTIVITY (APSRA)**

All fellows will participate in an annual Ambulatory Patient Self Review Activity in which they will perform a case review of their own notes generated from encounters in their continuity clinic. Fellows will evaluate the quality of the care they provide to their patients measured against published treatment guidelines and evidence based medicine.

Progress will be reported during the semiannual review with the Program Director. Completion of this activity will be required for promotion to the next year of training. This activity will achieve the practice-based learning and improvement objectives as described below:

1) Fellows will identify strengths, deficiencies, and limits in their knowledge and expertise (self-reflection and self-assessment). By performing a case review of their own continuity clinic patients, fellows will engage in self-reflection and self-assessment. Fellows will be expected to refer to evidence based medicine and published guidelines in order to critically appraise the quality of care they provide to their patients and identify strengths, deficiencies, and limits in their knowledge.

2) Fellows will set learning and improvement goals. Based on the case reviews of their own continuity clinic patients, fellows will execute a Plan Do Study Act (PDSA) cycle to create an intervention intended to address any deficiencies. The intervention will strive to conform to best practices described by guidelines developed by professional organizations including the American College of Cardiology and the American Heart Association.

3) Fellows will identify and perform appropriate learning activities to achieve self-identified goals. As part of the PDSA cycle, fellows will engage in appropriate learning activities to address any deficiencies identified by review of their own continuity clinic patients. These activities may include:
   - Medline searches on the internet for appropriate review articles,
   - Clinical trials and published guidelines;
   - Selection of a journal article to be reviewed in Journal Club;
   - Participation in a hospital quality improvement committee; or
   - Discussion of a case during one of the clinical conferences (Morbidity and Mortality, Clinical Cardiology, Cath Conference)

**KEY PROCEDURES AND DOCUMENTATION**

The table below is provided for reference. Fellows will be required to document procedures during the three-year training program. This can be accomplished on New Innovations/ RMS.
<table>
<thead>
<tr>
<th>Procedure</th>
<th>ACGME Required</th>
<th>COCATS Level I</th>
<th>COCATS Level II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Current Cardioversion*</td>
<td>10</td>
<td>20</td>
<td>NA</td>
</tr>
<tr>
<td>Echocardiography – TTE*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Perform</td>
<td>75</td>
<td>75</td>
<td>150</td>
</tr>
<tr>
<td>- Interpret</td>
<td>150</td>
<td>150 (3 mo)</td>
<td>300 (6 mo)</td>
</tr>
<tr>
<td>Advanced TTE 3D, Strain, IVUS</td>
<td></td>
<td></td>
<td>Requires level III training</td>
</tr>
<tr>
<td>Echocardiography – TEE</td>
<td>No number specified</td>
<td>Clinical exposure</td>
<td>25 intubations 50 studies (100 preferred)</td>
</tr>
<tr>
<td>TEE Intraoperative</td>
<td></td>
<td></td>
<td>Additional 100 intraoperative cases</td>
</tr>
<tr>
<td>Stress Echocardiography</td>
<td>No number specified</td>
<td>Clinical exposure</td>
<td>100</td>
</tr>
<tr>
<td>Exercise Stress Testing</td>
<td>50</td>
<td>200-300 recommended</td>
<td>NA</td>
</tr>
<tr>
<td>Cardiac Catheterization</td>
<td>100</td>
<td>100 (4 mo)</td>
<td>300 (6 mo)</td>
</tr>
<tr>
<td>Placement and management of temporary pacemakers</td>
<td>No number specified</td>
<td>5</td>
<td>NA</td>
</tr>
<tr>
<td>Programming and follow-up surveillance of permanent pacemakers and ICDs</td>
<td>No number specified</td>
<td>No number specified</td>
<td>100 CIED interrogations 25 remote interrogations</td>
</tr>
<tr>
<td>Electrocardiograms</td>
<td>3500</td>
<td>3000-3500 recommended</td>
<td>NA</td>
</tr>
<tr>
<td>Ambulatory ECG</td>
<td>No number specified</td>
<td>100-200 recommended</td>
<td>NA</td>
</tr>
<tr>
<td>SPECT myocardial perfusion studies*</td>
<td>100</td>
<td>100 (2 mo)</td>
<td>300 (4-6 mo) 700 work hours</td>
</tr>
</tbody>
</table>
Two pieces would be 3 weekdays + the adjacent weekend and 2 weekdays + the adjacent weekend (through two pieces would be 3 weekdays + the adjacent weekend and 2 weekdays + the adjacent weekend (this could be 4 weekdays and 1 weekday as well – the idea here is for 2 pieces).
Back-to-back vacations affecting two consecutive rotations may be approved only under exceptional circumstances, pending review by the Program Director. Two weeks' vacation from a single rotation would (in most cases) exceed 25% of the time devoted to that rotation, and, therefore, is not allowed. Requests for vacation must be made IN WRITING to the Program Director at least SIX WEEKS in advance of the proposed leave. This requirement is strictly enforced. Vacation requests must be approved by the Clinical Rotation Director from which the vacation is being taken and the Program Director.

The Fellow’s continuity clinic must be canceled with at least six weeks’ notice. Requests must be made in writing to the Continuity Clinic Director separately.

Time away from the hospital for academic leave and conferences may be granted in addition to regular vacation time. A fellow may be allowed a maximum of seven (7) calendar days off per year.