Advocate Lutheran General Hospital

Cardiovascular Disease Fellowship Program

2014 – 2015

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Cardiovascular Disease Fellowship Goals and Objectives

Updated August, 2014

Goals

The main objective of the Fellowship Training Program in Cardiovascular Disease is to provide an academically and clinically rigorous training program to give the trainee outstanding skills in general cardiology. The program is designed to provide basic and clinical knowledge, procedural skills, clinical judgment, professionalism and interpersonal skills required as accomplished specialists in the discipline of cardiovascular diseases. The ultimate goal is to produce competent cardiologists who can practice independently in either a private practice or academic center.

Education Requirements

The ALGH Cardiovascular Disease Fellowship program is structured to comply with the recommended training requirements outlined in the Guidelines for Training in Adult Cardiovascular Medicine Core Cardiology Training Symposium (COCATS-2) for each area of cardiovascular disease, published by the American College of Cardiology and the American Heart Association and within the framework of the ACGME Core Competencies. Fellows are expected to be familiar with these training guidelines and ensure that their training is aligned with their own personal educational objectives.

Program Basics

Advocate Lutheran General Hospital is a licensed 638-bed tertiary, quaternary care, academic and research hospital, which serves as the primary location for the cardiolovascular disease training program rotations.

The fellowship is a 36-month program, of which no fewer than 24months are dedicated to basic clinical training. Required curriculum rotations include the cardiac catheterization laboratory, CICU/Interventional Unit service, Consultative service, Electrophysiology, Heart Station, Heart Failure / Heart Transplant, Nuclear, Research and electives. In addition, outpatient competency clinic occurs for ½ day per week throughout the training duration at private provider offices adjacent to the main hospital environment. All fellows must complete a scholarly activity project during the course of the fellowship as a requirement for program completion.

Supervision

Supervision of the Cardiovascular Disease Fellowship Program is currently led by program director Stephen Smith, M.D.and by an active faculty of 14 attendings representing multiple cardiovascular disciplines and subspecialties. The fellowship is fully aligned with all Internal Medicine core program, institution, system and ACGME guidelines and policies.

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ACGME Core Competencies

The fellowship program requires its trainees to obtain competencies in the 6 areas below to the level expected of an independent practitioner.

Patient Care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health. This requires competency in patient care skills such as data gathering, appropriate use of diagnostic testing, clinical decision-making, appropriate use and performance of procedures, implementation of the therapeutic plan, and ability to work with others in the patient care process.

Medical Knowledge about established and evolving biomedical, clinical, and cognate (e.g. epidemiological and social-behavioral) sciences and the application of this knowledge to patient care.

Practice-Based Learning and Improvement that involves investigation and evaluation of their own patient care, appraisal and assimilation of scientific evidence, and improvements in patient care. Skills include the ability to analyze practice performance and implement necessary improvements, ability to locate and apply scientific evidence to the care of patients, ability to critically appraise the scientific literature, ability to use the computer to support learning and patient care, and ability to facilitate the learning of other health care professionals.

Interpersonal and Communication Skills that result in effective information exchange and teaming with patients, their families, and other health professionals. Skills include the ability to develop a therapeutic relationship with patients and their families, the ability to use both verbal and nonverbal skills to facilitate communication with patients and their families, and the ability to work effectively within teams and as team leader.

Professionalism, as manifested through a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population. Facets of professionalism include integrity, honesty, and willingness to accept responsibility, acting in the interest of the patient and respecting his/her autonomy, sensitivity toward patient's ethnicity, age and disabilities. Professional requirements for fellows will be closely monitored. Occurrences of unprofessional behavior or actions can and will result in punitive consequences at the discretion of the Program Director.

Systems-Based Practice, as manifested by actions that demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value. Important aspects are the provision of cost-effective care, advocacy for quality patient care, and working with hospital management and interdisciplinary teams to improve patient care.

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ACGME Core Competencies Assessment Methods & Educational Activities

Assessment Methods

1. **Anatomic or animal models** - Form of low-tech simulation; performance of procedures using non-computerized 3-dimensional anatomic models that replicate properties of human anatomical structures is observed and assessed concurrently (direct observation). May be used to identify learning gaps and to provide evidence of improvement.
2. **Direct observation** - Assessor watches a clinical encounter and assesses performance (same day) using a rating tool specific for the type of encounter (e.g., procedure, physical exam, patient interview, etc.). Direct observation is used as part of other assessment methods, e.g., simulations and OSCE's. Examples of rating tools are communication checklists (e.g. SEGUE), technical/procedure skills forms (e.g. OSATS, DOPS), clinical encounter forms (e.g., mini CEX).
3. **Formal oral examination** - Examiner asks a list of questions in a prepared format about what to do in a clinical scenario presented verbally or role played by the examiner; criteria for evaluation are preset in right/wrong format. High stakes oral exams may be videotaped for documentation purposes.
4. **Global assessment** - Rating of overall functioning of resident during a specified time period on a continuum from low to high (specific rating anchors vary) across one or more performance domains; performance descriptors may vary from a single word to multiple sentences. Alternate name for this method is "clinical performance rating." Global assessments are not specific enough to be used to provide specific feedback to improve resident performance.
5. **In-house written examination** - Exam (usually multiple-choice) developed by local (program) faculty; may be administered in either paper or computer format. Since validity and reliability is usually low, these should not be used for high stakes decisions (pass-fail or promotion).
6. **In-training examination** - Exam (usually multiple choice) developed by an external vendor; may be administered in either paper or computer format. Validity and reliability will vary depending on the vendor; most ITE's are intended to be used only for self assessment, program evaluation, and to identify remediation needs.
7. **Multisource assessment** - Rating of performance/development from multiple points of view, including two or more of the following: supervisor, peer, subordinate, patient, self. MSA is a limited form of 360-degree assessment. A 360-degree assessment must include all relevant raters, including self-assessment.
8. **Objective structured clinical examination** - Consists of several short (5-10 minute) stations; each station is a carefully designed and replicated (standardized) clinical situation (may involve a simulated patient, anatomical models, data interpretation, or other clinical task) and standardized rating tools (standard questions and marking scheme) intended to enable a fairer comparison of peers and assessment of complex procedures without endangering a real patient's health or safety.
9. **Oral Examination** - May involve one or more examiners simultaneously; questions are less structured and evaluations are usually more subjective. Criteria for answers are often less exact and value is often added for problem solving analysis and method, as well as interpersonal communication and presentation. Since validity and reliability is usually low, informal oral exams should not be used for high-stakes decisions (pass-fail or promotion).
10. **Patient survey** - Intended to record the patient perspective of a clinical encounter (could be one part of a multisource assessment). If used to assess resident performance, patient surveys must be carefully designed and administered so that aspects of the clinical encounter not under the resident's control (e.g., parking, registration, billing, etc.) do not affect the rating scores and so that the patient

is rating the correct care provider.

11. **Practice/billing audit** - Review of billing data of an individual resident which is then compared with practice guidelines and/or peers in the office, hospital or managed care setting. Recommended practice is for one person to be responsible for all audits, review 5 or more records per payor using multiple methods for drawing a random sample, and use a claim analysis checklist to identify appropriateness of coding, documentation and completeness of claim. See Record/chart review.
12. **Project assessment** - A project is assessed using a standardized rating tool that reflects the learning objectives established for the project. Examples of projects include targeted literature reviews (EBM), root cause analysis, quality improvement, and research.
13. **Record/chart view** - Review of patient records to collect data on specified aspects of patient care; used to assess quality of care against pre-specified criteria (e.g., expectations for pain management, physical exam, patient history, use of laboratory tests, etc.). Record reviews may focus on a resident's performance over time, over a range of circumstances, and/or types of patients. Record reviews are best used for formative assessment. (Also known as medical record audit; clinical care audit.)
14. **Resident experience narrative** - Resident records their perspectives of a patient care experience (often a critical incident) and discusses with a faculty mentor. Method should be used only for formative feedback.
15. **Review of case or procedure log** - Residents record cases or procedures following a preset protocol. Selected logs are assessed using standardized rating tools that incorporate pre-specified criteria. Batches of logs may be reviewed to determine if program expectations for number and type have been met. Batches of completed assessments may also be reviewed and subjected to global assessment. (See Global assessment.)
16. **Review of drug prescribing** - Review of drugs prescribed by an individual resident which is then compared with practice guidelines and/or peers in the office, hospital or managed care setting. Reviews may target specific aspects of drug prescribing such as unnecessary prescribing, cost-effectiveness of prescribing, adequate documentation of information related to prescribing, patient education and counseling related to drug prescribing, etc. See Record/chart review (other).
17. **Review of patient outcomes** - Review of patient outcome data which is then evaluated using a set of pre-specified criteria for measurable outcomes (e.g., readmission, relapse, postoperative pneumonia, catheter-associated UTI, etc.) which is then compared to practice guidelines and/or peers in the office, hospital or managed care setting. See Record/chart review (other).
18. **Role-play or simulations** - Form of low-tech simulation usually carried out as part of a focused didactic teaching session; assessment is usually narrative, involving verbal self-assessment and feedback from observers of the role-play; used primarily to identify learning gaps.
19. **Simulations/models** - Resident performance of procedures on a high-tech computerized simulator is evaluated; may also be used to evaluate individuals within a team and overall team performance during a predetermined clinical scenario. Evaluation data may be collected by the simulator (preprogrammed) or by trained observers via direct observation using standardized tools.
20. **Standardized patient examination** - Form of low-tech simulation involving a simulated patient (trained actor) and standardized rating tools (standard questions and marking scheme) for formative assessment of focused or complete patient examination skills. May be used to identify learning gaps and to provide evidence of improvement.
21. **Structured case discussions** - Form of informal mini-oral exam; may consist of a small set of pre-determined questions and is commonly conducted as part of a resident's case presentation to the faculty supervisor or mentor. See Oral examination (informal).
22. **Videotaped/recorded assessment** - Resident performance of a clinical procedure or patient encounter is videotaped for later review and concurrent evaluation by a faculty supervisor or mentor; may also include self assessment by the resident and/or assessment by other clinical personnel involved in the procedure or patient encounter (e.g., nurses, peers, other clinicians) after review of the videotape/recording.

Instructional Methods

1. **Clinical Teaching** - teaching that occurs in the clinic, EDs, ORs, laboratories, or other medical settings and addresses issues related to residents' current patient cases or clinical responsibilities.
2. **Focused or Direct Observation and Evaluation** - direct, hands-on clinical or patient care activities. This may include surgery, patient exams, the reading of radiographs and preparation of pathology assays.
3. **Performance Feedback** - information provided to a resident that describes what (s)he has done well or poorly and provides specific guidance as to how performance might be improved.
4. **Departmental Conferences, Lectures or Discussions** - formal, classroom instruction on a specific topic or method, led by one or more faculty, residents, or staff, etc.
5. **Institutional Conferences, Lectures, or Discussions** - formal educational event involving institution-sponsored grand rounds, lectures, discussions, or workshops for residents and/or faculty from multiple specialties; may be part of an institutional core curriculum (i.e. a set or course of learning activities arranged to impart knowledge and skills in fundamental domains, for example, communication skills, legal issues, ethics).
6. **Individual or Group Projects** - multi-step, multi-component tasks performed as vehicles for learning and applying knowledge and skills. Projects should result in a product. Examples are literature reviews, research, clinical quality improvement projects, and community health advocacy work.
7. **Computer Modules** - computer-based instructional units that present medical knowledge or clinical tasks, etc, that residents work through independently. These modules are developed either by the institution/program or purchased from commercial vendors.
8. **Standardized Patients** - professional actors or real patients trained to present realistically and reliably a medical condition and/or specific patient behaviors; the standardized patient provides instruction to the resident or feedback about his/her performance
9. **High-Tech Simulators/Simulations** - 3-dimensional, high tech, computerized devices that represent human anatomy and physiological responses (simulators) are used by residents to learn procedures and operations. Or realistic patient care scenarios are generated using high tech/virtual reality devices (simulations). Residents engage in the scenario as in real life to learn or apply clinical or teamwork skills.
10. **Anatomic or Animal Models** - non-computerized, 3-dimensional devices that replicate the properties of human anatomical structures are used by residents to learn procedures.
11. **Role Play or Simulations** - staged replicas of potentially real situations are engaged in by residents to learn, practice or rehearse skills needed in those situations. This method is often used in difficult or high-risk situations, e.g. mobilization of a medical team in a multi-victim accident or confrontation of an "impaired " colleague.
12. **Games** - informal activities with goals, rules, rewards and penalties for various courses of action. Games may be computerized, played individually or in groups, facilitated or self-paced.
13. **Role Modeling** - portrayal of desired professional behaviors, communication skills, or clinical skills, etc. by attending/supervising physician with the expectation that residents will learn these behaviors and skills by observing the role models.

Assessment Terminology

1. **Criteria** - specific behaviors, actions, outcomes, or product characteristics that are indicative of how well clinical work or learning tasks have been performed and are used as standards for evaluating performance. Points on a rating scale, such as "satisfactory " or "unsatisfactory " are **not** criteria.
2. **Focused or Direct Observation and Evaluation** - occurs (minimally) if evaluators review and discuss the criteria and (more robustly) if they practice using the criteria and resolve differences in evaluations of the same sample performance.
3. **Objective standards** - pre-determined scores, ratings, or patterns of ratings and comments that trigger specific educational decisions such as a requirement for remediation or denial of promotion.

Methods of Evaluation Used to Assess Fellow Competence

Competency	Assessment Method	Evaluators							
		Program Director	KCF/Faculty	Attending	Nurses and Technicians	Clerical	Patients	Self	Allied Health Professionals
Interpersonal & Communication Skills	Direct observation	x	x	x			x		
	Global assessment	x	x						
	Multi-source assessment				x	x			x
	Record/chart review	x	x	x	x				
	Resident narrative experience							x	
	Review of case or procedure log								
	Review of patient outcomes	x	x	x	x				
	Simulation/models	x	x						
	Structured discussions	x	x	x					
Medical Knowledge	Direct observation	x	x	x	x				
	Global assessment	x	x	x					
	In-training exam	x						x	
	Multi-source assessment				x				x
	Patient survey						x		
	Record/chart review	x	x	x					
	Review of case or procedure log	x	x						
	Review of patient outcomes	x	x	x			x		
	Simulation/models	x	x						
	Structured discussions	x	x	x			x	x	
Practice-Based Learning & Improvement	Direct observation	x	x	x	x				
	Global assessment	x	x	x					
	Multi-source assessment				x				x
	Record/chart review	x	x	x					
	Review of patient outcomes	x	x	x					
Professionalism	Direct observation	x	x	x	x	x	x	x	x

Professionalism	Global assessment	x	x	x			x	x	
	Multi-source assessment				x	x			x
	Patient Survey						x		
	Record/chart review	x	x	x					
	Resident narrative experience	x	x	x					

Competency	**Assessment Method**	**Evaluators**							
Patient Care	Direct observation	x	x	x					
	Global assessment	x	x	x					
	Multi-source assessment				x	x			x
	Patient survey						x		
	Resident experience or narrative							x	
	Record of case or procedure log	x	x						
	Review of patient outcomes	x	x	x					
	Role play	x	x						
	Standardized patient examination	x	x	x					
	Structured discussions		x	x	x				

Systems Based Practice	Direct observation	x	x	x					
	Global assessment								
	Multi-source assessment				x	x	x		x
	Record/Chart view	x	x	x					
	Resident experience or narrative							x	
	Record of case or procedure log	x	x	x					

Advocate Lutheran General Hospital

Cardiovascular Disease Fellowship Educational Goals by PGY Level

Updated August, 2014

INTRODUCTION

The Advocate Lutheran General Fellowship Program in Cardiovascular Disease is a three year program designed to train clinical and academic cardiologists. We are committed to training fellows to assume leadership role in cardiovascular medicine in basic and clinical research and clinical cardiology. The curriculum is organized to provide increasing levels of responsibility for trainees with respect to patient care and procedure performance. Adequate progression through the curriculum is assessed by evaluating each fellow's clinical judgment, clinical skills, medical knowledge, procedural skills, professionalism, communication skills, leadership ability, and continuing scholarship. At all times during their training, fellows are expected to conduct themselves with the highest of ethical standards and are expected to display integrity, honesty, compassion, and respect to all members of the health care team, patients, and patient family members. Fellows should always be strong advocates for all patients under their care and should utilize the health care system to maximize the benefit to each individual patient while respecting the patient's expressed wishes. In the end, the welfare of the patient should be the fellow's primary concern.

FIRST YEAR FELLOWSHIP TRAINING – PGY IV

General:

The overall purpose of the first year of training is to provide new fellows with a broad exposure to all aspects of clinical cardiology as well as ample introductory experience to a wide variety of invasive and non-invasive cardiac procedures. Fellows will also be introduced to both clinical and basic science research. By the end of the first year, fellows will be able to evaluate cardiac patients and to initiate care appropriate for a wide variety of acute and chronic cardiac conditions but will not be expected to be experts in either clinical care or procedural skills. The goals for the first year of training are for fellows to be introduced to the full range of cardiovascular disease clinical and research opportunities, identify a specific area of interest and a projected career path, be paired with an appropriate mentor, and to select a research project.

Clinical Judgment and Skills:

By the end of the first year of fellowship training, fellows should be able to obtain an accurate and complete cardiac history and to perform a thorough but directed cardiac physical examination for patients being evaluated for a wide variety of cardiovascular diseases. During their first year of training, fellows will learn the proper role of the various invasive and non-invasive cardiac procedures and tests. Using the information available from the history, physical examination, and test results, first year fellows should be expected to be able to develop a differential diagnosis and a plan of care for common acute and chronic cardiovascular disease states. Additionally, first year fellows will be expected to identify life-threatening cardiovascular conditions and emergencies and to be able to initiate prompt therapy. First year fellows will gain experience in understanding the pathophysiologic basis of cardiac conditions. First year fellows should be able to contribute to patient management discussions on rounds in conjunction with the teaching attending.

Medical Knowledge:
First year fellows will begin to build the critical knowledge base that will permit them to function as competent well-rounded cardiologists. This knowledge will be acquired by reading current cardiology literature sources and standard textbooks as well as via didactic lecture sessions. Clinical knowledge will be gained in the following areas: coronary artery disease, myocardial diseases and heart failure, congenital heart disease, valvular heart disease, peripheral vascular disease and diseases of the aorta, cardiovascular prevention, hypertension, pericardial diseases, cardiac dysrhythmias and clinical electrophysiology, cardiothoracic surgery, cardiac rehabilitation, and pulmonary hypertension. First year fellows will begin to learn the basic literature related to cardiovascular testing and procedures and will begin to develop interpretive skills.

Procedural Skills:
First year fellows will learn the indications, contraindications, and potential complications related to each major cardiovascular procedure. First year fellows will also begin to develop a working knowledge of the risk/benefit assessment that must take place prior to performing an invasive cardiac procedure. First year fellows will begin to learn how to safely perform procedures and to interpret the data obtained. These procedures will include electrocardiograms, ambulatory ECG monitoring, transthoracic and transesophageal echocardiograms, cardiac catheterization (hemodynamic and angiographic studies), exercise and pharmacologic stress testing, cardiac CT and MRI, electrical and chemical cardioversion, temporary pacemaker placement, and nuclear cardiac imaging. First year fellows will be instructed in how to properly document procedure findings and will be expected to document a thorough and accurate report on any procedure performed. By the end of the first year, fellows should be expert in the pre-procedural and post-procedural assessment of patients referred for cardiac testing and should participate in the performance of invasive procedures only under the direct supervision of an attending cardiologist.

Teaching:
First year fellows will be expected to provide teaching to medical students and residents on the basics of common cardiovascular conditions and routine bedside invasive procedures especially on the consult and CICU services. Teaching methods should include actively participating in case discussions on rounds, conducting brief teaching sessions, and introducing house staff to common cardiology literature sources (journal articles, textbooks, etc).

Professionalism:
First year fellows are expected to conduct themselves with exemplary professionalism at all times, as evidenced by the display of honesty, integrity, respect, and compassion when caring for patients and interacting with patient families, referring providers, and other members of the health care team. First year fellows will accept responsibility for the care of cardiac patients and will be held accountable for conducting themselves with the highest of ethical standards at all times.

Communication Skills:
First year fellows will learn how to write a thorough, informative, and instructive cardiac consultation note as well as accurate and detailed procedure notes. First year fellows will learn to verbally communicate effectively with patients, families, and all members of the health care

team. Fellows will learn the importance of maintaining complete and accurate medical records easily accessible to referring providers.

Leadership:
First year fellows should be able to provide guidance for medical students and residents as it relates to routine patient care. First year fellows should be able to participate in management discussions on teaching rounds in conjunction with the service attending.

Continuing Scholarship:
First year fellows will be expected to develop a reading program that will build the foundation of basic cardiology knowledge necessary to become a competent clinical cardiologist. Fellows will learn the significance of keeping current with the literature in order to be able to adapt their clinical practice as new advances are made. Attendance at journal club will allow the fellows to keep abreast of the current literature. Fellows will improve their ability to critically review the cardiovascular literature and to correctly apply the literature in their clinical practice. Fellows will be introduced to both clinical and basic science research as it applies to cardiovascular diseases in order to help them select their fellowship research project.

SECOND YEAR FELLOWS – PGY V
General:
Second year fellows will continue to build upon the knowledge and skills gained during the first year of training and will begin to focus on their particular area of interest. Second year fellows will be given greater latitude in patient management decisions in the continuity of care clinic. During the second year, the fellow's research project should be well-established, and each second year fellow should be able to present his/her activities at the dedicated research conference. Depending upon the outcome of their research work, some second year fellows may be positioned to submit their findings in abstract form to national or regional scientific meetings.

Clinical Judgment and Skills:
Second year fellows will improve upon the clinical judgment and skills acquired during their first year of training by continued participation in patient care in a variety of settings and will work to master the development of acute and chronic management plans for patients with cardiovascular diseases. Second year fellows will be expected to understand the pathophysiologic basic of common cardiovascular diseases and will use this knowledge to help guide clinical management decisions. Fellows will gain a better understanding of how best to utilize cardiac procedures in the care of patients, will demonstrate continued improvement in test result interpretation, and will continue to refine their understanding of the risks and benefits of the various cardiac procedures. During the second year, fellows will continue to improve their ability to synthesize the cardiology literature and apply it in an evidence-based manner to the care of their patients.

Medical Knowledge:
Second year fellows will continue to advance their knowledge base by critically reviewing the cardiology literature and continuing to read standard cardiology texts.

Procedural Skills:
Second year fellows will be skilled in determining the appropriateness of planned procedures.

Teaching:
In addition to teaching medical students ECG's, second year fellows are expected to help introduce first year fellows to the program and to assist with bedside procedures (e.g., PA catheter placement, temporary pacemaker placement, transthoracic echocardiography, etc) especially when the second year fellows are on weeknight or weekend call for the intensive care unit

Professionalism:
Second year fellows will continue to perform their duties with utmost professionalism utilizing the highest of ethical standards.

Communication Skills:
Second year fellows will work to improve their written and verbal communication skills relative to direct patient care reporting. Second year fellows will continue to gain experience in interacting with patients, family members, and all members of the health care team especially in the continuity of care clinic. Second year fellows will understand the importance of maintaining complete and accurate medical records easily accessible to referring providers.

Leadership:
Second year fellows will be expected to be role models for first year fellows and to set the highest professional and ethical standards for them to follow.

Continuing Scholarship:
Second year fellows will continue to update their cardiovascular knowledge base via critical review of the literature and continued reading of standard cardiology texts. Second year fellows will be expected to be able to interpret the cardiology literature correctly and to apply it appropriately in an evidenced-based manner to the care of individual patients. Second year fellows will be expected to formulate a meaningful research experience in conjunction with an appropriate mentor. Second year fellows may apply for research grant funding after discussion with their research mentors and gathering preliminary data.

THIRD YEAR FELLOWS - PGY VI
General:
The overall purpose of the third year of fellowship is for trainees to perfect their clinical patient care and procedural skills and to be able to practice evidence-based medicine for the full spectrum of cardiovascular diseases. By the end of their third year, fellows should be deemed capable of practicing clinical cardiology competently and independently and to safely and expertly perform all procedures. Third year fellows should fully meet all six of the ACGME general core competencies. Additionally, third year fellows may submit the results of their research project as an abstract to the appropriate forum. They will also be encouraged to submit full-length manuscripts for publication in clinical or scientific journals. The faculty will provide guidance and support with regard to such scholarly endeavors.

Clinical Judgment and Skills:
Third year fellows will improve upon the clinical judgment and skills acquired during the first two years of training by further participation in patient care in a variety of settings and will be expected to apply evidence-based medicine to develop comprehensive acute and chronic management plans for the full spectrum of cardiovascular diseases. Third year fellows will be expected to skillfully select the most appropriate cardiac tests for individual patients and to expertly apply the results leading to the safest and most optimal care. By the end of the third year, fellows should be able to manage all cardiac patients expertly and should be able to function independently as a consultant cardiologist.

Medical Knowledge:
Third year fellows will continue to build their cardiology knowledge base by further review of the available literature, and by the completion of the training program, fellows will be expected to be well-versed in all aspects of the clinical cardiovascular diseases literature. Third year fellows will be able to expertly interpret cardiac tests and to apply the results appropriately to the care of individual cardiac patients.

Procedural Skills:
Third year fellows will perfect their procedural skills and will become skilled in performing procedures in complicated patients. Third year fellows will have a thorough understanding of the risks and benefits of the procedures they perform, will be able to manage associated complications, will be able to expertly interpret and apply all data obtained, and will be able to effectively communicate procedure results to patients and referring providers.

Teaching:
Third year fellows will be expected to teach medical students, residents, and junior cardiology fellows on clinical services, laboratory and non-laboratory setting and actively participate in conferences.

Professionalism:
Third year fellows will continue to conduct themselves professionally at all times and with the highest of ethical standards.

Communication Skills:
Third year fellows will be able to write complete, accurate, and informative consults as well as detailed and accurate procedure reports. Third year fellows will be able to communicate effectively with patients, their families, and all members of the health care team.

Leadership:
Third year fellows should be able to function as team leader for the clinical cardiovascular services under the direction of the assigned staff physician. Third year fellows will be expected to mentor junior fellows in all aspects of the training program.

Continuing Scholarship:
Third year fellows should have a well-established educational program that will continue into their practice and allow them to stay current with the cardiology literature and should be expert at interpreting and applying new data to enhance patient care. By the end of third year, fellows are expected to demonstrate the outcome of their research activities in an appropriate formal

setting. This presentation is usually completed at the research conference at the end of the second year of training. However, fellows may choose to present their research project results as an oral presentation to the Division of Cardiology, a written abstract submitted to a local or national meeting, or a manuscript submitted to a peer reviewed journal.

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Cardiovascular Disease Fellowship Curriculum

Updated August, 2013

The curriculum topics listed below incorporate required knowledge areas specified by the ACGME, suggested by COCATS, and inclusive of the American College of Cardiology Foundation's Competency Milestones. These specific core competencies should be attained by all general cardiology trainees and will become the normative data used for assessing the quality of the outcomes-based, specialty specific educational goals and objectives through the structure of NAS.

Coronary Artery Disease

1. Coronary Heart Disease Epidemiology (M10.1)
2. Metabolic Syndrome
3. Pathogenesis of Atherosclerosis (May consider video presentation from Mayo BR) (M10.1)
4. Endothelial Dysfunction and Coronary Artery Disease
5. Dyslipidemia, Diabetes Mellitus, Hypertension and Risk of Atherosclerosis, Novel Risk Markers of Atherosclerosis
6. Acquired and Congenital Lipid Disorders
7. Assessment of Chest pain (M10.3, 10.4, 10.5, 10.6, 10.9)
8. Chronic Coronary Artery Disease: (10.7, 10.8, 10.10-18)
9. Acute Coronary Syndrome (UA-NSTEMI spectrum): (M1.1, 1.2, 1.3, 1.4, 1.5, 1.15, 1.16)
10. Acute ST Elevation Myocardial Infarction (M1.1-7, 1.12, 1.13, 1.14)
11. Reperfusion Strategy for STEMI: Fibrinolysis vs. PCI (M1.13)
12. Fibrinolytic Trials in Acute MI (M1.13)
13. Complications of Acute ST elevation MI (M1.8, 1.9, 1.10, 4.9)
14. Right Ventricular Infarction (M1.11)
15. Risk Stratification after MI (M1.5)
16. Coronary Collateral Circulation
17. Cardiac Rehabilitation (M1.5)
18. Coronary Artery Bypass Graft Surgery
19. Cardiac Biomarkers (M1.3)

Arrhythmias and Electrophysiology, Electrocardiography and Ambulatory ECG

1. Basic ECGs (M3.1, 3.3)
2. Advanced ECGs (ECG Conferences by Dr. Richard Sorkin) (M3.3, 3.5, 3.6, 3.7, 3.8, 3.9)
3. Electrical Emergencies
4. Cardiac Cellular Electrophysiology (M3.2, 3.4)
5. Normal Sinus Rhythm, and Sinus Node Dysfunction (M2.1)
6. Reentrant Supraventricular Tachycardia (M2.2, 2.13, 5.8)
7. Atrial Fibrillation (M2.3, 5.8)
8. Atrial Flutter (M2.3, 5.8)
9. Sustained and Non-sustained Ventricular Tachyarrhythmias (M2.4, 5.8)
10. AV Dissociation and AV Heart Block (M2.5, 2.6, 5.8)
11. Indications and Limitations of Non-invasive EP Testing (M2.9, 3.10)
12. Indications and Limitations of Invasive EP Testing (M2.10)
13. Indications for PPM, ICD and CRT (Trials) (M2.11, 5.8)

14. Cardiac Channelopathies(M2.14)
15. Syncope (M2.12)
16. Sudden Cardiac Death
17. Heart Disease in Athletes

Echocardiography

1. Basics of Transthoracic Echocardiography (M4.2, 4.4)
2. Ultrasound Physics and Artifacts (M4.1, 4.3)
3. M-mode Imaging (M4.2)
4. Doppler Echocardiography and Color Flow Imaging and Hemodynamics (M4.2)
5. Transesophageal Echocardiography (M4.2, 4.5)
6. Stress Echocardiography (M4.9)
7. Tissue Doppler and Strain Imaging (M4.2)
8. Chamber Quantification and Systolic Function and Use of Contrast Agents (M4.6, 4.2)
9. Diastolic Function (M4.15)
10. Right Heart Function (M4.15)
11. Echocardiography for Aortic Stenosis (M4.8)
12. Echocardiography for Mitral Regurgitation (M4.8)
13. Echo and Cardiomyopathy (M4.7)

Heart Failure, Hypertrophic and Other Cardiomyopathies

1. Cardiovascular Reflexes and Hormones
2. Hemodynamics
3. New Onset of Heart Failure: Diagnosis and Evaluation (M5.1, 5.2, 5.3)
4. Chronic Systolic Heart Failure (M5.1, 5.2, 5.3, 5.4)
5. Chronic Diastolic Heart Failure (HFPEF) (M5.1, 5.2, 5.3, 5.4)
6. Acute Heart Failure
7. Management of Advanced Heart Failure with Inotropes, Mechanical Therapies (LVADs) and Heart Transplantation (M5.5, 5.6, 5.9)
8. Cardiorenal Syndrome (M5.7)
9. Right Ventricular Failure
10. Myocarditis
11. Dilated Cardiomyopathy
12. Restrictive Cardiomyopathy including Infiltrative Cardiomyopathy (M5.6)
13. Hypertrophic Cardiomyopathy (M6.1-11)
14. Inherited Cardiomyopathy with Echo Features

Invasive Cardiology

1. Indications of Cardiac Catheterization (M7. 1)
2. Diagnostic Angiographic Catheters and Engaging Vessels
3. Basics of Interventional Cardiology
4. Indication of PCI and AUC Criteria (M7.11)
5. Diagnostic Coronary Angiographic Views and Ventriculography
6. Normal Coronary Anatomy, Variations and Congenital Anomalies (M7.8)
7. Coronary Vein Anatomy
8. Coronary Artery Physiology, Intracoronary Ultrasonography, Coronary Artery Lesions and FFR (M7.8, 7.9, 10.2)
9. Principles of Radiation Safety (M7.2)
10. Contrast Agents and Contrast Induced Nephropathy (M7. 3)
11. Antiplatelet Therapies in Cath Lab (M7.4)

12. Antithrombotic Therapies in Cath Lab (M7.4)
13. Right Heart Catheterization (M7.5, 7.6)
14. Invasive Hemodynamics and Calculation of Stenotic Orifice Area and Regurgitant Lesions (M7.6)
15. Invasive Hemodynamics and Intracardiac Shunt, Shunt Measurements and Device Closure (M7.7)
16. Indications of Endomyocardial Biopsy (M7.12)
17. Percutaneous Mechanical Circulatory Support Devices Including Intra-aortic Balloon Pump, Impella and Tandem Heart (M7.13)
18. Radial Arterial Access for Cardiac Catheterization (M7.14)
19. Femoral Arterial Access for Cardiac Catheterization (M7.14)
20. Closure Devices (M7.14)
21. Cardiogenic Shock
22. Restriction and Constriction
23. Angiography of Peripheral Vessels (Thoracic and Abdominal)
24. Hemodynamics of HOCM and HF
25. Pericardiocentesis

Nuclear Cardiology

1. Basics of Nuclear Imaging
2. Myocardial Perfusion Imaging Tracers
3. Imaging Protocols
4. SPECT, MUGA and First Pass
5. Quality Check Issues in Nuclear Cardiology and Experience in Hot Lab
6. Appropriate Use Criteria for Myocardial Perfusion Imaging

Diseases of Heart, Pericardium and Pulmonary Vasculature

1. Systemic Disease and Heart (M4.16)
2. Cardiac Tumors (M4.13)
3. The Pericardium: Normal Anatomy and Structural Abnormality (M9.8)
4. Acute and Relapsing Pericarditis (M9.1, 9.4, 9.6, 9.7, 9.10, 9.11, 9.9, 4.10)
5. Pericardial Effusion and Tamponade, Indications for Pericardiocentesis, Role of Echo during Pericardiocentesis (M9.2, 9.4, 9.5, 9.7, 9.9, 9.10, 9.11, 4.10, 7.12)
6. Constrictive Pericarditis (M9.3, 9.4, 9.7, 9.9, 9.10, 9.11, 4.10, 7.6)
7. Pulmonary Embolism
8. Pulmonary Hypertension
9. Sleep Apnea and Cardiac Disease

Valvular Heart Disease

1. Aortic Stenosis including congenital anomalies (M11.1, 11.2, 11.4, 11.8-15, 7.1)
2. Mitral Stenosis (M11.2, 11.4, 11.8-14, 4.8, 6.1)
3. Acute and Chronic Aortic Regurgitation (M11.2, 11.5, 11.6, 11.8-14, 4.8, 7.1)
4. Acute and Chronic Mitral Regurgitation including Mitral Valve Prolapse (M11.2, 11.5, 11.6, 11.7-15, 7.1)
5. Pulmonic and Tricuspid Valve Disease (M11.2, 11.8-14)
6. Prosthetic Valve (M11.8, 11.12, 4.8)
7. Native and Prosthetic Valve Endocarditis (M11.16, 4.13)
8. Rheumatic Valvular Heart Disease (M11.3)
9. Carcinoid and Drug Related Heart Disease
10. Surgery for Cardiac Valve Disease

11. Percutaneous Valvular Interventions (TAVR, Mitraclip, Melody Valve) (M7.11)
Vascular Disease
1. Peripheral Vascular Anatomy and Indications for Peripheral Vascular Angiography (M12.1, 7.10) 2. Peripheral Vascular Disease (M12.2, 12.3, 12.5-9, 12.11, 12.12, 12.15) 3. Cerebrovascular Disease and Carotid Stenting (M12.5-9, 12.12, 12.15) 4. The Aorta and Marfan/Ehlers-danlos/Turner/Loeys-dietz/Idiopathic Causes of Aortic Aneurysm/Dissection, Endovascular Approaches (M12.5, 12.10, 12.15, 4.14) 5. Renovascular Disease and Renal Artery Stenting (M12.5-8, 12.12, 12.15) 6. Pathophysiology, Treatment and Prevention of Arterial Thrombosis 7. Venous and Lymphatic Disorders (M12.4, 12.14) 8. Vasculitis (M12.13)
Congenital Heart Disease
1. Cardiac Development and Embryology 2. Simple Congenital Heart Disease (M4.11, 6.11) 3. Complex Congenital Heart Disease (M4.12)
Cardiovascular Pharmacology
1. Amiodarone (M2.8) 2. Antiarrhythmic Drugs (M2.8) 3. Modulators of Renin Angiotensin System and Nitrates (M5.4) 4. Principles of Diuretic Usage (M5.4) 5. Digoxin (M2.8, 5.4) 6. Principles of Inotropic Drugs (M5.5) 7. Calcium Channel Blockers 8. Beta-adrenergic Receptor Blockers (M5.4) 9. Lipid Lowering Agents and Lipid Lowering Clinical Trials
Miscellaneous Topics
1. Cardiovascular Examination 2. Basics of Stress Testing 3. Cardiopulmonary Exercise Testing 4. Cardiac Radiography 5. Hypertension: Mechanism, Diagnosis and Management 6. Non-cardiac surgery in Patients with Heart Disease 7. Heart Disease in Women 8. Heart Disease in Elderly / Erectile Dysfunction 9. Pregnancy and Heart Disease (M11.17) 10. HIV Infection and Heart Disease 11. Conscious Sedation 12. Coding and Billing 13. Employment Contract 101 14. Practice Management

American College of Cardiology Foundation Curricular Milestones **Version 1, released February, 2012**

Introduction

The American College of Cardiology Foundation (ACCF), in conjunction with the ABIM and ACGME has identified specific core competencies in 12 topical categories that should be attained by all general cardiology trainees during fellowship training. These milestones will become the normative data used for assessing the quality of the outcomes-based specialty specific educational goals and objectives through the structure of the NAS (Next Accreditation System).

Acute Coronary Syndromes (ACS)

Medical Knowledge	PGY-4	PGY-5	PGY-6
Know the epidemiology, causes, pathophysiology, and natural history of ACS, including the roles and plaque rupture of erosion and platelet activation and thrombosis.	X		
Know the disorders that can simulate or mask ACS.	X		
Know how to use risk-assessment tools in ACS.	X		
Know the indications and clinical pharmacology of antiplatelet, anticoagulant, and other pharmacologic therapies.	X		
Know the post-ACS risk assessment, rehabilitation, and secondary prevention measures.	X		
STEMI			
Know the characteristic symptoms, physical findings, ECG patterns and biomarker findings.	X		
Know the effects and time course if ischemic injury on ventricular function and remodeling.	X		
Know the characteristic hemodynamic complications (including hypotension, low cardiac output, heart failure and shock).		X	
Know the characteristic arrhythmia and conduction complications.		X	
Know the characteristic mechanical complications (including papillary muscle rupture and myocardial rupture).		X	
Know the characteristic findings and complications of right ventricular infarction.		X	
Know the indications, contraindications, and risks of reperfusion therapies and the clinical, ECG, and angiographic signs of reperfusion.	X		
Know the relative benefits and risks of fibrinolysis and primary PCI as an initial reperfusion strategy.	X		
Know the indications for transfer, angiography, and revascularization in patients who did not receive primary PCI (including those who received fibrinolysis or did not receive initial reperfusion therapy).		X	
NSTE-ACS			
Know the differential diagnosis and the characteristic clinical, ECG, and biomarker features for diagnosis and risk stratification.		X	
Know the relative risks and benefits of an initial invasive versus an ischemia-guided strategy for angiography and revascularization.		X	
Evaluation Tools: direct observation; chart-stimulated recall; in-training exam; conference presentation			
Patient Care	**PGY-4**	**PGY-5**	**PGY-6**
Skill To:			
Evaluate and diagnose patients with STEMI, and initiate appropriate reperfusion therapy within guideline time limits.	X		
Employ appropriate antiplatelet, anticoagulant, and other pharmacologic therapies.	X		
Recognize and treat hemodynamic disturbances (including hypotension, low cardiac output, heart failure, acute pulmonary edema and shock) and diagnose the cause.		X	
Recognize and treat arrhythmias and conduction disturbances.		X	

Recognize and treat mechanical complications (including papillary muscle rupture and myocardial rupture).		X	
Recognize and treat patients with right ventricular infarction.		X	
Assess ventricular function and utilize in treatment strategy decisions.		X	
Interpret invasive hemodynamic data and angiographic findings and apply to treatment strategies.		X	
Insert intra-arterial and pulmonary artery catheters.		X	
Assess overall risk, identify candidates for invasive evaluation and treatment and establish optimal medical regimen in NSTE-ACS.	x		
Patient Care (cont.)	**PGY-4**	**PGY-5**	**PGY-6**
Identify patients who would benefit from mechanical circulatory support.		X	
Achieve risk-factor target levels for secondary prevention.	X		
Evaluation tools: in-training exam; direct observation; chart-stimulated recall; conference presentations; simulation			
Systems-based Practice	**PGY-4**	**PGY-5**	**PGY-6**
Work with EMS, ED & hospital teams to establish effective first medical contact strategies for cardiovascular emergencies.		X	
Identify and address financial, cultural, and social barriers to diagnostic and treatment recommendations.	X		
Utilize a multidisciplinary coordinated approach for patient management, including transfer of care and employment-related issues.	X		
Practice in a manner that fosters the balance of appropriate utilization of finite resources with the net clinical benefit for the individual patient.		X	
Evaluation tools: direct observation; record review; chart stimulate recall; conference presentations; multi-source evaluation.			
Practice-based Learning & Improvement	**PGY-4**	**PGY-5**	**PGY-6**
Identify gaps in knowledge & performance, and perform appropriate personal learning activities.		X	
Utilize decision support tools for accessing guidelines and pharmacologic information at the point of care.	X		
Evaluation tools: direct observation, chart stimulated recall; self-reflection			
Professionalism	**PGY-4**	**PGY-5**	**PGY-6**
Exhibit sensitivity to patient preference end-of-life issues.	X		
Demonstrate sensitivity and responsiveness to diverse patient populations.	X		
Demonstrate a commitment to carry out professional responsibilities, appropriately refer patients, and respond o patient needs in a way that supersedes self-interest.	X		
Evaluation tools: direct observation, multi-source evaluation.			
Interpersonal & Communication Skills	**PGY-4**	**PGY-5**	**PGY-6**
Effectively communicate with acutely ill patients across a broad range of cultural, ethnic, and socioeconomic backgrounds.	X		
Communicate with all of healthcare providers involved in patient care.	X		
Evaluation tools: direct observation, chart stimulated recall; multi-source evaluation.			

Arrhythmias and Electrophysiology

Medical Knowledge	PGY-4	PGY-5	PGY-6
Know the mechanism and characteristics of normal sinus rhythm and sinus node dysfunction.	X		
Know the pathophysiology, differential diagnosis, and clinical significance of reentrant (AVNRT; AVRT), and ectopic atrial tachycardias, and accelerated atrioventricular junctional rhythm.		X	
Know the pathophysiology, differential diagnosis, and the clinical significance of atrial fibrillation and flutter.		X	
Know the pathophysiology, differential diagnosis, and clinical significance of sustained and non-sustained ventricular tachyarrhythmias.		X	
Know the types, mechanisms, differential diagnosis, and clinical significance of atrioventricular dissociation and of atrioventricular heart blocks (first, second, and third degree).	X		
Know the physical examination characteristics of arrhythmias (e.g., findings of atrioventricular dissociation).		X	
Know the significance of underlying or congenital heart disease in the likelihood and significance of cardiac arrhythmias, and in clinical management decisions.		X	
Know the indications, contraindication, and clinical pharmacology of antiarrhythmic medications – including drug-drug and drug-device interactions and proarrhythmia potential.	X		
Know the indications and limitations of non-invasive testing in the diagnosis and management of patients with arrhythmias; ambulatory, event, implantable loop recorder and tilt-table testing.		X	
Know the indications for, and limitations and complications of, invasive electrophysiologic testing, as well as arrhythmia ablation.		X	
Know the indications for permanent pacemaker placement, CRT, and ICD placement.		X	
Know the pathophysiology, differential diagnosis, and natural history of syncope, including neurocardiogenic causes.	X		
Know the mechanisms, findings, and clinical significance of ventricular pre-excitation.		X	
Know the pathology and clinical significance of genetic ion channel abnormalities and arrhythmias.		X	
Know principles and practice of radiation safety.	X		
Evaluation tools: global ratings, ins-service exam, chart-stimulated recall			
Patient Care	**PGY-4**	**PGY-5**	**PGY-6**
Skill to evaluate and manage patients with palpitations.	X		
Skill to evaluate and manage patients with syncope.		X	
Skill to evaluate and manage patients with supraventricular tachyarrhythmias.		X	
Skill to evaluate and manage patients with atrial fibrillation and flutter (including rate and rhythm control and anticoagulation strategies).		X	
Skill to evaluate and manage patients with wide-QRS tachycardia.		X	
Skill to manage patients with non-sustained and sustained ventricular arrhythmias.		X	
Skill to evaluate and manage patients with bradycardia and/or heart block.		X	
Skill to perform electrical cardioversion.	X		
Skill to perform tilt-table testing.		X	
Skill to perform temporary pacemaker placement.		X	
Skill to select and manage patients requiring permanent pacemaker, implantable cardioverter defibrillator or biventricular pacing.		X	
Skill to perform pacemaker and ICD interrogation, programming, and surveillance.		X	
Skill to perform permanent pacemaker implantation and manage complications.			X
Evaluation tools: direct observation; chart-stimulate recall; conference, simulation, global rating; procedure logs			

Systems-based Practice	PGY-4	PGY-5	PGY-6
Utilize a multidisciplinary coordinated approach for patient management, including transfer of care and employment-related issues.		X	
Use technology and available registries to assess appropriateness, performance, and safety of implanted devices.		X	
Incorporate risk-benefit analysis and cost considerations in diagnostic and treatment decisions.		X	
Evaluation tools: global assessment; multi-source evaluation, direct observation			
Practice-based Learning & Improvement	**PGY-4**	**PGY-5**	**PGY-6**
Identify competency gaps and engage in opportunities to achieve focused education and performance improvement.		X	
Utilize decision support tools for accessing guidelines and pharmacologic information at the point of care.		X	
Evaluation tools: chart-stimulated recall; patient conference presentations; in-training exam; log book review			
Professionalism	**PGY-4**	**PGY-5**	**PGY-6**
Exhibit sensitivity to patient preference and end-of-life issues.		X	
Practice within the scope of personal expertise or technical skills.		X	
Evaluation tools: multi-source evaluation; direct observation; chart review			
Interpersonal & Communication Skills	**PGY-4**	**PGY-5**	**PGY-6**
Communicate with and educate patients and families across a broad range of cultural, ethnic and socioeconomic backgrounds.		X	
Engage in shared decision-making with patients about their condition and the options for diagnosis and treatment.		X	
Evaluation tools: direct observation; multi-source evaluation; global assessment			

Electrocardiography / Ambulatory ECG

Medical Knowledge	PGY-4	PGY-5	PGY-6
Know the basic principles of scalar electrocardiography, and the operation/use of the instruments to acquire, display, and store ECGs.	X		
Know the underlying cellular and ionic mechanisms in the genesis of the surface electrocardiograms and the effects of the autonomic nervous system.	X		
Know how to measure and the normal values for, electrical axis, and ECG intervals, durations, and voltage.	X		
Know the anatomy of the specialized conducting tissue, and the spread of excitation in the ventricles.	X		
Know reentry, automaticity, and triggered activity mechanisms for cardiac arrhythmias.	X		
Know the types and mechanisms of aberrancy.	X		
Know capture and fusion complexes and the ECG pattern criteria for distinction of supraventricular arrhythmias with aberrancy from ventricular arrhythmias.		X	
Know the concepts of concealed conduction and exit block – and their manifestations on the ECG.		X	
Know the characteristic ECG patterns of key clinical diagnoses.		X	
Evaluation tools: direct observation, global assessment; in-training exam; ECG examination			
Patient Care	**PGY-4**	**PGY-5**	**PGY-6**
Skill to identify normal ECG patterns, normal variants, and artifacts (including incorrect lead placement).	X		
Skill to identify ECG signs of atrial abnormalities, and of right and left ventricular hypertrophy or enlargement.	X		
Skill to identify types and significance of intraventricular conduction delay or block (including functional or aberrant conduction and abnormalities).	X		
Skill to identify the types of atrioventricular dissociation.		X	
Skill to identify first, second (types I, II, 2:1, and high degree) and third degree atrioventricular blocks.	X		
Skill to identify the ECG patterns and localization of cardiac ischemia and infarction.	X		
Skill to identify the ECG changes of electrolyte and metabolic abnormalities, and of drug effects.		X	
Skill to identify non-specific QRS and ST-T wave changes.	X		
Skill to identify atrial, atrioventricular nodal and ventricular arrhythmias.		X	
Skill to integrate ECG findings into clinical and risk assessments, and the management of patients.		X	
Skill to select and interpret ambulatory ECG recording studies.		X	
Skill to identify normal and abnormal pacemaker rhythms/functions.		X	
Evaluation tools: direct observation; ECG examination, in-training exam			
Systems-based Practice	**PGY-4**	**PGY-5**	**PGY-6**
Participate in hospital/practice quality monitoring of ECG testing.		X	
Evaluation tools: direct observation, conference and presentations			
Practice-based Learning & Improvement	**PGY-4**	**PGY-5**	**PGY-6**
Identify competency gaps and engage in opportunities to achieve focused education and performance improvement.	X		
Evaluation tools: clinical / M&M conferences; in-service and ECG exams			
Professionalism	**PGY-4**	**PGY-5**	**PGY-6**
Practice within the scope of personal expertise or technical skills.	X		
Use of appropriateness criteria for ECG testing.	X		
Evaluation tools: multi-source evaluation; self-reflection; direct observation			
Interpersonal & Communication Skills	**PGY-4**	**PGY-5**	**PGY-6**

Communicate testing results in a timely manner to primary and referring physicians.	**X**		
Evaluation tools: multi-source evaluation; record review			

Echocardiography

Medical Knowledge	PGY-4	PGY-5	PGY-6
Know the physical principles of ultrasound, and the instrumentation used to obtain images.	X		
Know the appropriate indications for: M-mode, two-dimensional, & three dimensional transthoracic echocardiography (TTE); Doppler echocardiography & color flow imaging; transesophageal echocardiography (TEE); tissue Doppler & strain imaging; contrast echocardiography.		X	
Know the limitations and potential artifacts of the echo examination.	X		
Know the standard views included in a comprehensive TTE.	X		
Know the standard views included in a comprehensive TEE.		X	
Know how to quantify cardiac chamber sizes, evaluate left and right ventricular systolic and diastolic function, and hemodynamics.		X	
Know the characteristic findings of cardiomyopathies.		X	
Know how to use echo and Doppler data to evaluate native and prosthetic valve function and diseases.		X	
Know the echo & Doppler findings of cardiac ischemia and infarction, and the complications of myocardial infarction.		X	
Know the echo findings of pericardial disease, pericardial effusion, and pericardial constriction.		X	
Know the characteristic findings of basic adult congenital heart diseases.		X	
Know how to evaluate cardiac masses, and suspected endocarditis.		X	
Know how to evaluate diseases of the aorta.		X	
Know how to assess pulmonary artery pressure and diseases of the right heart.		X	
Know how to evaluate patients with systemic diseases involving the heart.		X	
Know the indications for and the echocardiographic findings in patients with known or suspected cardio-embolic events.		X	
Evaluation tools: direct observation, in-training exam			
Patient Care and Procedural Skills	**PGY-4**	**PGY-5**	**PGY-6**
Skill to perform & interpret a basic TTE exam.	X		
Skill to perform & interpret comprehensive TTE exam.		X	
Skill to perform & interpret comprehensive TEE exam.			X
Skills to recognize pathophysiology, quantify severity of disease, identify associated findings, and recognize artifacts in echocardiography.			X
Skill to integrate echo findings with clinical and other testing results in the evaluation & management of patients.		X	
Skill to interpret echocardiography.			X
Skill to interpret stress echocardiography.			X
Evaluation tools: direct observation; simulation; procedure logs; in-training exam.			
Systems-based Practice	**PGY-4**	**PGY-5**	**PGY-6**
Work effectively with the echo laboratory staff.	X		
Incorporate appropriate use criteria, risk benefit, safety, and cost containment consideration in the use of ultrasound techniques.		X	
Participate in echo quality monitoring and initiatives.		X	
Evaluation tools: direct observation; multi-source evaluation.			
Practice-based Learning & Improvement	**PGY-4**	**PGY-5**	**PGY-6**
Identify competency gaps and engage in opportunities to achieve focused education and performance improvement.		X	
Evaluation tools: in-training exam; direct observation, conference presentation			
Professionalism	**PGY-4**	**PGY-5**	**PGY-6**
Promote adherence to guidelines and appropriate use criteria.		X	

Evaluation tools: direct observation; procedure logs; multisource evaluation			
Interpersonal & Communication Skills	**PGY-4**	**PGY-5**	**PGY-6**
Communicate with and educate patients and families across a broad range of cultural, ethnic, and socioeconomic backgrounds.	X		
Communicate testing results in a timely manner to primary and referring physicians.		X	
Evaluation tools: direct observation, multisource evaluation; global assessment			

Heart Failure

Medical Knowledge	PGY-4	PGY-5	PGY-6
Know the pathophysiology, differential diagnosis, stages, and natural histories of HF.	X		
Know the characteristic history and physical exam findings – and their limitations – in evaluation of HF syndromes.	X		
Know the appropriate use of laboratory studies and imaging modalities in evaluation and management of HF patients.		X	
Know the indications for, and clinical pharmacology of, drugs used for treatment of HF, including adverse effects and use in special populations.		X	
Know the indications and clinical pharmacology of intravenous vasoactive and inotropic drugs used for circulatory support in advanced/refractory HF.		X	
Know the types of and indications for mechanical circulatory support.		X	
Know the effects and interactions of HF with other organ systems (kidney, nutritional, metabolic) & in the setting of other systemic disease.		X	
Know the management of cardiac arrhythmias in HF patients, and the indications and risks of use of ICD and cardiac resynchronization therapies.		X	
Know the indications for referral for cardiac transplantation or assist devices.		X	
Evaluation tools: in-training exam; chart stimulated recall; direct observation			
Patient Care	**PGY-4**	**PGY-5**	**PGY-6**
Skill to evaluate and manage patients with new-onset, chronic, and acute decompensated HF.	X		
Skill to appropriately select and incorporate data from diagnostic and laboratory testing in the evaluation and management of HF.	X		
Skill to use and perform invasive hemodynamic monitoring.	X		
Skill to identify candidates for palliative care and hospice, heart transplant and ventricular assist devices.		X	
Skill to recognize and manage cardiac arrhythmias, including the identification of candidates for ICD, biventricular pacing, or arrhythmia ablation.		X	
Skill to recognize and manage co-morbidities in HF patients.		X	
Skill to participate in the management of patients with heart transplantation and mechanical circulatory assist devices.		X	
Evaluation tools: direct observation; multisource evaluation; chart-stimulate review; in-training exam			
Systems-based Practice	**PGY-4**	**PGY-5**	**PGY-6**
Utilize a multidisciplinary coordinated approach for patient management, including transfer of care and employment-related issues.		X	
Incorporate risk-benefit analysis and cost considerations in diagnostic and treatment decisions.		X	
Identify and address financial, cultural, and social barriers to diagnostic and treatment recommendations.		X	
Evaluation tools: chart-stimulated recall; multisource evaluation			
Practice-based Learning & improvement	**PGY-4**	**PGY-5**	**PGY-6**
Identify competency gaps and engage in opportunities to achieve focused education and performance improvement.		X	
Utilize decision support tools for accessing guidelines and pharmacologic information at the point of care.		X	
Evaluation tools: direct observation, self-reflection; conference presentation			
Professionalism	**PGY-4**	**PGY-5**	**PGY-6**
Exhibit sensitivity to patient preferences and end-of-life issues.		X	
Evaluation tools: direct observation; multisource evaluation; global assessment			
Interpersonal & Communication Skills	**PGY-4**	**PGY-5**	**PGY-6**

Communicate with and educate patients and families across a broad range of cultural, ethnic, and socioeconomic backgrounds.	**X**		
Engage in shared decision-making with patients about their condition and the options for diagnosis and treatment.		**X**	
Evaluation tools: direct observation; multisource evaluation; patient survey			

Hypertrophic Cardiomyopathy

Medical Knowledge	PGY-4	PGY-5	PGY-6
Know the prevalence, pathophysiology, differential diagnosis, and natural history of HCM.	**X**		
Know the genetic basis of HCM, the indications for genetic testing, and the indications for screening first-degree relatives.	**X**		
Know the mechanism of dynamic left ventricular outflow obstruction and the effects of changes in load and contractility on the severity of obstruction.	**X**		
Know the role of diastolic dysfunction in the clinical manifestations of HCM.	**X**		
Know the cardinal symptoms and physical findings of HCM, including the effects of position change and Valsalva maneuver.	**X**		
Know the appropriate indications for, and the characteristic findings with, non-invasive imaging studies in HCM patients.	**X**		
Know the indications for, and limitations of, medical therapy, dual chamber pacing, and septal reduction therapy.		**X**	
Know the risk factors for sudden death.	**X**		
Know the appropriate utilization of ICD for primary and secondary prevention.		**X**	
Know the management of cardiac arrhythmias, including atrial fibrillation, in patients with HCM.		**X**	
Know the indications for referral for heart transplantation.		**X**	
Evaluation tools: in-training exam; direct observation; conference presentation; chart review			
Patient Care	**PGY-4**	**PGY-5**	**PGY-6**
Skill to diagnose HCM and evaluate for resting and dynamic left ventricular outflow obstruction.		X	
Skill to appropriately select and incorporate data from non-invasive imaging in the evaluation, management, and follow-up of patients with HCM.		X	
Skill to medically manage HCM patients, with and without obstruction.		X	
Skill to identify appropriate candidates for septal reduction therapy.		X	
Skill to incorporate clinical and diagnostic testing results in the estimation of sudden death risk in HCM.	X		
Skill to manage the patient with HCM who becomes hemodynamically unstable.		X	
Skill to advise appropriate activity levels and limitations for patients with HCM, including avoidance of competitive athletics.	X		
Skill to recognize and manage cardiac arrhythmias in patients with HCM.		X	
Skill to identify appropriate candidates for ICD.		X	
Skill to recognize and manage co-morbidities in HCM patients.		X	
Evaluation tools: direct observation; clinical conference presentation; chart review			
Systems-based Practice	**PGY-4**	**PGY-5**	**PGY-6**
Coordinate care and hand-offs for patients with HCM, including transition or transfer of care.		X	
Utilize cost-awareness and risk-benefit analysis in patient care.		X	
Evaluation tools: direct observation; clinical conference presentation; chart review			
Practice-based Learning and Improvement	**PGY-4**	**PGY-5**	**PGY-6**
Locate, appraise, and assimilate evidence from scientific studies and guidelines in the care of HCM patients.		X	
Engage in self-directed assessment-seeking to identify competency gaps and develop individualized learning plans to address those gaps.		X	
Evaluation tools: direct observation; conference presentation; chart review			
Professionalism	**PGY-4**	**PGY-5**	**PGY-6**
Respond to patient needs in a way that supersedes self-interest, including referral of	X		

complex HCM patients when appropriate			
Evaluation tools: direct observation, multi-source evaluation, chart audit, conference presentation			
Interpersonal & Communication Skills	**PGY-4**	**PGY-5**	**PGY-6**
Communicate with patients and families across a broad range of socioeconomic and cultural backgrounds.	X		
Evaluation tools: direct observation; multi-source feedback; global assessment			

Invasive Cardiology

Medical Knowledge	PGY-4	PGY-5	PGY-6
Know the indications/contraindications and potential complications of cardiac catheterization – for assessment of coronary, cardiac valve, myocardial, and basic adult congenital heart diseases.	X		
Know the principles of radiation safety.	X		
Know the use and complications of contrast agents and the role of renal protection measures.	X		
Know the indications for, and clinical pharmacology of, antiplatelet & anticoagulant drugs, and vasopressor &vasodilating agents, used in the cardiac catheterization lab.		X	
Know cardiovascular hemodynamics and the principles & interpretation of waveforms, pressure, flow, resistance, and cardiac output measurements.		X	
Know the characteristic hemodynamic findings with myocardial, valvular, pericardial, and pulmonary vascular diseases.		X	
Know the methods to detect and estimate the magnitude of intracardiac shunts.		X	
Know coronary anatomy, its variations & congenital abnormalities and coronary blood flow physiology.		X	
Know the angiographic features of coronary artery disease and how to assess the anatomic and physiologic severity.		X	
Know peripheral vascular anatomy; and, the indications for, and complications of, peripheral vascular angiography.		X	
Know the indications/contraindications and potential complications for percutaneous coronary, valvular, and structural heart interventions.		X	
Know the indications for, and the complications of, endomyocardial biopsy and pericardiocentesis.	X		
Know the indications for, and the mechanisms of action of, mechanical circulatory support devices.		X	
Know the indications for, and complications of, vascular access and closure strategies and devices.	X		
Evaluation tools: direct observation; procedure log book; simulation; in-training exam, conference presentation			
Patient Care & Procedural Skills	**PGY-4**	**PGY-5**	**PGY-6**
Skills to perform pre-procedure evaluation, assess appropriateness, and plan procedure strategy.		X	
Skill to perform venous and arterial access and closure.		X	
Skill to perform right heart catheterization.	X		
Skill to analyze hemodynamic, ventriculographic, and angiographic data, and to integrate with clinical findings for patient management.		X	
Skill to perform pericardiocentesis.			X
Skill to manage post-procedural patients, including complications and coordination of care.		X	
Skill to insert and manage intra-aortic balloon counterpulsation device.			X
Skill to perform peripheral angiography.			X
Skills to perform percutaneous coronary interventions.			X
Evaluation tools: procedure log, direct observation, simulation, conference presentation, chart review			
Systems-based Practice	**PGY-4**	**PGY-5**	**PGY-6**
Coordinate care in a multidisciplinary approach for patient management, including transition of care.		X	
Utilize cost-awareness and risk-benefit analysis in patient care.		X	
Evaluation tools: direct observation; procedure log; multidisciplinary conferences; chart stimulated recall			
Practice-based Learning & Improvement	**PGY-4**	**PGY-5**	**PGY-6**
Locate, appraise, and assimilate information from scientific studies, guidelines and registries in order to identify knowledge and performance gaps.		X	

Document number and outcomes of diagnostic and therapeutic procedures.		X	
Evaluation tools: procedure log, direct observation, conference presentation, self-reflection.			
Professionalism	**PGY-4**	**PGY-5**	**PGY-6**
Practice within the scope of personal technical skills or expertise.		X	
Promote and adhere to guidelines and appropriate use criteria.		X	
Evaluation tools: multi-source evaluation, direct observation, conference presentation, self-reflection, procedure log			
Interpersonal & Communication Skills	**PGY-4**	**PGY-5**	**PGY-6**
Communicate with patients and families across a broad range of socioeconomic, ethnic, and cultural backgrounds, including obtaining informed consent.		X	
Evaluation tools: multi-source evaluation; direct observation; patient survey			

Nuclear Cardiology

Medical Knowledge	PGY-4	PGY-5	PGY-6
Know the principles of single photon emission computed tomography (SPECT) and radionuclide ventriculography (RVG) image acquisition and display, including the standard tomographic planes and views.		X	
Know the properties and use of standard perfusion tracers.		X	
Know the principles of radiation safety and how to minimize radiation exposure.		X	
Know the indications for myocardial perfusion imaging and the appropriate selection of exercise versus pharmacologic stress testing.	X		
Know how to evaluate pre-test probability and perform sequential probability analysis to assess post-test probability.	X		
Know the mechanism of the pharmacologic stress agents, the methods of their administration, and the safety issues in using the agents.		X	
Know the protocols for administration of the standard perfusion agents, and the influence of the clinical situation on choice of imaging protocol.		X	
Know the quality control issues, how to review raw data, and recognize artifacts.		X	
Know how to assess ventricular function.		X	
Know the protocols for the use of perfusion imaging to assess myocardial viability.		X	
Know the indications for PET imaging and the use of PET tracers.			X
Evaluation tools: direct observation; in-training exam			
Patient Care & Procedural Skills	**PGY-4**	**PGY-5**	**PGY-6**
Skill to select the appropriate imaging study.	X		
Skill to integrate perfusion imaging findings with clinical and other testing results in the evaluation & management of patients.		X	
Skill to identify results that indicate a high-risk state.	X		
Evaluation tools: direct observation, conference participation, procedure log, in-training exam			
Systems-based Practice	**PGY-4**	**PGY-5**	**PGY-6**
Work effectively & efficiently with the Nuclear lab staff.		X	
Incorporate appropriate use criteria, risk benefit, and cost considerations in the use of radionuclide imaging techniques.	X		
Participate in lab quality monitoring and initiatives.			X
Evaluation tools: direct observation; multi-source evaluation; chart review; conference presentation			
Practice-based Learning & Improvement	**PGY-4**	**PGY-5**	**PGY-6**
Identify gaps and opportunities to achieve focused education and performance improvement.		X	
Evaluation tools: in-training exam; direct observation; conference presentation			
Professionalism	**PGY-4**	**PGY-5**	**PGY-6**
Know and promote adherence to guidelines and appropriate use criteria.		X	
Evaluation tools: global assessment; in-training exam; direct observation; conference presentation			
Interpersonal & Communication Skills	**PGY-4**	**PGY-5**	**PGY-6**
Communicate effectively and timely with patients, families, and referring physicians to ensure test result information is used optimally in patient care.		X	
Create a comprehensive and user-friendly report.			X
Evaluation tools: direct observation; multi-source evaluation			

Pericardial Disease

Medical Knowledge	PGY-4	PGY-5	PGY-6
Know the pathophysiology, differential diagnosis, and natural history of acute and relapsing pericarditis.	X		
Know the pathophysiology, differential diagnosis, and natural history of pericardial effusion and pericardial tamponade.	X		
Know the pathophysiology, differential diagnosis, and natural history of constrictive pericarditis.		X	
Know the cardinal physical findings of acute pericarditis, pericardial tamponade, and constrictive pericarditis.	X		
Know the indications for pericardiocentesis.	X		
Know the indications for, and clinical pharmacology of drugs used for the treatment of acute and relapsing pericarditis.	X		
Know the effects of pericardial disease on other organ systems.		X	
Know pericardial anatomy and structural abnormalities (pericardial cyst and congenital absence of the pericardium).	X		
Know the indications for and characteristic findings in, imaging studies of pericardial diseases.		X	
Know the indications for surgical referral in pericardial diseases, and the expected outcomes.		X	
Evaluation tools: global assessment; chart-stimulated recall, in-training exam			
Patient Care	**PGY-4**	**PGY-5**	**PGY-6**
Skills to clinically evaluate, diagnose, and manage patients with acute pericarditis, and with chronic relapsing pericarditis.	X		
Skill to identify cardinal physical findings, and to evaluate and manage patients with pericardial effusion, including tamponade.		X	
Skill to identify cardinal physical findings, and to evaluate and manage patients with constrictive pericarditis.		X	
Skill to appropriately select and incorporate data from laboratory testing and non-invasive imaging in the evaluation and management of patients with pericardial disease.		X	
Skill to perform pericardiocentesis.			X
Skill to distinguish constrictive pericarditis from restrictive cardiac disease			
Skill to identify patients who should be referred for cardiac catheterization in the evaluation of pericardial disease.		X	
Skill to identify patients with constrictive pericarditis who are candidates for referral for consideration of cardiac surgery.		X	
Evaluation tools: direct observation; global assessment; procedure log; simulation			
Systems-based Practice	**PGY-4**	**PGY-5**	**PGY-6**
Utilize a multidisciplinary coordinated approach for patient management, including transfer of care and employment-related issues.		X	
Incorporate risk-benefit analysis and cost considerations in diagnostic and treatment decisions.		X	
Evaluation tools: direct observation; case presentation; chart review; multi-source evaluation			
Practice-based Learning & Improvement	**PGY-4**	**PGY-5**	**PGY-6**
Identify competency gaps and engage in opportunities to achieve focused education and performance improvement.		X	
Evaluation tools: in-training exam; self-reflection; chart review			
Professionalism	**PGY-4**	**PGY-5**	**PGY-6**

Exhibit sensitivity to patient preference and end-of-life issues.		X	
Practice within the scope of personal expertise or technical skills.		X	
Evaluation tools: global assessment; direct observation; multisource evaluation			
Interpersonal & Communication Skills	**PGY-4**	**PGY-5**	**PGY-6**
Communicate with and educate patients and families across a broad range of cultural, ethnic, and socioeconomic backgrounds.		X	
Engage in shared decision-making with patients about their condition and the options for diagnosis and treatment.		X	
Evaluation tools: direct observation; global assessment; multisource evaluation; patient survey			

Stable Ischemic Heart Disease (SIHD)

Medical Knowledge	PGY-4	PGY-5	PGY-6
Know the epidemiology, pathophysiology, and natural history of atherosclerotic vascular disease, and the characteristic features of stable and unstable coronary artery plaque.	X		
Know the determinants of coronary blood flow and myocardial oxygen consumption.	X		
Know the differential diagnosis of chest pain syndromes, and the characteristic clinical features of typical angina, atypical angina, and non-cardiac chest pain.	X		
Know the clinical features and natural history of angina pectoris in special populations: women, the elderly, and patients with diabetes.	X		
Know the causes of angina pectoris not related to atherosclerotic coronary disease (including valvular heart disease; hypertrophic cardiomyopathy; cocaine; congenital coronary anomalies; vasculitis; and coronary artery spasm).	X		
Know the medical conditions that can provoke or exacerbate angina pectoris.	X		
Know the differential diagnosis and prognosis of myocardial ischemia in patients with non-obstructive coronary disease.	X		
Know the characteristic ECG features of SIHD	X		
Know the indications, contraindications, and limitations of non-invasive testing in the context of the pre-test likelihood and predictive value for diagnosis of coronary artery disease.	X		
Know the role of non-invasive testing in risk-assessment, including the clinical, functional capacity, ECG, and hemodynamic stress test findings indicative of advanced coronary disease or high-risk state.	X		
Know the lifestyle & activity guidelines, and risk factor treatment targets in patients with SIHD.	X		
Know the indications, contraindications, and the clinical pharmacology of medications used to improve symptoms and/or prognosis in patients with SIHD.	X		
Know the role of left ventricular systolic function in clinical decision-making and in estimation of prognosis in patients with SIHD.	X		
Know the indications, limitations and risks of coronary angiography in patients with known or suspected SIHD.	X		
Know the anatomic and physiologic catheterization findings indicating significant coronary artery obstruction; and the coronary angiographic features indicative of a high-risk state.	X		
Know the indications, risks, and benefits of percutaneous or surgical revascularization versus medical therapy in patients with SIHD.	X		
Know the treatment options for refractory symptomatic SIHD.	X		
Know the indications for non-invasive or invasive evaluation following revascularization procedures.	X		
Evaluation tools: in-training exam; direct observation			
Patient Care	**PGY-4**	**PGY-5**	**PGY-6**
Obtain and utilize history, physical examination, and ECG findings in patients with chest pain syndromes to establish a clinical probability of the presence of symptomatic coronary artery disease.	X		
Distinguish stable versus unstable coronary syndromes.	X		
Select evidence-based and cost-effective non-invasive testing for diagnosis and/or risk assessment in patients with chest pain syndromes.	X		
Interpret and apply results of non-invasive testing in the management of patients with SIHD.		X	
Perform and interpret exercise ECG testing.	X		
Establish an effective anti-ischemic medical regimen for patients with SIHD.	X		
Identify appropriate candidates for coronary angiography, and percutaneous or surgical revascularization.	X		
Interpret diagnostic cardiac catheterization findings and integrate into patient management.		X	

Implement lifestyle and pharmacologic interventions to control and achieve target levels of risk factors.	X		
Perform pre-operative risk assessment in cardiovascular patients undergoing non-cardiac surgery.	X		
Evaluation tools: direct observation; chart review; conference presentation; procedure logs			
Systems-based Practice	**PGY-4**	**PGY-5**	**PGY-6**
Incorporate risk-benefit analysis and cost considerations in treatment decisions.		X	
Utilize a multidisciplinary coordinated approach for patient management, including transfer of care and employment-related issues.		X	
Evaluation tools: direct observation; chart review; conference presentation, multi-source evaluation			
Practice-based Learning & Improvement	**PGY-4**	**PGY-5**	**PGY-6**
Identify competency gaps and engage in opportunities to achieve focused education and performance improvement.		X	
Utilize decision support tools for accessing guidelines and pharmacologic information at the point of care.		X	
Evaluation tools: direct observation; in-training exam; conference presentation			
Professionalism	**PGY-4**	**PGY-5**	**PGY-6**
Exhibit sensitivity to patient preference and with end-of-life issues.		X	
Identify and manage conflicts of interest.		X	
Practice within the scope of personal expertise or technical skills.		X	
Evaluation tools: direct observation, multi-source evaluation, self-reflection, chart review			
Interpersonal & Communication Skills	**PGY-4**	**PGY-5**	**PGY-6**
Communicate with and educate patients and families across a broad range of cultural, ethnic, and socioeconomic backgrounds.		X	
Engage in shared decision-making with patients about their condition and the options for diagnosis and treatment.		X	
Evaluation tools: direct observation; multi-source evaluation; patient survey			

Valvular Heart Disease (VHD)

Medical Knowledge	PGY-4	PGY-5	PGY-6
Know the characteristic features and natural history of congenital bicuspid aortic valve disease.	X		
Know the etiology, natural history, pathophysiology, and differential diagnosis of acquired aortic, mitral, pulmonic, and tricuspid valve diseases.	X		
Know the characteristic features and natural history of rheumatic VHD.	X		
Know the cardinal symptoms and physical findings of aortic & mitral stenosis, and their role in management decisions.	X		
Know the cardinal symptoms and physical findings of chronic aortic and chronic mitral regurgitation, and their roles in management of decisions.		X	
Know the causes and distinguishing characteristics of acute versus chronic mitral and aortic regurgitation.		X	
Know the natural history, clinical features, and complications of mitral valve prolapse.	X		
Know the appropriate indications for, and characteristic findings of, echocardiographic testing for diagnosis and assessment of severity during initial evaluation and upon follow-up.		X	
Know the role of stress testing in assessment of VHD.	X		
Know the indications for MRI and CT, in assessment of VHD.		X	
Know the indications for, and characteristic findings with, cardiac catheterization in patients with VHD.		X	
Know the indications for, and clinical pharmacology of, drugs used for the treatment of native and prosthetic VHD, including anticoagulation and antibiotic prophylaxis.	X		
Know the effects of arrhythmias on the clinical manifestations, risk of complications, and management of VHD.	X		
Know the indications and expected outcomes for surgical therapy in VHD, including valve selection and repair versus replacement.		X	
Know the indications and expected outcomes for transcatheter therapy in VHD.		X	
Know the etiology, natural history, physical findings, differential diagnosis, complications and treatment of native valve and prosthetic valve endocarditis.		X	
Know the effects of pregnancy on the clinical manifestations & management of patients with VHD (native & prosthetic).		X	
Evaluation tools: direct observation; in-training exam; chart review; conference presentation			
Patient Care	**PGY-4**	**PGY-5**	**PGY-6**
Identify cardinal physical findings, and ECG abnormalities in patients with VHD.		X	
Distinguish innocent from pathologic heart murmurs.		X	
Manage patients with VHD and coronary artery disease.		X	
Select appropriate testing and integrate results with clinical findings in the evaluation and management of patients with VHD.		X	
Distinguish aortic stenosis from HOCM and other causes of LVOT obstruction.	X		
Recognize bicuspid aortic valve disease and its associated abnormalities.	X		
Recognize impact of ventricular dysfunction on clinical decision-making in VHD.	X		
Recognize the cause and impact of pulmonary hypertension in management of VHD.		X	
Determine candidacy and optimal timing of cardiac surgical or transcatheter treatments in patients with VHD.		X	
Evaluations tools: direct observation, procedure logs, simulation, chart review			
Systems-based Practice	**PGY-4**	**PGY-5**	**PGY-6**
Participate in interdisciplinary decision-making with regard to surgery and transcatheter therapy.		X	
Practice in a manner that fosters the balance of appropriate utilization of finite resources with the net clinical benefit for the individual patients.		X	
Evaluation tools: direct observation; case presentation, multi-source evaluation, chart review			

Practice Learning & Improvement	PGY-4	PGY-5	PGY-6
Identify competency gaps and engage in opportunities to achieve focused education and performance improvement.		X	
Utilize decision support tools for accessing guidelines and pharmacologic information at the point of care.		X	
Evaluation tools: self-reflection; in-training exam			
Professionalism	**PGY-4**	**PGY-5**	**PGY-6**
Exhibit sensitivity to patient preference and with end-of-life issues.		X	
Practice within the scope of personal expertise or technical skill.		X	
Evaluation tools: direct observation, multi-source evaluation, global assessment			
Interpersonal and Communication Skills	**PGY-4**	**PGY-5**	**PGY-6**
Engage in shared decision-making with patients about their condition and the options for diagnosis and treatment.		X	
Evaluation tools: direct observation, multi-source evaluation, patient survey			

Vascular Disease

Medical Knowledge	PGY-4	PGY-5	PGY-6
Know the anatomy of the peripheral arterial and venous systems.	X		
Know the causes and clinical epidemiology of peripheral artery disease, including the incidence and prevalence, sex and ethnic differences, and the influence of traditional risk factors and demographics on outcomes.		X	
Know the pathology, pathophysiology, and differential diagnosis of peripheral artery disease, including atherosclerotic, thrombotic, vasculitic, fibromuscular, vasopastic, and atheroembolic causes.		X	
Know the pathology, pathophysiology, and differential diagnosis of peripheral venous diseases, including venous thromboembolic disease, post-thrombotic syndrome, congenital abnormalities, and varicosity and venous insufficiency.	X		
Know the cardinal symptoms & physical findings of carotid, aorta, renal artery, and of upper and lower extremity arterial diseases.		X	
Know the indications for noninvasive vascular testing, including duplex ultrasonography of carotid arteries, peripheral arteries, bypass grafts and renal arteries.		X	
Know the indications for CT and MRI angiography in patients with suspected vascular disease.		X	
Know the indications, risks, clinical pharmacology, and drug interactions of drugs used to treat vascular diseases.		X	
Know the methods and indications to assess subclinical atherosclerosis (including coronary calcification, carotid intima-media thickness, and ankle-brachial index).		X	
Know the indications for non-invasive screening for abdominal aortic aneurysm.		X	
Know the role for exercise rehabilitation in patients with claudication.		X	
Know the indications and risks for surgical and percutaneous interventional treatments for peripheral vascular diseases; and, the expected outcomes.		X	
Know the indicated laboratory tests to assess for thrombophilia and vasculitis.	X		
Know the causes and treatment of lymphedema.	X		
Know the impact of peripheral vascular disease on overall cardiovascular morbidity and mortality.	X		
Evaluation tools: global assessment; in-training exam; chart review; case presentation			

Patient Care	PGY-4	PGY-5	PGY-6
Skill to perform and interpret an ankle-brachial index measurement.	X		
Skill to interpret limb segmental blood pressure measurements, pulse volume recordings, and treadmill vascular exercise tests.		X	
Skills to interpret duplex ultrasound tests for carotid disease, abdominal aortic aneurysm, peripheral artery disease, renal artery disease and venous disease.			X
Skills to interpret and integrate clinical findings and testing results in the evaluation and management of patients with peripheral vascular disease.		X	
Skills to identify patients for whom referral for revascularization is indicated.			X
Skills to identify asymptomatic patients who may benefit from intensive risk reduction management strategies.	X		
Skill to determine when assessment for subclinical atherosclerosis may be indicated, and to select appropriate tests.		X	
Skill to evaluate and manage patients at risk for, or with, venous thrombosis and/or thromboembolism.	X		
Evaluation tools: global assessment; in-training exam; direct observation, chart review			

Systems-based Practice	PGY-4	PGY-5	PGY-6
Utilize a multidisciplinary coordinated approach for patient management, including transfer of care and employment related issues.		X	
Practice in a manner that fosters the balance of appropriate utilization of finite resources with the net clinical benefit for the individual patient.		X	
Evaluation tools: global assessment; in-training exam; multi-source feedback; chart review			

Practice Learning & Improvement	PGY-4	PGY-5	PGY-6
Identify competency gaps and engage in opportunities to achieve focused education and performance improvement.		X	
Utilize decision support tools for accessing guidelines and pharmacologic information at the point of care.		X	
Evaluation tools: global assessment, conference presentation, multi-source evaluation			
Professionalism	**PGY-4**	**PGY-5**	**PGY-6**
Promote adherence to guidelines and appropriate use criteria.		X	
Forego recommending unvalidated diagnostic testing or treatments.	X		
Evaluation tools: chart review; in-training exam; direct observation; multi-source evaluation; participation in regional/national professional society registries; procedure logbook			
Interpersonal & Communication Skills	**PGY-4**	**PGY-5**	**PGY-6**
Communicate with and educate patients and families across a broad range of cultural, ethnic, and socioeconomic backgrounds.		X	
Evaluation tools: direct observation, multi-source evaluation, global assessment			

Cardiac Catheterization Lab Rotation

ALGH Cardiovascular Disease Fellowship Program

Revised: August, 2014

Overview

The purpose of this rotation is to better understand the roles of invasive catheterization in the modern day management of cardiovascular disease.

Faculty: Drs. B. Greenspahn, A. Hertsberg, B. Laskoe, N. Sabri

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Goals: The CCL rotation is designed to facilitate learning of the indications, limitations and complications of cardiac catheterization; to gain an accelerated knowledge of coronary anatomy; to acquire skill for interpretation of hemodynamic findings; and learn the medical and surgical implications of the angiographic and hemodynamic findings.

Objectives: During the rotation the fellow will participate in the acquisition, interpretation and reporting of invasive imaging modalities including hemodynamic date, invasive imaging, and therapeutic techniques. The fellow will understand the complementary nature of the modalities as well as the specific strengths and weaknesses of all modalities. Fellows will have increasing responsibility for the care of the patient before, during and afterthe procedure as dictated by their level of experience. This includes case selection and planning during and post-procedure.

Responsibilities of Fellows:

1. *Pre-cath evaluation:* Fellows are responsible for the pre-procedure evaluation of each patient scheduled for cardiac catheterization. They will present findings to the attending cardiologists. During the case presentation, the workup is critiqued by the attending. When warranted, discussion of recent literature pertaining to patient management occurs at this time.
    - A complete history and thorough physical exam
    - Pertinent pre-test studies
    - Pre-test non-invasive testing
    - Review of available prior cardiac catheterizations
    - Completing ACC/NCDR Registry forms for data collection

2. *Cath procedure*: Direct observation and supervised performance ofselect procedures.
    - Obtain vascular access
    - Perform catheterization and angiography as appropriate for their level of training with attending physician supervision
    - Review the hemodynamic and angiographic findings with the attending cardiologist following the procedure.
    - Complete post-diagnostic procedure orders before the patient leaves the cath lab

3. *Post-procedure*: Fellows are responsible for the post-procedure care and evaluation of patients undergoing diagnostic cardiac catheterizations. All complications/concerns will be reviewed with the attending cardiologist.
    - Assess the arterial and venous puncture sites for complications
    - Understand the symptoms, and findings associated with access complications
    - Understand and be able to manage the common complications following cardiac catheterization

4. *Reporting and conferences*: Fellows will complete the procedure report reflecting the findings of the catheterization and angiography in a timely manner. More advanced trainees will understand the treatment options available along with their limitations and contra-indications. Fellows will also prepare appropriate patient data for presentation at weekly Cardiac Cath Lab conference.

Responsibilities of Attendings

Attendings on the rotation will be responsible for the final interpretation of all studies. The attending will review each patient's data and images performed that day with the fellow. Educational points of each study will be reviewed with an emphasis on evidence-based medicine regarding indications for, utilization and interpretation of and clinical application of the results in patient management. The attending will supervise the fellow in the preparation of the final report. For senior level fellows, the attending will allow the fellow an increasing role in the care of the patient as warranted by their experience.

Expectations

The CCL rotation experience is designed to progressively increase the trainee responsibilities. Fellows are expected to gain manual dexterity skills as well as enhance their judgment and interpretative skills progressively. Initially, fellows observe, then assist, then perform the various procedures under the direct observation and supervision of an attending cardiologist. The pace of the transformation is commensurate with the fellow's experience and ability at the time.

Skills Expectations for Each Level of Training	PGY IV	PGY V	PGY VI
Learning vascular access	x		
Achieving hemostasis, sheath removal	x		
Setting up pressure manifolds	x		
Maintaining sterility in cardiac catheterization lab	x		
Performing diagnostic coronary angiography and left ventriculography	x		
Maintaining sterility in cardiac catheterization lab	x		
Performing diagnostic coronary angiography and left ventriculography	x		
Performing and interpreting right heart catheterization	x		
Hemodynamics and valve area calculations		x	
Assessment of severity of lesion (stenosis)		x	
Interpretation of angiograms		x	
Assisting in percutaneous transluminal coronary angioplasties		x	
Assisting in intra-coronary stent placements		x	

Insertion and care of intra-aortic balloon counterpulsation devices		x	
Perform endomyocardial biopsies		x	
Performing simple percutaneous transluminal coronary angioplasties (under direct supervision of an attending cardiologist)			x
Assisting in intra-coronary stent placements			x
Assisting in other interventional procedures such as rotoblations, directional coronary arthrectomies, laser angioplasties			x
Assisting in balloon valvuloplasties			x
Learning techniques of lesion assessments including "setting up" angiographic views, analyzing lesions with quantitative coronary angiography			x
Planning interventional strategies			x
Assisting in intra-coronary Doppler flow studies			x
Assisting in the performance and interpretation of intra-coronary ultrasound studies			x

Learning Activities - Core Competency Goals and Objectives

Learning Activities Legend -Fellows			
CCON	**Core Cardiology Conference –** can include Morning Report, Electrophysiology Conference (EP), Cardiac Cath Conference (CCL), Cardiology/ED Conference (CED), Fellows Noon (Core) Conference (FNC), Research Conference (RCON), Journal Club (JC), Cardiac Imaging Conference (CICON)		
DPC	**Direct Patient Care**	**IMGR**	**Internal Medicine Grand Rounds**
DSP	**Directly Supervised Procedure**	**OCC**	**Outpatient Continuity Clinic**
FS	**Faculty Supervision**	**TR**	**Teaching Rounds**
DSP	**Directly Supervised Procedure**		

MEDICAL KNOWLEDGE – PGY IV		
Goal: Demonstrate proficient skills and ability to interpret/perform invasive procedures to treat various cardiovascular illnesses.		
Objectives	**Learning Activities**	**Evaluation Methods**
Expand clinically applicable knowledge base of the basic and clinical sciences underlying the care of patients with chest pain and acute cardiac disease.	**CCON, DPC, FS**	**AE**
Access and critically evaluate current medical information and scientific evidence relevant to acute cardiac care.	**CCON, DPC, FS**	**AE**
Understand indications for aggressive anticoagulant and antiplatelet therapy as well as the mechanisms of action of the various agents.	**CCON, DPC, FS**	**AE**
Understand the physiologic and pathophysiologic principles of invasive hemodynamic monitoring including indications.	**CCON, DPC, FS**	**AE**
Develop and demonstrate in-depth knowledge of the principles of diagnosis and management of ischemic heart disease including unstable angina pectoris and myocardial infarction; congestive heart failure; rheumatic heart disease, and congenital heart disease.	**CCON, DPC, FS**	**AE**

Develop and demonstrate in-depth knowledge of the indications for, principles, complications, and interpretation of right and left heart catheterization, coronary angiography, ventriculography and percutaneous interventions.	**CCON, DPC, FS**	**AE**

PATIENT CARE– PGY IV		
Goal: Demonstrate understanding and competency in approach to pre-operative, peri-operative and post-operative patient care.		
Objectives	**Learning Activities**	**Evaluation Methods**
Pre-procedural patient evaluation, post procedural follow-up protocols.	**CCON, DPC, FS**	**AE, PL**
Performance of left and right heart catheterization.	**CCON, DPC, FS**	**AE, PL**
Experience and expertise in the performance of coronary angiography and left ventriculography.	**CCON, DPC, FS**	**AE, PL**
Interpretation of hemodynamic data and determination of aortic stenosis and shunt flow.	**CCON, DPC, FS**	**AE, PL**
Gain experience and assessment of pericardial disease including pericardiocentesis as well as constrictive pericarditis.		
Experience in performance of percutaneous endomyocardial biopsies.	**CCON, DPC, FS**	**AE, PL**
Experience and expertise in placement utilization and indications for intra-aortic balloon counterpulsation placement.	**CCON, DPC, FS**	**AE, PL**

INTERPERSONAL AND COMMUNICATION SKILLS – PGY IV		
Goal: Demonstrate interpersonal and communication skills in medical practice that develop and maintain effective information exchange and collaboration with cardiology patients, family, and other members of the health care team.		
Objectives	**Learning Activities**	**Evaluation Methods**
Communicate effectively with patients and families in a stressful critical care environment.	**DPC, FS**	**AE**
Communicate effectively with physician colleagues and members of other health care professions to assure timely, comprehensive patient care.	**DPC, FS**	**AE**
Communicate effectively with colleagues when discussing results of various cardiac catheterization and interventions and further management.	**DPC, FS**	**AE**

PROFESSIONALISM – PGY IV		
Goal: Demonstrate commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse cardiology patient population.		
Objectives	**Learning Activities**	**Evaluation Methods**
Interact professionally toward patients, families, colleagues, and all members of the health care team.	**DPC**	**AE**
Appreciation of the social context of illness.	**DPC**	**AE**

PRACTICE BASED LEARNING AND IMPROVEMENT – PGY IV		
Goal: Learn to investigate and evaluate personal patient care practices, appraise and assimilate scientific evidence related to cardiology, and improve personal patient care practices.		
Objectives:	**Learning Activities**	**Evaluation Methods**

Identify and acknowledge gaps in personal knowledge and skills in care of acute cardiac patients.	**DPC**	**AE**
Commitment to professional scholarship, including systematic and critical perusal of relevant print and electronic literature, with emphasis on integration of basic science with clinical medicine, and evaluation of information in light of the principles of evidence-based medicine.	**DPC**	**AE**

SYSTEM BASED PRACTICE – PGY IV		
Goal: Demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care in that is of optimal value to their cardiology program.		
Objectives	**Learning Activities**	**Evaluation Methods**
Identify and acknowledge gaps in personal knowledge and skills in care of acute cardiac patients.	**DPC**	**AE**
Commitment to professional scholarship, including systematic and critical perusal of relevant print and electronic literature, with emphasis on integration of basic science with clinical medicine, and evaluation of information in light of the principles of evidence-based medicine.	**DPC**	**AE**

MEDICAL KNOWLEDGE – PGY V		
Goal: Demonstrate proficient skills and ability to interpret/perform invasive procedures to treat various cardiovascular illnesses.		
Objectives	**Learning Activities**	**Evaluation Methods**
Expand clinically applicable knowledge base of the basic and clinical sciences underlying the care of patients with chest pain and acute cardiac disease.	**CCON, DPC, FS**	**AE**
Access and critically evaluate current medical information and scientific evidence relevant to acute cardiac care.	**CCON, DPC, FS**	**AE**
Understand indications for aggressive anticoagulant and antiplatelet therapy as well as the mechanisms of action of the various agents.	**CCON, DPC, FS**	**AE**
Understand the physiologic and pathophysiologic principles of invasive hemodynamic monitoring including indications.	**CCON, DPC, FS**	**AE**
Develop and demonstrate in-depth knowledge of the principles of diagnosis and management of ischemic heart disease including unstable angina pectoris and myocardial infarction; congestive heart failure; rheumatic heart disease, and congenital heart disease.	**CCON, DPC, FS**	**AE**
Develop and demonstrate in-depth knowledge of the indications for principles, complications, and interpretation of right and left heart catheterization, coronary angiography, ventriculography and percutaneous interventions.	**CCON, DPC, FS**	**AE**

PATIENT CARE– PGY V		
Goal: Demonstrate understanding and competency in approach to pre-operative, peri-operative and post-operative patient care.		
Objectives	**Learning Activities**	**Evaluation Methods**
Pre-procedural patient evaluation, post procedural follow-up protocols.	**CCON, DPC, FS**	**AE, PL**
Performance of left and right heart catheterization.	**CCON, DPC, FS**	**AE, PL**
Experience and expertise in the performance of coronary angiography and left ventriculography.	**CCON, DPC, FS**	**AE, PL**
Interpretation of hemodynamic data and determination of aortic stenosis and shunt flow.	**CCON, DPC, FS**	**AE, PL**
Gain experience and assessment of pericardial disease including pericardiocentesis as well as constrictive pericarditis.	**CCON, DPC, FS**	**AE, PL**
Experience in performance of percutaneous endomyocardial biopsies.	**CCON, DPC, FS**	**AE, PL**
Experience and expertise in placement utilization and indications for intra-aortic balloon counterpulsation placement.	**CCON, DPC, FS**	**AE, PL**

INTERPERSONAL AND COMMUNICATION SKILLS – PGY V		
Goal: Demonstrate interpersonal and communication skills in medical practice that develop and maintain effective information exchange and collaboration with cardiology patients, family, and other members of the health care team.		
Objectives	**Learning Activities**	**Evaluation Methods**
Communicate effectively with patients and families in a stressful critical care environment.	**DPC, FS**	**AE**
Communicate effectively with physician colleagues and members of other health care professions to assure timely, comprehensive patient care.	**DPC, FS**	**AE**
Communicate effectively with colleagues when discussing results of various cardiac catheterization and interventions and further management.	**DPC, FS**	**AE**
PROFESSIONALISM – PGY V		
Goal: Demonstrate commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse cardiology patient population.		
Objectives	**Learning Activities**	**Evaluation Methods**
Interact professionally toward patients, families, colleagues, and all members of the health care team.	**DPC**	**AE**
Appreciation of the social context of illness.	**DPC**	**AE**

PRACTICE BASED LEARNING AND IMPROVEMENT – PGY V		
Goal: Learn to investigate and evaluate personal patient care practices, appraise and assimilate scientific evidence related to cardiology, and improve personal patient care practices.		
Objectives:	**Learning Activities**	**Evaluation Methods**
Identify and acknowledge gaps in personal knowledge and skills in care of acute cardiac patients.	**DPC**	**AE**
Commitment to professional scholarship, including systematic and critical	**DPC**	**AE**

perusal of relevant print and electronic literature, with emphasis on integration of basic science with clinical medicine, and evaluation of information in light of the principles of evidence-based medicine.		

SYSTEM BASED PRACTICE – PGY V		
Goal: Demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care in that is of optimal value to their cardiology program.		
Objectives	**Learning Activities**	**Evaluation Methods**
Identify and acknowledge gaps in personal knowledge and skills in care of acute cardiac patients.	**DPC**	**AE**
Commitment to professional scholarship, including systematic and critical perusal of relevant print and electronic literature, with emphasis on integration of basic science with clinical medicine, and evaluation of information in light of the principles of evidence-based medicine.	**DPC**	**AE**
Identify and acknowledge gaps in personal knowledge and skills in care of acute cardiac patients.	**DPC**	**AE**

MEDICAL KNOWLEDGE – PGY VI		
Goal: Demonstrate proficient skills and ability to interpret/perform invasive procedures to treat various cardiovascular illnesses.		
Objectives	**Learning Activities**	**Evaluation Methods**
Expand clinically applicable knowledge base of the basic and clinical sciences underlying the care of patients with chest pain and acute cardiac disease.	**CCON, DPC, FS**	**AE**
Access and critically evaluate current medical information and scientific evidence relevant to acute cardiac care.	**CCON, DPC, FS**	**AE**
Understand indications for aggressive anticoagulant and antiplatelet therapy as well as the mechanisms of action of the various agents.	**CCON, DPC, FS**	**AE**
Understand the physiologic and pathophysiologic principles of invasive hemodynamic monitoring including indications.	**CCON, DPC, FS**	**AE**
Develop and demonstrate in-depth knowledge of the principles of diagnosis and management of ischemic heart disease including unstable angina pectoris and myocardial infarction; congestive heart failure; rheumatic heart disease, and congenital heart disease.	**CCON, DPC, FS**	**AE**
Develop and demonstrate in-depth knowledge of the indications for principles, complications, and interpretation of right and left heart catheterization, coronary angiography, ventriculography and percutaneous interventions.	**CCON, DPC, FS**	**AE**

PATIENT CARE– PGY VI		
Goal: Demonstrate understanding and competency in approach to pre-operative, peri-operative and post-operative patient care.		
Objectives	**Learning Activities**	**Evaluation Methods**
Pre-procedural patient evaluation, post procedural follow-up protocols.	**CCON, DPC, FS**	**AE, PL**
Performance of left and right heart catheterization.	**CCON, DPC, FS**	**AE, PL**
Experience and expertise in the performance of coronary angiography and left ventriculography.	**CCON, DPC, FS**	**AE, PL**
Interpretation of hemodynamic data and determination of aortic stenosis and shunt flow.	**CCON, DPC, FS**	**AE, PL**
Gain experience and assessment of pericardial disease including pericardiocentesis as well as constrictive pericarditis.	**CCON, DPC, FS**	**AE, PL**
Experience in performance of percutaneous endomyocardial biopsies.	**CCON, DPC, FS**	**AE, PL**
Experience and expertise in placement utilization and indications for intra-aortic balloon counterpulsation placement.	**CCON, DPC, FS**	**AE, PL**

INTERPERSONAL AND COMMUNICATION SKILLS – PGY VI		
Goal: Demonstrate interpersonal and communication skills in medical practice that develop and maintain effective information exchange and collaboration with cardiology patients, family, and other members of the health care team.		
Objectives	**Learning Activities**	**Evaluation Methods**
Communicate effectively with patients and families in a stressful critical care environment.	**DPC, FS**	**AE**
Communicate effectively with physician colleagues and members of other health care professions to assure timely, comprehensive patient care.	**DPC, FS**	**AE**
Communicate effectively with colleagues when discussing results of various cardiac catheterization and interventions and further management.	**DPC, FS**	**AE**
PROFESSIONALISM – PGY VI		
Goal: Demonstrate commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse cardiology patient population.		
Objectives	**Learning Activities**	**Evaluation Methods**
Interact professionally toward patients, families, colleagues, and all members of the health care team.	**DPC**	**AE**
Appreciation of the social context of illness.	**DPC**	**AE**

PRACTICE BASED LEARNING AND IMPROVEMENT – PGY VI		
Goal: Learn to investigate and evaluate personal patient care practices, appraise and assimilate scientific evidence related to cardiology, and improve personal patient care practices.		
Objectives:	**Learning Activities**	**Evaluation Methods**
Identify and acknowledge gaps in personal knowledge and skills in care of acute cardiac patients.	**DPC**	**AE**
Commitment to professional scholarship, including systematic and critical perusal of relevant print and electronic literature, with emphasis on	**DPC**	**AE**

integration of basic science with clinical medicine, and evaluation of information in light of the principles of evidence-based medicine.		

SYSTEM BASED PRACTICE – PGY V		
Goal: Demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care in that is of optimal value to their cardiology program.		
Objectives	**Learning Activities**	**Evaluation Methods**
Identify and acknowledge gaps in personal knowledge and skills in care of acute cardiac patients.	**DPC**	**AE**
Commitment to professional scholarship, including systematic and critical perusal of relevant print and electronic literature, with emphasis on integration of basic science with clinical medicine, and evaluation of information in light of the principles of evidence-based medicine.	**DPC**	**AE**
Identify and acknowledge gaps in personal knowledge and skills in care of acute cardiac patients.	**DPC**	**AE**

Knowledge Expectations

1. Vascular Access
    - Basic understanding of access site anatomy, including femoral artery and vein, internal jugular vein and brachial artery
    - Basic understanding of disease conditions (and surgical correction) involving these anatomic structures
    - Appreciate atherosclerotic disease of the ileo-femoral system and knowledge of surgical revascularization anatomy, including aorto-bifemoral graft, Fem-fem bypass and Fem-pop bypass.

2. Right Heart Catheterization (hemodynamics): Basic understanding of normal and abnormal right heart hemodynamics with specific attention to the following disease states
    - Congenital ASD
    - Congenital VSD
    - 1st pulmonary hypertension
    - Congestive heart failure
    - Constrictive physiology
    - Cardiac tamponade

3. Left Heart Catheterization (hemodynamics): Basic understanding of normal and abnormal left hemodynamics with specific attention to the following disease states
    - Aortic insufficiency
    - Aortic stenosis
    - Hypertrophic cardiomyopathy
    - Mitral insufficiency
    - Mitral stenosis
    - Cardiomyopathy
    - Constrictive physiology
    - Cardiac tamponade

- Measurements of cardiac output (Fick, Thermodilution)

4. Left Ventriculography: Basic understanding of normal and abnormal left ventricular function with specific attention to the following disease states
    - Coronary artery disease
    - Mitral insufficiency
    - Hypertrophic cardiomyopathy
    - Estimation of ejection fraction

5. Coronary Angiography: Basic understanding of normal anatomy, pathologic impact on anatomy and surgical impact, with specific attention on the following:
    - Normal coronary anatomy
    - Anomalous origins of the major coronary arteries
    - Coronary artery disease
    - Saphenous vein grafts
    - Internal mammary arteries

6. Aortography and Ilio-femoral angiography: Basic understanding of normal anatomy, pathologic impact on anatomy and surgical impact, with specific attention on the following:
    - Aortic insufficiency
    - Aneurysm
    - Ascending Aorta
    - Descending aorta
    - Abdominal aorta
    - Aortic dissection
    - Surgical repair of aortic dissection

7. Intra-aortic balloon pump: Basic understanding of the indications, contraindications, insertion technique and trouble-shooting

8. Cardiac catheterization laboratory equipment: Basic understanding of the equipment and devices used in the catheterization
    - X-ray/fluoroscopic equipment
    - Pressure manometers
    - Digital storage system
    - Troubleshoot common equipment problems

Lines of Responsibility: The CCL team is comprised of technicians, nurses, nurse practitioners, physician assistants, fellows and attending cardiologists. The team will interact with the referring cardiologists and internists and with the cardiothoracic surgeons as needed. The team is led by an attending, who bears the final responsibility for patient management or recommendations for management. The cardiology fellows are next in line, followed by physician assistants, nursing staff and technicians.

Cardiac Intensive Care/Interventional Unit Rotation

ALGH Cardiovascular Disease Fellowship Program

Revised August, 2014

Overview

The purpose of the CICU/IU rotation is to develop expertise in the care of patients with acute cardiovascular illnesses.

Faculty: All

Goals: During the CICU/IU rotation, trainees will acquire the skills necessary to care for critically ill, hospitalized patients with a broad range of cardiovascular diseases, including acute myocardial infarction, congestive heart failure, congenital heart disease, serious arrhythmias and advanced valvular heart disease. Fellows will also have exposure to patients following in the cardiac catheterization lab.

Objectives:

- Function in the acute care setting providing patient care and consultations to the attending staff, other fellows, residents, medical students, nursing staff and others as appropriate.
- Understand the appropriate use of non-invasive and invasive testing and monitoring tools for patient assessment and development of treatment strategies.
- Participate in the placement of monitoring lines and pacing devices as needed.
- Understand the pharmacodynamics of vasoactive medications routinely utilized in this setting.
- Develop leadership skills in managing the CICU interdisciplinary team.
- Demonstrate increasing levels of independence in the above roles as appropriate for their level of training.

Responsibilities of Fellows:

- Appropriate triage and initial evaluation of all patients presenting to the CICU/ IU and communication of these findings to the designated supervising attending cardiologist.
- Daily follow-up and documentation on all patients on the CCU/IU service; discussion of test results and care plan with the attending as the patients progress through the hospital stay.
- Supervision of house staff in the planning and implementation of the treatment plan.
- Discharge patients as appropriate and as their condition warrants ongoing cardiology involvement.
- Manage an interdisciplinary team by leading daily rounds.

Responsibilities of Attendings:

- Responsible for direct supervision of the fellow at all times.
- Will review and confirm the historical and physical findings documented by the fellow.
- Review and discuss testing results and care plan with the fellow.
- Supervise all unit-based procedures.
- Retains ultimate responsibility for the care of the patient.

Learning Activities - Core Competency Goals and Objectives

Learning Activities Legend -Fellows			
CCON	**Core Cardiology Conference –** can include Morning Report, Electrophysiology Conference (EP), Cardiac Cath Conference (CCL), Cardiology/ED Conference (CED), Fellows Noon (Core) Conference (FNC), Research Conference (RCON), Journal Club (JC), Cardiac Imaging Conference (CICON)		
DPC	**Direct Patient Care**	**IMGR**	**Internal Medicine Grand Rounds**
DSP	**Directly Supervised Procedure**	**OCC**	**Outpatient Continuity Clinic**
FS	**Faculty Supervision**	**TR**	**Teaching Rounds**

Legend for Methods of Evaluation - Fellows			
AE	**Attending Evaluation**	**PL**	**Procedure Logs**
CCR	**Competency Committee Review**	**SE**	**Self-Evaluation**
DSP	**Directly Supervised Procedure**		

PATIENT CARE– PGY IV		
Goal: Demonstrate understanding and ability to apply appropriate evaluation diagnosis and patient care plan to patients with chest pain and acute coronary syndromes.		
Objectives	**Learning Activities**	**Evaluation Methods**
Pharmacology of cardiovascular drugs	**CCON, DPC, TR**	**AE**
Cardiac emergencies, evaluation and treatment	**CCON, DPC, TR**	**AE**
Dilated cardiomyopathy	**CCON, DPC, TR**	**AE**
Risk stratification after myocardial infarction	**CCON, DPC, TR**	**AE**
Evaluation of valvular heart disease and indications for surgical treatment	**CCON, DPC, TR**	**AE**
Initial evaluation and treatment of acute coronary syndromes including ST-segment and non-ST segment elevation myocardial infarction	**CCON, DPC, TR**	**AE**
Use of thrombolytics for the treatment of acute coronary syndromes	**CCON, DPC, TR**	**AE**
Diagnosis, management and prevention of stroke in patients with atrial fibrillation	**CCON, DPC, TR**	**AE**
Medical therapy of systolic and diastolic congestive heart failure	**CCON, DPC, TR**	**AE**

MEDICAL KNOWLEDGE – PGY IV		
Goal: Demonstrate understanding and management of acute coronary syndromes.		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand mechanism of action and indication for anti-coagulation and antiplatelet agents.	**CCON, TR**	**AE**
Understand physiologic and pathophysiology of invasive hemodynamic monitoring	**CCON, DPC, TR**	**AE**
Understand indications and principles for ECG, echocardiography, nuclear imaging, stress testing, and right and left heart catheterization	**CCON, DPC, TR**	**AE**

INTERPERSONAL AND COMMUNICATION SKILLS – PGY IV		
Goal: Demonstrate interpersonal and communication skills in medical practice that develop and maintain effective information exchange and collaboration with cardiology patients, family members and other professional associates.		
Objectives	**Learning Activities**	**Evaluation Methods**
Communicate effectively with patients and families in a critical care setting	**DPC, TR**	**AE**
Communicate effectively with other physicians and other members of the health care team	**DPC, TR**	**AE**
Communicate effectively with colleagues when signing out	**DPC, TR**	**AE, Eval**

PRACTICE BASED LEARNING AND IMPROVEMENT – PGY IV		
Goal: Learn to investigate and evaluate personal patient care practices, appraise and assimilate scientific evidence related to cardiology, and improve personal patient care practices.		
Objectives	**Learning Activities**	**Evaluation Methods**
Identify and acknowledge gaps in personal knowledge and skills in caring for cardiac patients	**CCON, DPC**	**AE**
Begin to pursue professional scholarship integrating basic science with clinical medicine with principles of evidence based medicine	**CCON, DPC**	**AE**

SYSTEM BASED PRACTICE – PGY IV		
Goal: Demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care in that is of optimal value to their cardiology patients.		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand and utilize multidisciplinary resources to care for acutely ill cardiac patients	**CCON, DPC**	**AE**

PROFESSIONALISM – PGY IV		
Goal: Demonstrate commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse cardiology patient population.		
Objectives	**Learning Activities**	**Evaluation Methods**
Appreciate the social and psychological context of cardiac disease	**DPC, TR**	**AE**

PATIENT CARE– PGY V		
Goal: Demonstrate understanding and ability to apply appropriate evaluation diagnosis and patient care plan to patients with chest pain and acute coronary syndromes.		
Objectives	**Learning Activities**	**Evaluation Methods**
Use of interventional approaches for the treatment of acute coronary syndromes	**CCON, DPC, TR**	**AE**
Pathogenesis and treatment of Supraventricular and ventricular arrhythmias	**CCON, DPC, TR**	**AE**
Pathogenesis of congestive heart failure	**CCON, DPC, TR**	**AE**
Pathogenesis of atherosclerosis	**CCON, DPC, TR**	**AE**
Diseases of the aorta	**CCON, DPC, TR**	**AE**
Peripheral vascular disease including carotid, renal, and peripheral arteries	**CCON, DPC, TR**	**AE**
Hyperlipidemia and other risk factors for atherosclerosis	**CCON, DPC, TR**	**AE**
Pulmonary hypertension and pulmonary embolism	**CCON, DPC, TR**	**AE**
Endocarditis	**CCON, DPC, TR**	**AE**
Evaluation of patients with hypertrophic and restrictive Cardiomyopathy	**CCON, DPC, TR**	**AE**
Evaluation of patients with pericardial disease	**CCON, DPC, TR**	**AE**
Evaluation of the cardiac risk for non-cardiac surgery	**CCON, DPC, FS**	**AE**
Criteria for implantation of pacemakers	**CCON, TR**	**AE**
Overview and evaluation of pacemakers and cardioverter defibrillators	**CCON, TR**	**AE**
Mechanisms of sudden death	**CCON, TR**	**AE**

MEDICAL KNOWLEDGE – PGYV		
Goal: Demonstrate skills to apply understanding and management of patients with acute coronary syndromes.		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand principles of primary and secondary risk factor modification	**CCON, DPC**	**AE**

INTERPERSONAL AND COMMUNICATION SKILLS– PGY V		
Goal: Demonstrate interpersonal and communication skills in medical practice that develop and maintain effective information exchange and collaboration with cardiology patients, family members and professional associates.		
Objectives	**Learning Activities**	**Evaluation Methods**
Communicate effectively with patients and families in a critical care setting	**DPC, TR**	**AE**
Communicate effectively with other physicians and other members of the health care team	**DPC, TR**	**AE**
Communicate effectively with colleagues when signing out service	**DPC, TR**	**AE, Eval**

PROFESSIONALISM – PGY V		
Goal: Demonstrate commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse cardiology patient population.		
Objectives	**Learning Activities**	**Evaluation Methods**
Appreciate the social and psychological context of cardiac disease	**DPC, TR**	**AE**

PRACTICE BASED LEARNING AND IMPROVEMENT – PGY V		
Goal: Learn to investigate and evaluate personal patient care practices, appraise and assimilate scientific evidence related to cardiology, and improve personal patient care practices.		
Objectives	**Learning Activities**	**Evaluation Methods**
Identify and acknowledge gaps in personal knowledge and skills in the care of cardiac patients	**CCON, DPC**	**AE**

SYSTEMS BASED PRACTICE – PGY V		
Goal: Demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care in that is of optimal value to their cardiology patients.		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand cost effectiveness of diagnostic and therapeutic strategies	**CCON, DPC**	**AE**

PATIENT CARE - PGY VI		
Goal: Demonstrate understanding and ability to apply, manage and teach appropriate evaluation diagnosis and patient care plan to patients with chest pain and acute coronary syndromes.		
Objectives	**Learning Activities**	**Evaluation Methods**
Adult congenital heart disease	**CCON, DPC**	**AE, DSP**
Heart disease in the elderly patient and in women	**CCON, TR**	**AE**
Neoplastic heart disease	**CCON, TR**	**AE**
Cardiovascular reflex and humoral control of the circulation	**CCON, TR**	**AE**
Pathogenesis of endothelial dysfunction	**CCON, TR**	**AE**
Evaluation of patients with cardiovascular disease during pregnancy	**CCON, TR**	**AE**
Rheumatological heart disease including a collagen vascular disease and the heart, rheumatic fever, and miscellaneous causes of heart disease including restrictive disease of the heart such as amyloidosis and hemachromatosis, and infectious diseases of the heart such as HIV, Lyme carditis, and endocarditis	**CCON, AR**	**AE**

MEDICAL KNOWLEDGE – PGY VI		
Goal: Demonstrate skills to apply and teach principles and care management of patients with acute coronary syndromes.		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand mechanism of action and indication for anti-coagulation and antiplatelet agents.	**CCON, TR**	**AE**
Understand physiologic and pathophysiology of invasive hemodynamic monitoring	**CCON, DPC, TR**	**AE**
Understand indications and principles for ECG, echocardiography, nuclear imaging, stress testing, and right and left heart catheterization	**CCON, DPC, TR**	**AE**
Understand principles of primary and secondary risk factor modification	**CCON, DPC, TR**	**AE**

PROFESSIONALISM – PGY VI		
Goal: Demonstrate commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse cardiology patient population.		
Objectives	**Learning Activities**	**Evaluation Methods**
Appreciate the social and psychological context of cardiac disease	**DPC, TR**	**AE**

INTERPERSONAL AND COMMUNICATION SKILLS– PGY VI		
Goal: Demonstrate interpersonal and communication skills in medical practice that develop and maintain effective information exchange and collaboration with cardiology patients, family members and professional associates.		
Objectives	**Learning Activities**	**Evaluation Methods**
Communicate effectively with patients and families in a critical care setting	**DPC, TR**	**AE**
Communicate effectively with other physicians and other members of the health care team	**DPC, TR**	**AE**
Communicate effectively with colleagues when signing out service	**DPC, TR**	**AE, Eval**

PRACTICE BASED LEARNING AND IMPROVEMENT – PGY VI		
Goal: Learn to investigate and evaluate personal patient care practices, appraise and assimilate scientific evidence related to cardiology, and improve personal patient care practices.		
Objectives	**Learning Activities**	**Evaluation Methods**
Pursue professional scholarship integrating basic science with clinical medicine with principles of evidence based medicine	**CCON, DPC**	**AE**

SYSTEMS BASED PRACTICE – PGY VI		
Goal: Demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care in that is of optimal value to their cardiology patients.		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand cost effectiveness of diagnostic and therapeutic strategies	**CCON, DPC**	**AE**
Understand and utilize multidisciplinary resources to care for the acutely ill	**CCON, DPC**	**AE**

Knowledge Expectations

1. Evaluation, triage, management and risk stratification of patients with chest pain
2. Management of patients with stable coronary artery disease and acute coronary syndromes (unstable angina, St and non-St elevation acute myocardial infarction)
3. Indications for and complications of non-invasive and invasive cardiac testing, intervention and revascularization
4. Primary and secondary prevention of coronary artery disease
5. Management of patients with acute and chronic CHF
6. Recognition and initial management of life threatening arrhythmias
7. Primary and secondary prevention of life threatening arrhythmias
8. Management of hypertensive urgency and crisis

9. Indications for use and adverse reactions of common cardiovascular drugs
10. EKG interpretation
11. Placement (and subsequent management of) Swan Ganz catheters, temporary intravenous and transcutaneous pacemakers and intra aortic balloon pumps
12. Practice evidence-based medicine

Lines of Responsibility: In the Cardiac Intensive Care and Interventional Units, cardiology fellows function as the key component of the medical team whose primary objective is to care for patients with acute cardiovascular illnesses and/or CCL post-procedure patients. Fellows will be required to interact with generalists and specialists in all areas, with particularly close interactions fostered with CV surgery and internal medicine services. The fellow works closely with the attending cardiologist and gradually assumes a more autonomous role in decision making; however it is always the attending cardiologist who bears the ultimate responsible for patient management and care.

Consultative Cardiology Rotation

ALGH Cardiovascular Disease Fellowship Program

Revised August, 2014

Faculty: All

Goals: This rotation includes a broad experience in consultative/inpatient cardiology. Patients will be seen and evaluated throughout the hospital setting, including the ED and general medical floors. Through participation in the initial evaluation and ongoing care of these patients, the fellow will develop skills and abilities appropriate for their level of learning to function as an independent cardiology consultant.

Objectives: During this rotation the fellow will increase their knowledge base in all aspects of cardiology. Communication and teaching skills will be heavily focused upon during interactions with patients, attendings and other healthcare providers.

Responsibilities of Fellows:

1. The appropriate and initial evaluation for all consults seen in the hospital and the communication of these findings to the appropriate attending physician.
2. Daily follow-up and documentation on all consult service patients along with discussion of test results and care plans with the attending physician.
3. Ongoing teaching of residents and medical students on the rotation on conjunction with the supervising attending.
4. Leading multidisciplinary teams in driving best patient outcomes.

Responsibilities of Attendings:

Attendings on the rotation will be responsible for direct supervision of the fellow at all times. The attending will review and confirm the historical and physical findings that have been documented by the fellow. Additionally, the attendings will review and discuss the care plan and recommendations and review pertinent testing results with the fellow. Ultimate responsibility for the care of the patient lies with the attending physician.

Learning Activities - Core Competency Goals and Objectives

Learning Activities Legend -Fellows			
CCON	**Core Cardiology Conference –** can include Morning Report, Electrophysiology Conference (EP), Cardiac Cath Conference (CCL), Cardiology/ED Conference (CED), Fellows Noon (Core) Conference (FNC), Research Conference (RCON), Journal Club (JC), Cardiac Imaging Conference (CICON)		
DPC	**Direct Patient Care**	**IMGR**	**Internal Medicine Grand Rounds**

DSP	**Directly Supervised Procedure**	**OCC**	**Outpatient Continuity Clinic**
FS	**Faculty Supervision**	**TR**	**Teaching Rounds**

Legend for Methods of Evaluation - Fellows			
AE	**Attending Evaluation**	**PL**	**Procedure Logs**
CCR	**Competency Committee Review**	**SE**	**Self-Evaluation**
DSP	**Directly Supervised Procedure**		

PATIENT CARE – PGY IV		
Goal: Demonstrate ability to understand and evaluate patients with cardiovascular disorders		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand the pharmacology of cardiovascular drugs	**CCON, TR**	**AE**
Ability to respond to cardiac emergencies, evaluation and treatment	**CCON, DPC, TR**	**AE**
Evaluation of valvular heart disease and of indications for surgical treatment	**CCON, DPC, TR**	**AE**
Complete preoperative evaluations of patients with cardiovascular disorders	**CCON, DPC, TR**	**AE**
Ability to complete a diagnosis, management and prevention of stroke in patients with atrial fibrillation	**CCON, TR**	**AE**
Carry out medical therapy of systolic and diastolic congestive heart failure	**CCON, TR**	**AE**

MEDICAL KNOWLEDGE – PGY IV		
Goal: Demonstrate ability to understand and carry out the approach to cardiac patient consult or clinic visit.		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand the mechanism of action and indication for anti-coagulation and antiplatelet agents	**CCON, TR**	**AE**
Understand physiologic and pathophysiology of invasive hemodynamic monitoring	**CCON, DPC, TR**	**AE**
Understand the indications and principles for ECG, echocardiography, nuclear imaging, stress testing, and right and left heart catheterization	**CCON, DPC, TR**	**AE**

INTERPERSONAL AND COMMUNICATION SKILLS – PGY IV		
Goal: Demonstrate interpersonal and communication skills in medical practice that develop and maintain effective information exchange and collaboration with cardiology patients, family members, and other health team members		
Objectives	**Learning Activities**	**Evaluation Methods**
Communicate effectively with patients and families in the critical care setting	**DPC, TR**	**AE**
Communicate effectively with other physicians and members of the health care team	**DPC, TR**	**AE, SE**
Communicate effectively with colleagues during patient hand-off (transition of care).	**CCON, DPC, TR**	**AE, CCOM**

PROFESSIONALISM – PGY IV		
Goal: Demonstrate commitment to carrying out professional responsibilities, adherence to ethical principles and sensitivity to a diverse cardiology patient population		
Objectives	**Learning Activities**	**Evaluation Methods**
Interact in a professional manner with patients, families and members of the health care team	**DPC, TR**	**AE, CCOM**
Appreciate the social and psychological context of cardiac disease	**DPC, TR**	**AE, CCOM**

PRACTICE BASED LEARNING AND IMPROVEMENT – PGY IV		
Goal: Demonstrate ability to understand and carry out the approach to cardiac patient consult or clinic visit.		
Objectives	**Learning Activities**	**Evaluation Methods**
Begin to understand and identify gaps in personal knowledge and skills in the care of patients with cardiovascular disease	**CCON, DPC, TR**	**AE**

SYSTEM BASED PRACTICE – PGY IV		
Goal: Demonstrate An awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value to their cardiology patients.		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand and utilize multidisciplinary resources to care for acutely ill cardiac patients	**CCON, DPC, TR**	**AE**

PATIENT CARE – PGY V		
Goal: Demonstrate ability to understand and evaluate patients with cardiovascular disorders		
Objectives	**Learning Activities**	**Evaluation Methods**
Pathogenesis and treatment of supraventricular and ventricular arrhythmias	**CCON, DPC, TR**	**AE**
Pathogenesis of congestive heart failure	**CCON, DPC, TR**	**AE**
Pathogenesis of atherosclerosis	**CCON, DPC, TR**	**AE**
Diseases of the aorta	**CCON, DPC, TR**	**AE**
Peripheral vascular disease including carotid, renal and peripheral arteries	**CCON, DPC, TR**	**AE**
Hyperlipidemia and other risk factors for atherosclerosis	**CCON, DPC, TR**	**AE**
Endocarditis	**CCON, DPC, TR**	**AE**
Evaluation of patients with hypertrophic and restrictive cardiomyopathy	**CCON, DPC, TR**	**AE**
Evaluation of patients with pericardial disease	**CCON, DPC, TR**	**AE**
Evaluation of the cardiac risk for non-cardiac surgery	**CCON, DPC, FS, TR**	**AE**
Criteria for implantation of pacemakers	**CCON, DPC, TR**	**AE**
Overview and evaluation of pacemakers and cardioverter defibrillators	**CCON, DPC, TR**	**AE**
Mechanisms of sudden death	**CCON, DPC, TR**	**AE**

MEDICAL KNOWLEDGE – PGY V		
Goal: Demonstrate ability to understand, carry out and manage the approach to cardiac patient consult or clinic visit.		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand principles of primary and secondary risk factor modification	**CCON, DPC, TR**	**AE**

INTERPERSONAL AND COMMUNICATION SKILLS – PGY V		
Goal: Demonstrate interpersonal and communication skills in medical practice that develop and maintain effective information exchange and collaboration with cardiology patients, family members and other members of the health care team.		
Objectives	**Learning Activities**	**Evaluation Methods**
Communicate effectively with patients and families in the critical care setting	**DPC, TR**	**AE**
	DPC, TR	**AE, SE**
Communicate effectively with other physicians and members of the health care team	**CCON, DPC, TR**	**AE**
Communicate effectively with colleagues during patient hand-off (transition of care).	**CCON, DPC, TR**	**AE**

PROFESSIONALISM – PGY V		
Goal: Demonstrate commitment to carrying out professional responsibilities, adherence to ethical principles and sensitivity to a diverse cardiology patient population.		
Objectives	**Learning Activities**	**Evaluation Methods**
Appreciate the social and psychological context of cardiac disease.	**DPC, TR**	**AE, CCOM**

PRACTICE BASED LEARNING AND IMPROVEMENT – PGY V		
Goal: Learn to investigate and evaluate personal patient care practices, appraise and assimilate scientific evidence related to cardiology and improve patient care practices.		
Objectives	**Learning Activities**	**Evaluation Methods**
Identify and acknowledge gaps in personal knowledge and skills in the care of cardiac patients.	**CCON, DPC, TR**	**AE**

SYSTEM BASED PRACTICE – PGY V		
Goal: Demonstrate An awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value to their cardiology patients.		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand cost effectiveness of diagnostic and therapeutic strategies.	**CCON, DPC, TR**	**AE**

PATIENT CARE – PGY VI		
Goal: Demonstrate skills and ability to manage clinic, teach junior residents, and conduct clinical evaluation and basic treatment of patients with cardiovascular disorders		
Objectives	**Learning Activities**	**Evaluation Methods**
Adult congenital heart disease	**CCON, DPC, TR**	**AE**
Heart disease in the elderly patient and in women	**CCON, DPC, TR**	**AE**
Neoplastic heart disease	**CCON, DPC, TR**	**AE**
Cardiovascular reflex and humoral control of the circulation	**CCON, DPC, TR**	**AE**
Pathogenesis of endothelial dysfunction	**CCON, DPC, TR**	**AE**
Evaluation of patients with cardiovascular disease during pregnancy	**CCON, DPC, TR**	**AE**
Rheumatological heart disease including collagen vascular disease and the heart, rheumatic fever, and miscellaneous causes of heart disease including restrictive disease of the heart such as amyloidosis and hemochromatosis and infectious diseases of the heart such as HIV, Lyme carditis and endocarditis.	**CCON, DPC, TR**	**AE**

MEDICAL KNOWLEDGE – PGY VI		
Goal: Demonstrate ability to understand, carry out and manage the approach to cardiac patient consult or clinic visit.		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand the mechanism of action and indication for anti-coagulation and antiplatelet agents	**CCON, DPC, TR**	**AE**
Understand physiologic and pathophysiology of invasive hemodynamic monitoring	**CCON, DPC, TR**	**AE**
Understand the indications and principles for ECG, echocardiography, nuclear imaging, stress testing, and right and left heart catheterization	**CCON, DPC, TR**	**AE**
Understand principles of primary and secondary risk factor modification	**CCON, DPC, TR**	**AE**

INTERPERSONAL AND COMMUNICATION SKILLS – PGY VI		
Goal: Demonstrate interpersonal and communication skills in medical practice that develop and maintain effective information exchange and collaboration with cardiology patients, family members and other members of the health care team.		
Objectives	**Learning Activities**	**Evaluation Methods**
Communicate effectively with patients and families in the critical care setting	**DPC, TR**	**AE**
	DPC, TR	**AE, SE**
Communicate effectively with other physicians and members of the health care team	**CCON, DPC, TR**	**AE**
Communicate effectively with colleagues during patient hand-off (transition of care).	**CCON, DPC, TR**	**AE, CCOM**

PROFESSIONALISM – PGY VI		
Goal: Demonstrate commitment to carrying out professional responsibilities, adherence to ethical principles and sensitivity to a diverse cardiology patient population.		
Objectives	**Learning Activities**	**Evaluation Methods**
Appreciate the social and psychological context of cardiac disease.	**DPC, TR**	**AE, CCOM**
Interact in a professional manner with patients, families and health team members	**DPC, TR**	**AE, CCOM**
PRACTICE BASED LEARNING AND IMPROVEMENT – PGY VI		
Goal: Learn to investigate and evaluate personal patient care practices, appraise and assimilate scientific evidence related to cardiology and improve patient care practices.		
Objectives	**Learning Activities**	**Evaluation Methods**
Pursue professional scholarship integrating basic science with clinical medicine and principles of evidence-based medicine.	**CCON, DPC**	**AE**

SYSTEM BASED PRACTICE – PGY VI		
Goal: Demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value to their cardiology patients.		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand cost effectiveness of diagnostic and therapeutic strategies.	**CCON, DPC, TR**	**AE**
Understand and utilize multidisciplinary resources to care for acutely ill patients	**CCON, DPC, TR**	**AE**

Knowledge Expectations

1. The elements of effective consultation
2. Techniques for enhancing compliance and adherence to consultative recommendations
3. Pre-operative evaluation of cardiovascular operative risk
4. Assessment of abnormalities in serological determinants of cardiac injury, particularly in the perioperative patient
5. Evaluation of chest pain, especially in the post-operative patient
6. Assessment of newly-detected or changing heart murmurs
7. Assessment of cardiac physical findings, electrocardiographic changes and arrhythmias in pregnancy, labor and delivery
8. Assessment and management of tachyarrhythmias, particularly in the perioperative patient
9. Evaluation of possible infectious endocariditis in hospitalized patients with new cardiac findings
10. Management of uncontrolled hypertension
11. Assessment and management of ischemic risk factors, particularly the dysmetabolic syndromes
12. Medical management of peripheral arterial, venous and lymphatic disease

13. Understand the indications for, interpretation of, and risks of the common cardiovascular testing modalities: ECG, CXR, CT scan, myocardial serum marker interpretation for ACS, echocardiography, cardiac catheterization and electrophysiologic testing
14. Understand the spectrum of disease from silent ischemia to acute coronary syndrome in the coronary vasculature, and from claudication to limb loss in the peripheral vasculature
15. Understand the diagnostic and prognostic evaluation of valvular insufficiency and stenosis (AS, AR, MS, MR, TR) as well as the role of the medical treatment and considerations for angiographic evaluation, treatment and surgical intervention
16. Be familiar with the evaluation of hypertension and understand the medical, surgical and intravascular treatment options for primary pulmonary hypertension
17. Appreciate the spectrum of congenital heart disease, know the clinical presentation of uncorrected adult patient and understand the most common complications of corrected congenital lesions
18. Review the most common collagen vascular diseases (Marfan's, Scleroderma, Sjogren's) and rheumatologic disorders (SLE, RA) affecting the cardiovascular system
19. Be familiar with the post-operative care of patients undergoing coronary artery bypass grafting, valvular repair or replacement and aortic aneurysm repair

Lines of Responsibility: The cardiology fellow will interact with generalists and specialist in all areas, and will function as the consultant for cardiovascular problems. Close interactions are fostered with cardiothoracic surgery and internal medicine residents and staff. Primary care of these patients remains with the surgical or medical services, with the cardiology consult fellow available for consultation at any time. The team is lead by an attending, who bears the final responsibility for patient management or recommendations for management. The cardiology fellows are next in line, followed by medical residents and students.

Advocate Lutheran General Hospital

Clinical Continuity Clinic

ALGH Cardiology Fellowship Program

Updated August, 2014

OVERVIEW

The overall purpose of the continuity skills is to develop and demonstrate skills as a consultant cardiologist in the outpatient setting and to learn all aspects in addressing chronic cardiovascular disease management issues on a long term basis.

GOALS

The ambulatory experience provides exposure to outpatient cardiology practice, including both consultative and continuity experiences, and a means for clinical follow-up of patients recently discharged from the hospital. This experience provides an opportunity to follow and manage patients for a full 3 years in an outpatient setting.

Fellows participate in a continuity clinic for ½ day each week during the course of the 3-year training program at Advocate Medical Group Cardiology or Center for Advanced Cardiology offices. Fellows see an average of 2-3 new patients and 3-5 return patients on their clinic day. Fellows in their final year may opt to complete an additional half-day rotation in a clinic specific to their area of interest.

PGY IV: It is assumed that the fellow can take a complete and cardiovascular-pertinent history at this point and perform an adequate physical examination. A thorough differential diagnosis for each cardiovascular problem should be made and a plan proposed for each problem. Awareness of the guidelines and other Principles of management should be used to structure such a plan. Following discussion with the supervising attending, this plan should be articulated with the patient, the note completed, and procedures scheduled by the ancillary staff in a timely manner. Awareness of each of the core competencies, discussed below, should come into play in the decision-making process.

PGY V: In addition to honing those skill sets noted above, focal areas of growth should include expansion of physical examination acumen, more complete development of differential diagnosis, and more complete knowledge of guidelines and principles. As the second year fellow has now experienced different technological aspects of cardiovascular diagnosis and treatment, inclusionof the benefits and risks of each should play an increasing role in discussion with the attending and the patient. At this point, more attention to system-based practice competencies, as noted below, should become an important part of each treatment plan.

PGY VI: In addition to the above, mastery of physical examination and the core competencies is the goal. The fellow should demonstrate increasing independence of thought and plan in the discussion with the attending and the patient. The goal is to move toward mastery of all core competencies and demonstration of full ability to function independently and successfully in the outpatient setting after completion of the fellowship.

RESPONSIBILITY

Fellows are directly responsible for care of the patients to which they have been assigned. The fellow evaluates new cardiology referrals and provides follow-up care for patients with cardiovascular diseases. The fellow performs the initial evaluation, formulates a plan of care, and presents the case to the attending cardiologist. The fellow is responsible for ordering and following up on all appropriate studies.

SUPERVISION

One attending physician is present full-time during the clinic to supervise the fellow in training. Each fellow works closely with the single physician providing a uniquely intimate view of the practice patterns of a given faculty physician. All patients are presented to the designated staff physician in the clinic.

LEARNING OBJECTIVES

1. Evaluate patients in the outpatient clinical setting who have a wide variety of general cardiovascular disorders by taking a thorough problem-directed history, performing a careful physical examination, and generating a differential diagnosis and plan of care.
2. Learn to treat common cardiovascular disorders in the outpatient setting in accordance with established practice guidelines.
3. Learn to generate a well-organized written consultation that clearly conveys the management plan.
4. Provide follow-up care to assess success and adverse effects of treatment.
5. Learn to accurately code and bill for services.
6. Gain an appreciation for the role of the ancillary staff members in the outpatient clinic setting, including the nurses, administrative staff, and social workers.

PATIENT CHARACTERISTICS/MIX OF DISEASES/TYPES OF CLINICAL ENCOUNTERS

All clinical encounters are in the outpatient setting and include both new patient consults and follow-up care. Consults referred cover a wide variety of cardiovascular diseases, including coronary artery disease, heart failure, valvular disease, hypertension, arrhythmias, pulmonary heart disease, syncope, surgical clearance, peripheral vascular disease, dysrhythmias and congenital heart disease.Male and female patients of all adult ages and of various ethnic backgrounds are seen.

TEACHING METHODS

The attending will review the fellow's presentation, review and constructively critique the fellow's plan of care, confirm the fellow's physical exam findings, and review and confirm the

fellow's notes. The fellow will assume progressive levels of responsibility for patient care under the supervision of the attending.

EVALUATION:

- The goals and objectives for cardiology clinic will be reviewed at the beginning of each academic year.
- On a semi-annual basis, the fellow's progress will be reviewed verbally and a standard fellow evaluation form will be completed by the supervising attending.
- The final evaluation by the supervising physician will be based on the fulfillment of the continuity clinic objectives and the basic six core competencies:

Patient Care

Competency: Provides compassionate, appropriate, and effective health care for the treatment of cardiac problems and the promotion of health.

1. Gathers essential and accurate information about the patient through interviews, examination, and complete history and by appropriately accessingadjunctive sources of information to this obtained from the patient and/or family members.

2. Makes informed diagnostic and therapeutic decisions based on patient information, current scientific evidence, clinical judgment, and patient preference.

3. Fellows learn the practice of health promotion, disease prevention, diagnosis, care, and treatment of men and women in all age ranges within the domain of adult cardiology.

Medical Knowledge

Competency: Demonstrates knowledge of concepts involved in the outpatient diagnosis and management of dyslipidemia, hypertension, coronary artery disease, arrhythmias,heart failure, and peri-operative risk assessment.

1. Understands and employs recommendations and pharmacotherapy for lipid management.

2. Understands and employs recommendations and pharmacotherapyfor hypertension.

3. Understands recommendations for dietary management of weight, lipids and hypertension and discusses such with clinic patients.

4. Understands outpatient use of warfarin and anti-arrhythmic drugs and appropriatelymonitors such.

5. Understands indications for and limitations of outpatient diagnostic tests including stress testing, echocardiography and ambulatory electrocardiographic monitoring.

6. Fellows demonstrate knowledge of established and evolving biomedical, clinical, epidemiological and social-behavioral sciences, as well as the application of this knowledge to patient care. Fellows learn the scientific method of problem solving, evidence-based decision making, a commitment to lifelong learning, and an attitude of caring that is derived from humanistic and professional values.

Practice-Based Learning and Improvement

Competency: Evaluates each patient individually and addresses new problems/questions encountered through assimilation of scientific evidence as part of improving carepractices.

1. Identify strengths, deficiencies, and limits in one's knowledge and expertise.

2. Set learning and improvement goals.

3. Identify and perform appropriate learning activities.

4. Systematically analyze practice using quality improvement methods, and implement changes with the goal of practice improvement.

5. Incorporate formative evaluation feedback into daily practice; locate, appraise, and assimilate evidence from scientific studies related to their patients' health problems.

7. Use information technology to optimize learning.

8. Participate in the education of patients, families, students, residents and other health professionals

Interpersonal and Communication

Competency: Fellows demonstrate interpersonal and communication skills that result in the effective exchange of information and collaboration with patients, their families,and health professionals.

1. Fellows communicate effectively with patients, families, and the public, as appropriate, across a broad range of socioeconomic and cultural backgrounds.

2. Maintains comprehensive, timely and legible medical record demonstration and correspondence related to patient care activities.

3. Communicate effectively with physicians, other health professionals, and health related agencies provide accurate and timely feedback to referring physician.

4. Actively listens and elicits appropriate information from the patient and/or family members and colleagues.

5. Work effectively as a member or leader of a health care team or other professional group.

6. Act in a consultative role to other physicians and health professionals.

Professionalism

Competency: Proficiency is primarily behavioral and attitudinal. The major components of professionalism are commitment, adherence, and sensitivity. Commitment means respect, altruism, integrity, honesty, compassion, empathy, and dependability; accountability to patients and society; and professional commitment to excellence (demonstrated by engaging in activities that foster personal and professional growth as a physician).

Adherence means accepting responsibility for continuity of care; and practicing patient-centered care that encompasses confidentiality, respect for privacy and autonomy throughappropriate informed consent and shared decision-making as relevant to the specialty.

Sensitivity means showing sensitivity to cultural, age, gender and disability issues of patients as well as of colleagues, including appropriate recognition and response to physician impairment.

Fellows are expected to demonstrate:
(1) compassion, integrity, and respect for others
(2) responsiveness to patient needs that supersedes self-interest
(3) respect for patient privacy and autonomy

Systems Based Practice

Competency: Focuses on the broader context of patient care within the multiple payers of a healthcare system including purchasers (employers, government), insurers (commercial, Medicare, Medicaid), delivery systems (hospitals, physician networks, drug and technology companies, community resources), work group (local entity providing care such as a group practice, hospital service), providers (physicians,

nurses, physicians extenders and others both as individuals and teams that provide direct care), and the users (patients and families).

1. Demonstrates teamwork skills to identify, analyze implement, evaluate and report improvement initiatives as well as identifying system errors.

2. Understands accesses, utilizes and evaluates effectiveness of resource providers, and systems to provide optimal cardiac therapy.

3. Understands different medical practice models and delivery systems and how to best utilize them to care for the individual patient.

4. Practices quality, cost-effective health care.

5. Advocates and facilitates patient advancement through the health care system.

Electrophysiology Rotation

ALGH Cardiolovascular Disease Fellowship Program

Revised August, 2014

Overview

The purpose of the Electrophysiology (EP) rotation is to develop an understanding of the indications, implantation and troubleshooting of EP devices, including pacemakers and defibrillators. Fellows will learn to manage patients with common arrhythmias. In addition, trainees will gain proficiency in the interpretation of electrocardiograms and ambulatory ECG tracings (Holter monitors).

Faculty: Ray Kawasaki, M.D., Scott Miller, M.D.

Goals: Clinical electrophysiology requires an understanding of cardiac physiology, anatomy as well as cellular electrophysiology. A general cardiologist must be able to diagnose and treat a variety of acute and chronic arrhythmias. This requires knowledge of the safe and effective use of Antiarrhythmic drugs as well as the indications for pacemaker and defibrillator implantation, radiofrequency ablation and electrophysiology testing. In addition, fellows are instructed on appropriate evaluation and management of documented or suspected arrhythmias, as well as risk stratification for sudden death. As required by the ACGME, fellows will have 2 months of EP rotations.

Responsibilities of Fellows:

- Appropriate triage and initial evaluation of all patients presenting to the EP service and communication of these findings to the designated EP supervising attending.
- Daily follow-up and documentation on all patients on the EP service; discussion of test results and care plan with the attending as the patients progress through the hospital stay.
- Observe diagnostic EP and ablation procedures in the CRM lab, including cardioversions, defibrillation threshold testing and tilt table tests.
- Participate in select procedures as deemed suitable by the supervising attending.

Responsibilities of Attendings:

- Responsible for direct supervision of the fellow at all times.
- Will review and confirm the historical and physical findings documented by the fellow.
- Review and discuss testing results and care plan with the fellow.
- Supervise and perform procedures in the CRM lab.
- Recommend appropriate reading material for fellow.
- Retains ultimate responsibility for the care of the patient.

Learning Activities - Core Competency Goals and Objectives

Learning Activities Legend -Fellows			
CCON	**Core Cardiology Conference –** can include Morning Report, Electrophysiology Conference (EP), Cardiac Cath Conference (CCL), Cardiology/ED Conference (CED), Fellows Noon (Core) Conference (FNC), Research Conference (RCON), Journal Club (JC), Cardiac Imaging Conference (CICON)		
DPC	**Direct Patient Care**	**IMGR**	**Internal Medicine Grand Rounds**
DSP	**Directly Supervised Procedure**	**OCC**	**Outpatient Continuity Clinic**
FS	**Faculty Supervision**	**TR**	**Teaching Rounds**

Legend for Methods of Evaluation - Fellows			
AE	**Attending Evaluation**	**PL**	**Procedure Logs**
CCR	**Competency Committee Review**	**SE**	**Self-Evaluation**
DSP	**Directly Supervised Procedure**		

PATIENT CARE – PGY IV		
Goal: The fellow will recognize and effectively evaluate common electrophysiology problems including indications for further evaluation and treatment options.		
Objectives	**Learning Activities**	**Evaluation Methods**
Bradycardia and indications for pacing.	**CCON, DSP, TR**	**AE, DSP**
Pacemaker and ICD limitations on patients who have devices.	**CCON, DPC, TR**	**AE, DSP**
Evaluation of patients with sudden cardiac death (both primary and secondary causes) including EP studies and T-wave Alternans testing	**CCON, DPC, TR**	**AE, DSP**
Treatment of atrial fibrillation and atrial flutter. Management with rate control, rhythm control, anti-coagulation, and therapies such as pulmonary vein ablation and pacing to prevent atrial fibrillation	**CCON, DPC, TR**	**AE, DSP**
Evaluation of syncope including etiology, tilt table testing as well as treatment. Assessment with Holter monitors, event recorders and reveal monitors.	**CCON, DPC, TR**	**AE, DSP**
Evaluation of ventricular tachycardia in patients with structurally normal heart and right ventricular dysplasia.	**CCON, DPC, TR**	**AE, DSP**

MEDICAL KNOWLEDGE – PGY IV		
Goal: The fellow will gain knowledge in the pathophysiology of cardiac arrhythmias.		
Objectives	**Learning Activities**	**Evaluation Methods**
Assessment of intracardiac electrograms and general properties of AV node, SA node and His-Purkinje system	**CCON, DSP, TR**	**AE, DSP**
Supraventricular tachycardia mechanisms including reentry and enhanced automatic triggered activity. Understanding the difference between short RP versus long RP tachycardias. Types of SVT's including intracardiac versus surface electrocardiograms. Appropriate management for each arrhythmia will be reviewed. Types of SVT will	**CCON, DPC, TR**	**AE, DSP**

be differentiated by intracardiac electrograms vs. surface electrocardiogram.		
Cardiac cellular electrophysiology action potentials, ion channels and gap junctions	**CCON, DPC, TR**	**AE, DSP**
Arrhythmic diseases based on channelopathies such as Brugada, long QT-syndrome and Arrhythmogenic RV Dysplesia.	**CCON, DPC, TR**	**AE, DSP**
Antiarrhythmic medication indications and side effects	**CCON, DPC, TR**	**AE, DSP**
Biventricular pacing. Indications and a review of the literature (special considerations: narrow QRS, RBBB and mitral regurgitation).	**CCON, DPC, TR**	**AE, DSP**

INTERPERSONAL AND COMMUNICATION SKILLS – PGY IV		
Goal: The ability to communicate treatment plans to other members of the health care team, patients, and family members.		
Objectives	**Learning Activities**	**Evaluation Methods**
Communicate effectively the consult findings with physician, colleagues, and other members of the health care team in a timely fashion to assure a comprehensive patient care plan.	**DPC**	**AE**
Present professional findings to patient and family members in a compassionate and informative manner	**DPC**	**AE**

PROFESSIONALISM – PGY IV		
Goal: Exhibit professionalism in all interactions with the hospital and health care settings.		
Objectives	**Learning Activities**	**Evaluation Methods**
Interact professionally with patients, patient's family, colleagues and other members of the health care team.	**DPC, TR**	**AE**
Appreciation of the spiritual and social context of wellness and illness	**DPC, TR**	**AE**
PRACTICE BASED LEARNING AND IMPROVEMENT– PGY IV		
Goal: Demonstrate ability to Utilize evidence based learning to assist with management of cardiac arrhythmias.		
Objectives	**Learning Activities**	**Evaluation Methods**
Commitment to scholarship and the use of evidence based cardiovascular medicine	**CCON, TR**	**AE**
Broad reading of the cardiovascular literature and access; access and research of Internet tools.	**CCON, DPC, TR**	**AE**

SYSTEM BASED PRACTICE – PGY IV		
Goal: Effectively collaborate with other members of the health care team and utilize multidisciplinary resources to optimally treat the patient.		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand the complexities of cardiovascular disease patients and utilize the multidisciplinary resources necessary to care for them	**DPC, TR**	**AE**
Collaborate with other members of the health care team to assure comprehensive cardiac care	**DPC, TR**	**AE**
Effective utilization of risk stratification using evidence based medicine	**DPC, TR**	**AE**
Consideration of cost effectiveness and outcome measurements of tests/interventions associated with EP study and transplantation.	**DPC, TR**	**AE**

PATIENT CARE – PGY V		
Goal: The fellow will recognize and effectively evaluate common electrophysiology problems including indications for further evaluation and treatment options.		
Objectives	**Learning Activities**	**Evaluation Methods**
Bradycardia and indications for pacing.	**CCON, DSP, TR**	**AE, DSP**
Pacemaker and ICD limitations on patients who have devices.	**CCON, DPC, TR**	**AE, DSP**
Evaluation of patients with sudden cardiac death (both primary and secondary causes) including EP studies and T-wave Alternans testing	**CCON, DPC, TR**	**AE, DSP**
Treatment of atrial fibrillation and atrial flutter. Management with rate control, rhythm control, anti-coagulation, and therapies such as pulmonary vein ablation and pacing to prevent atrial fibrillation	**CCON, DPC, TR**	**AE, DSP**
Evaluation of syncope including etiology, tilt table testing as well as treatment. Assessment with Holter monitors, event recorders and reveal monitors.	**CCON, DPC, TR**	**AE, DSP**
Evaluation of ventricular tachycardia in patients with structurally normal heart and right ventricular dysplasia.	**CCON, DPC, TR**	**AE, DSP**

MEDICAL KNOWLEDGE – PGY V		
Goal: The fellow will gain knowledge in the pathophysiology of cardiac arrhythmias.		
Objectives	**Learning Activities**	**Evaluation Methods**
Assessment of intracardiac electrograms and general properties of AV node, SA node and His-Purkinje system	**CCON, DSP, TR**	**AE, DSP**
Supraventricular tachycardia mechanisms including reentry and enhanced automatic triggered activity. Understanding the difference between short RP versus long RP tachycardias. Types of SVT's including intracardiac versus surface electrocardiograms. Appropriate management for each arrhythmia will be reviewed. Types of SVT will be differentiated by intracardiac electrograms vs. surface electrocardiogram.	**CCON, DPC, TR**	**AE, DSP**
Cardiac cellular electrophysiology action potentials, ion channels and gap junctions	**CCON, DPC, TR**	**AE, DSP**
Arrhythmic diseases based on channelopathies such as Brugada, long QT-syndrome and Arrhythmogenic RV Dysplesia.	**CCON, DPC, TR**	**AE, DSP**
Antiarrhythmic medication indications and side effects	**CCON, DPC, TR**	**AE, DSP**
Biventricular pacing. Indications and a review of the literature (special considerations: narrow QRS, RBBB and mitral regurgitation).	**CCON, DPC, TR**	**AE, DSP**

PROFESSIONALISM – PGY V		
Goal: Exhibit professionalism in all interactions with the hospital and health care settings.		
Objectives	**Learning Activities**	**Evaluation Methods**
Interact professionally with patients, patient's family, colleagues and other members of the health care team.	**DPC, TR**	**AE**
Appreciation of the spiritual and social context of wellness and illness	**DPC, TR**	**AE**

PRACTICE BASED LEARNING AND IMPROVEMENT– PGY V
Goal: Demonstrate ability to Utilize evidence based learning to assist with management of cardiac arrhythmias.

Objectives	Learning Activities	Evaluation Methods
Commitment to scholarship and the use of evidence based cardiovascular medicine	**CCON, TR**	**AE**
Broad reading of the cardiovascular literature and access; access and research of Internet tools.	**CCON, DPC, TR**	**AE**

SYSTEM BASED PRACTICE – PGY V		
Goal: Effectively collaborate with other members of the health care team and utilize multidisciplinary resources to optimally treat the patient.		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand the complexities of cardiovascular disease patients and utilize the multidisciplinary resources necessary to care for them	**DPC, TR**	**AE**
Collaborate with other members of the health care team to assure comprehensive cardiac care	**DPC, TR**	**AE**
Effective utilization of risk stratification using evidence based medicine	**DPC, TR**	**AE**
Consideration of cost effectiveness and outcome measurements of tests and interventions associated with EP study and device transplantation.	**DPC, TR**	**AE**

PATIENT CARE – PGY VI		
Goal: The fellow will recognize and effectively evaluate common electrophysiology problems including indications for further evaluation and treatment options.		
Objectives	**Learning Activities**	**Evaluation Methods**
Bradycardia and indications for pacing.	**CCON, DSP, TR**	**AE, DSP**
Pacemaker and ICD limitations on patients who have devices.	**CCON, DPC, TR**	**AE, DSP**
Evaluation of patients with sudden cardiac death (both primary and secondary causes) including EP studies and T-wave Alternans testing	**CCON, DPC, TR**	**AE, DSP**
Treatment of atrial fibrillation and atrial flutter. Management with rate control, rhythm control, anti-coagulation, and therapies such as pulmonary vein ablation and pacing to prevent atrial fibrillation	**CCON, DPC, TR**	**AE, DSP**
Evaluation of syncope including etiology, tilt table testing as well as treatment. Assessment with Holter monitors, event recorders and reveal monitors.	**CCON, DPC, TR**	**AE, DSP**
Evaluation of ventricular tachycardia in patients with structurally normal heart and right ventricular dysplasia.	**CCON, DPC, TR**	**AE, DSP**

MEDICAL KNOWLEDGE – PGY VI		
Goal: The fellow will gain knowledge in the pathophysiology of cardiac arrhythmias.		
Objectives	**Learning Activities**	**Evaluation Methods**
Assessment of intracardiac electrograms and general properties of AV node, SA node and His-Purkinje system	**CCON, DSP, TR**	**AE, DSP**
Supraventricular tachycardia mechanisms including reentry and enhanced automatic triggered activity. Understanding the difference between short RP versus long RP tachycardias. Types of SVT's including intracardiac versus surface electrocardiograms. Appropriate management for each arrhythmia will be reviewed. Types of SVT will be differentiated by intracardiac electrograms vs. surface	**CCON, DPC, TR**	**AE, DSP**

electrocardiogram.		
Cardiac cellular electrophysiology action potentials, ion channels and gap junctions	**CCON, DPC, TR**	**AE, DSP**
Arrhythmic diseases based on channelopathies such as Brugada, long QT-syndrome and Arrhythmogenic RV Dysplesia.	**CCON, DPC, TR**	**AE, DSP**
Antiarrhythmic medication indications and side effects	**CCON, DPC, TR**	**AE, DSP**
Biventricular pacing. Indications and a review of the literature (special considerations: narrow QRS, RBBB and mitral regurgitation).	**CCON, DPC, TR**	**AE, DSP**

PROFESSIONALISM – PGY VI		
Goal: Exhibit professionalism in all interactions with the hospital and health care settings.		
Objectives	**Learning Activities**	**Evaluation Methods**
Interact professionally with patients, patient's family, colleagues and other members of the health care team.	**DPC, TR**	**AE**
Appreciation of the spiritual and social context of wellness and illness	**DPC, TR**	**AE**

PRACTICE BASED LEARNING AND IMPROVEMENT– PGY VI		
Goal: Demonstrate ability to Utilize evidence based learning to assist with management of cardiac arrhythmias.		
Objectives	**Learning Activities**	**Evaluation Methods**
Commitment to scholarship and the use of evidence based cardiovascular medicine	**CCON, TR**	**AE**
Broad reading of the cardiovascular literature and access; access and research of Internet tools.	**CCON, DPC, TR**	**AE**

SYSTEM BASED PRACTICE – PGY VI		
Goal: Effectively collaborate with other members of the health care team and utilize multidisciplinary resources to optimally treat the patient.		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand the complexities of cardiovascular disease patients and utilize the multidisciplinary resources necessary to care for them	**DPC, TR**	**AE**
Collaborate with other members of the health care team to assure comprehensive cardiac care	**DPC, TR**	**AE**
Effective utilization of risk stratification using evidence based medicine	**DPC, TR**	**AE**
Consideration of cost effectiveness and outcome measurements of tests and interventions associated with EP study and device transplantation.	**DPC, TR**	**AE**

Knowledge Expectations

1. Clinical arrhythmia diagnosis and management
2. Diagnostic evaluation
   - History
   - Utility of the surface ECG

- Noninvasive evaluation (Holter, event recorder, SAECG, treadmill)
- Indications and diagnostic usefulness of the invasive electrophysiology test
- Head up tilt testing
- New techniques for arrhythmia diagnosis

3. Management of Specific Clinical Syndromes (with EP correlations)
   - Atrial fibrillation
   - Atrial flutter
   - Superventricular tachycardia
     - AV nodal reentry
     - WPW
     - Atrial tachycardia (focal, reentrant, incisional related to surgery for congenital heart disease)
   - Inappropriate sinus tachycardia
   - Premature ventricular contractions
   - Non-sustained ventricular tachycardia
   - Sustained ventricular tachycardia
   - Sudden cardiac death
   - Polymorphic ventricular tachycardia
   - Syncope of unknown origin (to include neutrally mediated syndromes)

4. Implantable Devices
   - Indications for temporary transvenous pacemakers (to include bradyarrhthmias, BBB and heart block with and without infarction)
     - Technique
     - Follow-up
     - Complications
   - Indications for permanent pacemaker implantation (to include in-depth discussions of sick sinus syndrome, BBB, hemiblocks)
   - Pacemaker electrocardiography with trouble shooting
   - Pacemaker programming and follow-up
   - Indications for implantable defibrillators
   - General aspects of ICD function and their applicability to individual patient management

Lines of Responsibility: Fellows will be required to interact with generalists and specialists in all areas, functioning as consultants for cardiovascular arrhythmia problems. This rotation comprises a consultation service, performance of certain procedures in the Cardiac Rhythm Management lab and patient follow-up in the outpatient continuity clinic setting. The fellow works closely with the attending cardiologist and gradually assumes a more autonomous role in decision making and procedure performance, however it is always the attending cardiologist who bears the ultimate responsible for patient management and care.

Heart Failure/Heart Transplant Rotation

ALGH Cardiovascular Disease Fellowship Program
(at Advocate Christ Medical Center)
Revised August, 2014

Faculty: William Cotts, MD; Gregory Macaluso, MD; Gabriel Sayer M.D., Geetha Bhat M.D. and Muhyaldeen Dia M.D.

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Goals: This rotation includes a concentrated experience in caring for patients with advanced heart failure, pulmonary hypertension, complex congenital heart disease, heart transplantation and mechanical assistance. The rotation is structured to include aspects of basic science cardiac physiology, evidenced based medicine and standard of care practice to the clinical management of the advanced heart failure patient. A significant emphasis will be on defining cost-effective outcomes-based management approaches. Patients will be seen and evaluated during daily inpatient rounds and in the CHF, LVAD and Heart Transplant outpatient clinics. Through participation in the initial evaluation and ongoing care of these patients, the fellow will develop skills and abilities appropriate for their level of learning to function as an independent cardiology consultant.

Objectives: During this rotation the fellow will increase their knowledge base in all aspects of cardiology. Communication and teaching skills will be heavily focused upon during interactions with patients, attendings and other healthcare providers.

Responsibilities/Expectations of Fellows:

5. Attend daily inpatient rounds with the inpatient LVAD /Transplant attending and LVAD/Transplant team (first 3 wks).
6. Attend LVAD and Transplant conferences
   - LVAD Conference – 7:30am, Wednesdays (Darcie Brazel Conference Room – ASHU)
   - Transplant Conference – 7:30am, Thursdays (Darcie Brazel Conference Room – ASHU)
   - Daily Fellow Conference – 12pm, M-Thu (Room/Topics TBD)
   - Cath Lab Conference – 8:00a, Wednesdays (Cath Lab)
7. Spend 4th week of rotation participating in Advanced Heart Failure, LVAD and Heart Transplant outpatient clinics (Physician's Office Bldg., #407)
8. See patients in the CHF clinic, working with CHF clinic nursing staff (Physician's Office Bldg., #407).
9. Fellow may be expected to complete a research project during the rotation.
10. Additional Clinical Experiences
    - Round with VAD Coordinator (inpatient LVAD management)
    - VAD clinic with a VAD Coordinator (outpatient LVAD management)
    - Right heart catheterizations/endomyocardial biopsy
    - Witness implantation of LVADs

Responsibilities of Attendings:

Attendings on the rotation will be responsible for direct supervision of the fellow at all times. The attending will review and confirm the historical and physical findings that have been documented by the fellow. Additionally, the attendings will review and discuss the care plan and recommendations and review pertinent testing results with the fellow. Ultimate responsibility for the care of the patient lies with the attending physician.

Learning Activities - Core Competency Goals and Objectives

Learning Activities Legend -Fellows			
CCON	**Core Cardiology Conference –** can include Morning Report, LVAD Conference, Cardiac Cath Conference, Transplant Conference, Fellows Noon (Core) Conference		
DPC	**Direct Patient Care**	**IMGR**	**Internal Medicine Grand Rounds**
DSP	**Directly Supervised Procedure**	**OCC**	**Outpatient Continuity Clinic**
FS	**Faculty Supervision**	**TR**	**Teaching Rounds**

Legend for Methods of Evaluation - Fellows			
AE	**Attending Evaluation**	**PL**	**Procedure Logs**
CCR	**Competency Committee Review**	**SE**	**Self-Evaluation**
DSP	**Directly Supervised Procedure**		

PATIENT CARE		
Objectives	**Learning Activities**	**Evaluation Methods**
Ability to obtain complete medical histories, including review of patient medical record, and perform accurate examinations with an emphasis on cardiac findings.	**CCON, TR**	**AE**
Evaluate and manage patients with heart failure, ventricular assist devices and heart transplantation, including the complications associated with these procedures	**CCON, DPC, TR**	**AE**
Ability to interpret the results of left heart catheterizations, hemodynamics, cardiopulmonary stress testing, echocardiography, nuclear stress testing, cardiac CT/MR and endomyocardial biopsies	**CCON, DPC, TR**	**AE**
Ability to risk-stratfy patients with heart failure	**CCON, DPC, TR**	**AE**
Understand the workup for patients being evaluated for heart transplant and LVAD	**CCON, TR**	**AE**
Understand the inpatient management of acute decompensated heart failure	**CCON, TR**	**AE**
Understand the immediate post-operative and chronic management of heart transplant patients including immunosuppression regimes	**CCON, DPC, TR**	**AE**
Understand the inpatient and outpatient management of LVAD patients	**CCON, DPC, TR**	**AE**

Participate in the education of patients and other care providers on the pathophysiology and management of heart failure, ventricular assist devices and heart transplantation	**CCON, TR**	**AE**
Participation in discussions regarding end-of-life issues with patients, family members and other providers	**CCON, DSP, OCC, TR**	**AE**
Trained in the performance of relevant cardiovascular procedures including echocardiography, cardiopulmonary stress testing, right heart catheterization, and the performance of endomyocardial biopsies	**CCON, DPC, DSP, TR**	**AE**
To observe and participate in donor organ procurement, ventricular assist device implantation and heart transplantation	**CCON, TR**	**AE**
Gain experience in interpreting and utilizing echocardiograms in LVAD and heart transplant patients	**CCON, DPC, TR**	**AE**

MEDICAL KNOWLEDGE		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand the pathophysiology of heart failure, both systolic and with preserved EF	**CCON, TR**	**AE**
Understand the different types and causes of heart failure (i.e. ischemic, valvular, hypertrophic, infiltrative, etc.) and their implications on therapy	**CCON, DPC, TR**	**AE**
Understand the systemic consequences of acute and chronic heart failure	**CCON, DPC, TR**	**AE**
Understand the indications and contraindications for heart transplant and LVAD	**CCON, DPC, TR**	**AE**
Understand the medical targets and pharmacologic therapy for advanced heart failure	**CCON, TR**	**AE**
Familiarity with the concepts of organ transplantation and the role, structure and function of donor services and the United Network of Organ Sharing (UNOS)	**CCON, TR**	**AE**

INTERPERSONAL AND COMMUNICATION SKILLS		
Objectives	**Learning Activities**	**Evaluation Methods**
Communicate effectively with patients, families, physicians and other members of the health care team, including findings and diagnoses when appropriate to both patients and consulting physicians	**DPC, TR**	**AE**
Maintain timely and comprehensive medical records	**DPC, TR**	**AE, SE**
Communicate effectively with colleagues during patient hand-off (transition of care).	**CCON, DPC, TR**	**AE, CCOM**
Provide education to patients, family members and care providers as needed.	**CCON, DPC, TR**	**AE, SE**

PROFESSIONALISM		
Objectives	**Learning Activities**	**Evaluation Methods**
Interact in a professional manner with patients, families and members	**DPC, TR**	**AE, CCOM**

of the health care team		
Appreciate the social and psychological context of patients with advanced heart failure, LVAD implantations, heart transplant	**DPC, TR**	**AE, CCOM**

PRACTICE BASED LEARNING AND IMPROVEMENT		
Objectives	**Learning Activities**	**Evaluation Methods**
Begin to understand the indications and timing of advanced heart failure therapy referral	**CCON, DPC, TR**	**AE**
Identify both gaps in knowledge and expertise strengths to set appropriate learning goals	**CCON, TR**	**AE, SE**
Utilize information technology to effectively locate, appraise, and utilize evidence based medicine within current literature to improve patient care	**CCON, TR**	**AE**

SYSTEM BASED PRACTICE		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand the complexities of and work with multidisciplinary resources necessary to care for patients with heart failure, ventricular assist devices and cardiac transplantation	**CCON, DPC, TR**	**AE**
Work effectively as a member of the health care team, including coordination of patient care	**CCON, DPC, TR**	**AE**
Demonstrate understanding of cost-effectiveness and risk=benefit analysis and incorporate these into patient care	**CCON, TR**	**AE**
Advocate for and work towards patient safety and improved quality of care. Identify system errors and implement system solutions	**CCON, DPC, TR**	**AE**

Lines of Responsibility: The cardiology fellow rotates on the advance heart failure / heart transplant service staffed by physicians who meet or exceed national competency standards. In addition, a multidisciplinary team of nurses, pharmacists and social workers will work in concert to develop comprehensive patient management plans – thus training the fellow to understand the importance of a team approach to improving outcomes. The team is lead by an attending, who bears the final responsibility for patient management or recommendations for management.

Selected Literature/Reading List:

<u>Heart Failure</u>

1) Lindenfeld J, Albert NM, Boehmer JP, et al. Executive Summary: HFSA 2010 Comprehensive Heart Failure Practice Guideline. J Card Fail 2010;16:475e539.

LVAD

1) Rose EA, Gelijns AC, Moskowitz AJ, et al. Long-term use of a left ventricular assist device for end-stage heart failure (REMATCH Trial Group).N Engl J Med. 2001 Nov 15;345(20):1435-43.

2) Lietz K, Long JW, Kfoury AG et al. Outcomes of left ventricular assist device implantation as destination therapy in the post-REMATCH era: implications for patient selection. Circulation. 2007 Jul 31;116(5):497-505. 2007 Jul 16.

3) **Miller LW**, **Pagani FD**, **Russell SD** et al. Use of a continuous-flow device in patients awaiting heart transplantation.**N Engl J Med.** 2007 Aug 30;357(9):885-96.

4) Slaughter MS, Rogers JG, Milano CA et al. Advanced heart failure treated with continuous-flow left ventricular assist device. N Engl J Med. 2009 Dec 3;361(23):2241-51. Epub 2009 Nov 17.

5) **Slaughter MS**, **Pagani FD**, **Rogers JG**, et al. **HeartMate II Clinical Investigators**. Clinical management of continuous-flow left ventricular assist devices in advanced heart failure.**J Heart Lung Transplant.** 2010 Apr;29(4 Suppl):S1-39. Epub 2010 Feb 24.

Heart Transplant

1) Jessup M, Banner N, Brozena S, et al. Optimal pharmacologic and non-pharmacologic management of cardiac transplant candidates: approaches to be considered prior to transplant evaluation: International Society for Heart and Lung Transplantation guidelines for the care of cardiac transplant candidates--2006.J Heart Lung Transplant. 2006 Sep;25(9):1003-23.

2) Mehra MR, Kobashigawa J, Starling R, et al. Listing criteria for heart transplantation: International Society for Heart and Lung Transplantation guidelines for the care of cardiac transplant candidates--2006.J Heart Lung Transplant. 2006 Sep;25(9):1024-42.

3) **Costanzo MR**, **Costanzo MR**, **Dipchand A**, et al. The International Society of Heart and Lung Transplantation Guidelines for the care of heart transplant recipients. **J Heart Lung Transplant.** 2010 Aug;29(8):914-56.

ISHLT Monograph Series: Mechanical Circulatory Support

1. Chapter 4 – Positive Displacement Ventricular Assist Devices – Donald Hill, David Farrar, Y. Naka et al.
2. Chapter 5 – Rotary Ventricular Assist Devices – Daniel Goldstein, Mark Zucker, Francis D. Pagani et al.
3. Chapter 6 – Total Artificial Hearts – Jack Copeland, Robert Dowling, Pei H. Tsau
4. Chapter 9 – Myocardial Recovery Following Prolonged Mechanical Support – G. Torre-Amione and M. Loebe
5. Chapter 10 – Permanent Mechanical Circulatory Support – M. Slaughter and M. Deng
6. Chapter 11 – The Evolving Role of Mechanical Circulatory Support in Advanced Heart Failure – L.W. Stevenson
7. Chapter 12 – Emerging Left Ventricular Assist Devices – Golding et al.

Heart Station Rotation

ALGH Cardiology Fellowship Program

Revised August, 2014

Overview

The purpose of the Heart Station rotation is obtain the required non-invasive cardiac imaging knowledge, skills and abilities to evaluate the patient with known or suspected heart disease.

Faculty: Leslie Brookfield, M.D., Carissa Buenvenida, M.D., Nayla Chaptini, M.D., Samuel Goldstein, M.D., Barry Laskoe, D.O., Edward Passen, M.D., Stephen Smith, M.D., Dariush Takhtehchian, M.D.,

Goals: The Heart Station rotation allows the fellows to gain a basic understanding of cardiac anatomy, physiology, pathophysiology and acquisition and interpretation of transthoracic, stress and transesophageal echo images using a variety of ultrasound imaging techniques. Trainees will also acquire skills to independently perform and interpret echocardiograms and to integrate the findings with 1) patient history and physical examination, 2) the medical and surgical management of patients, and 3) the results of other imaging modalities. Fellows will additionally learn basic principles of radioisotopes and myocardial perfusion imaging and will gain the skills to independently interpret nuclear perfusion studies.

Responsibilities of Fellows:

- Fully participate in the daily, clinical operations of the Heart Station
- Assessing appropriateness of requested studies
- Timely interpretation and reporting of studies
- Perform and interpret findings for outpatient procedures (e.g. TEE's, Cardioversions, PA catheter measurements, etc.), inpatient TEE's, and conduct exercise stress testing
- Participate and assist with preparation for non-invasive imaging conferences

Responsibilities of Attendings:

- Read and report all clinical studies on the day performed.
- Teach fellow in the principles and practice of non-invasive imaging modalities
- Recommend appropriate reading material for fellows.
- Retains ultimate responsibility for the final interpretation of all studies, and the care and safety of the patient.

Learning Activities - Core Competency Goals and Objectives

Learning Activities Legend -Fellows			
CCON	**Core Cardiology Conference –** can include Morning Report, Electrophysiology Conference (EP), Cardiac Cath Conference (CCL), Cardiology/ED Conference (CED), Fellows Noon (Core) Conference (FNC), Research Conference (RCON), Journal Club (JC), Cardiac Imaging Conference (CICON)		
DPC	**Direct Patient Care**	**IMGR**	**Internal Medicine Grand Rounds**
DSP	**Directly Supervised Procedure**	**OCC**	**Outpatient Continuity Clinic**
FS	**Faculty Supervision**	**TR**	**Teaching Rounds**

Legend for Methods of Evaluation - Fellows			
AE	**Attending Evaluation**	**PL**	**Procedure Logs**
CCR	**Competency Committee Review**	**SE**	**Self-Evaluation**
DSP	**Directly Supervised Procedure**		

PATIENT CARE – PGY IV		
Goal: Demonstrateunderstandingofbasicindications for cardiacultrasound in patient care.		
Objectives:	**Learning Activities**	**Evaluation Methods**
Observedand performedechocardiographyincongenital heart disease patients.	**CCON, DSP**	**AE, DSP, FS**
Observation and interpretation review ofoperativenotes from, angiographyandechocardiographyon patients with congenital heart disease.	**CCON, DSP**	**AE, DSP, FS**

MEDICALKNOWLEDGE – PGY IV		
Goal: Demonstrateunderstandingofultrasound imagingand be ableto perform limited transthoracicechocardiography.		
Objectives:	**Learning Activities**	**Evaluation Methods**
Increasingskills in echoevaluation ofvalvularheart disease,cardiac systolic and diastolic function, pericardial disease,cardiomyopathies, and diseaseofthe aorta.	**CCON,DSP**	**AE, FS**
Understands theechocardiographic evaluation ofcongenital heartdisease, infective endocarditis, cardiacmasses andtumors.	**CCON,DSP**	**AE, FS**
Understands theindications, contraindications, potentialcomplications and benefits forperformingtransthoracic, transesophageal and stress echos.	**CCON,DSP**	**AE, FS**
Understands themethodsand technical aspects oftwo-dimensional echo, colorflow Doppler, tissueDoppler, contrastand stress echocardiography.	**CCON,DSP**	**AE, FS**

INTERPERSONALAND COMMUNICATION SKILLS – PGY IV		
Goal: Demonstrateinterpersonal andcommunication skills inmedical practicethat developandmaintain effectiveinformation exchange and collaboration with cardiologypatients and family members as well as otherprofessional associates.		
Objectives	**Learning Activities**	**Evaluation Methods**

Communicates effectivelywith physician colleagues and members ofotherhealthcareprofessions to assuretimely,comprehensivepatient care.	**DPC**	**AE, FS**
Communicates effectivelywith colleagues when reportingpertinentfindings ofechocardiographicstudies.	**DPC**	**AE, FS**

PROFESSIONALISM – PGY IV		
Goal: Demonstrate commitment to carryingout professional responsibilities, adherencetoethical principles, and sensitivityto adiversepatient population with cardiacdisease.		
Objectives:	**Learning Activities**	**Evaluation Methods**
Interact professionallywith patients, patients' family, colleagues, and othermembers ofthehealth careteam.	**DPC**	**AE, FS,Eval**

PRACTICE BASED LEARNINGAND IMPROVEMENT – PGY IV		
Goal: Learn to investigate and evaluatepersonal patient carepractices, appraise and assimilate scientific evidencerelated to Cardiology, and improvepersonal patient carepractices.		
Objectives:	**Learning Activities**	**Evaluation Methods**
Fellow can identifyand acknowledgegaps in personal knowledge and skills in performing and interpretingechocardiographicstudies.	**CCON**	**AE, SE, Eval**

SYSTEMBASED PRACTICE – PGY IV		
Goal: Demonstrate anawareness of andresponsiveness to thelarger context ofthehealth care system, provideadequatedatabaseunderstanding with importanceto appropriate encounter documentation and theabilityto effectivelycall on system resources to provide carein that is of optimal valueto their cardiologypatients.		
Objectives:	**Learning Activities**	**Evaluation Methods**
Understands and utilizes themultidisciplinaryresources necessaryto performechocardiographicstudies optimallyonacutelyill cardiac patients.	**CCON, DCP, AR**	**AE, FS**
Use evidence-based, cost-conscious strategies in the appropriate performanceof echocardiographicstudies.	**CCON, DCP, AR**	**AE, FS**

PATIENTCARE – PGY V		
Goal: Demonstrate abilityto perform transthoracic echocardiographyand interpret stressecho and perform TEE on patients with cardiovasculardisorders.		
Objectives:	**Learning Activities**	**Evaluation Methods**
Observedand performedechocardiographyincongenital heart diseasepatients.	**CCON,DSP**	**AE, DSP**
Observation and interpretation review ofoperativenotes from, angiographyandechocardiographyon patients with congenital heart disease.	**CCON,DSP**	**AE, DSP**

MEDICALKNOWLEDGE - PGY V		
Goal: Demonstrate abilityto understand principles oftwo dimensional and Dopplerultrasoundimaginingincludingcolorflow imagingoftheheartas relates to patient management.		
Objectives:	**Learning Activities**	**Evaluation Methods**
Increasingskills in echoevaluation ofvalvularheart disease,cardiacsystolic and diastolic function, pericardial disease,cardiomyopathies, and diseaseofthe aorta.	**CCON, DSP**	**AE, FS**
Understands theechocardiographic evaluation ofcongenital heartdisease, infective endocarditis, cardiacmasses andtumors.	**CCON,DSP**	**AE, FS**
Understands theindications, contraindications, potentialcomplications and benefits forperformingtransthoracic, transesophageal and stress echos.	**CCON,DSP**	**AE, FS**
Understands themethodsand technical aspects oftwo-dimensionalecho, colorflow Doppler, tissueDoppler, contrastand stress echocardiography.	**CCON,DSP**	**AE, FS**
INTERPERSONALAND COMMUNICATION SKILLS – PGY V		
Goal: Demonstrateinterpersonal andcommunication skills in medical practicethat develop and maintaineffectiveinformation exchange and collaboration with cardiologypatients and family members as well as otherprofessional associates.		
Objectives:	**Learning Activities**	**Evaluation Methods**
Communicates effectivelywith physician colleagues and members ofotherhealthcareprofessions to assuretimely,comprehensivepatient care.	**DPC**	**AE, FS**
Communicates effectivelywith colleagues when reportingpertinentfindings ofechocardiographicstudies.	**DPC**	**AE, FS**

PROFESSIONALISM – PGY V		
Goal: Demonstrate commitment to carryingout professional responsibilities, adherencetoethical principles, and sensitivityto adiversecardiologypatient population.		
Objectives:	**Learning Activities**	**Evaluation Methods**
Interact professionallywith patients, patients' family, colleagues, andothermembers ofthehealth careteam.	**DPC**	**AE**

PRACTICE BASED LEARNINGAND IMPROVEMENT – PGY V		
Goal: Learn to investigate and evaluatepersonal patient carepractices, appraise and assimilatescientific evidence, participatein clinical researchrelated to Cardiology, and improvepersonal patient carepractices.		
Objectives:	**Learning Activities**	**Evaluation Methods**
Fellow can identifyand acknowledgegaps in personal knowledge	**CCON, DPC**	**AE, SE**

SYSTEMBASED PRACTICE – PGY V		
Goal: Demonstrate anawareness of andresponsiveness to thelarger context ofthehealth care system, provideadequatedatabaseunderstanding with importanceto appropriate encounter documentation and theabilityto effectivelycall on system resources to provide carein that is of optimal valueto their cardiologypatients.		
Objectives:	**Learning Activities**	**Evaluation Methods**
Understands and utilizes themultidisciplinaryresources necessaryto performechocardiographicstudies optimallyonacutelyill cardiac patients.	**DCP, DSP**	**AE, FS, SE**
Use evidence-based, cost-conscious strategies in the appropriate performanceof echocardiographicstudies.	**DCP, DSP**	**AE, FS, SE**

PATIENTCARE – PGY VI		
Goal: Demonstrateunderstandingof emergencyTEE indications, to be ableto recognizeimportanceoftheright test forthe right patient at the right time.		
Objectives:	**Learning Activities**	**Evaluation Methods**
Observedand performedechocardiographyincongenital heartdiseasepatients.	**CCON, DSP**	**AE, DSP**
Observation and interpretation review ofoperativenotes from,angiographyandechocardiographyon patients with congenital heart disease.	**CCON, DSP**	**AE, DSP**

MEDICALKNOWLEDGE – PGY VI		
Goal: DemonstrateunderstandingofTEE and stress echocardiographyforcardiacpatients.		
Objectives:	**Learning Activities**	**Evaluation Methods**
Increasingskills in echoevaluation ofvalvularheart disease,cardiacsystolic and diastolic function, pericardial disease,cardiomyopathies, and diseaseofthe aorta.	**CCON,DSP**	**AE**
Understands theechocardiographic evaluation ofcongenital heartdisease, infective endocarditis, cardiacmasses andtumors.	**CCON,DSP**	**AE**
Understands theindications, contraindications, potentialcomplications and benefits forperformingtransthoracic, transesophageal and stress echos.	**CCON,DSP**	**AE**
Understands themethodsand technical aspects oftwo-dimensionalecho, colorflow Doppler, tissueDoppler, contrastand stress echocardiography.	**CCON,DSP**	**AE**

INTERPERSONAL AND COMMUNICATION – PGY VI		
Goal: Demonstrateinterpersonal andcommunication skills inmedical practicethat developandmaintain effectiveinformation exchange and collaboration with cardiologypatients and family members as well as otherprofessional associates.		
Objectives:	**Learning Activities**	**Evaluation Methods**

Communicates effectivelywith physician colleagues and members ofotherhealthcareprofessions to assuretimely,comprehensivepatient care.	**DPC**	**AE, SE**
Communicates effectivelywith colleagues when reportingpertinentfindings ofechocardiographicstudies.	**DPC**	**AE, SE,**

PROFESSIONALISM –PGY VI		
Goal: Demonstrate commitment to carryingout professional responsibilities, adherencetoethical principles, and sensitivityto adiversecardiologypatient population.		
Objectives:	**Learning Activities**	**Evaluation Methods**
Interact professionallywith patients, patients' family, colleagues, andothermembers ofthehealth careteam.	**DPC**	**AE, SE**

PRACTICE BASED LEARNINGAND IMPROVEMENT – PGY VI		
Goal: Learn to investigate and evaluatepersonal patient carepractices, appraise and assimilatescientific evidencerelated to Cardiology, and improvepersonal patient carepractices.		
Objectives:	**Learning Activities**	**Evaluation Methods**
Fellow can identifyand acknowledgegaps in personal knowledgeand skills in performing and interpretingechocardiographicstudies.	**CCON, SE**	**AE, SE, FS**

SYSTEMBASED PRACTICE – PGY VI		
Goal: Demonstrate anawareness of andresponsiveness to thelarger context ofthehealth care system, provideadequatedatabaseunderstanding with importanceto appropriate encounter documentation and theabilityto effectivelycall on system resources to provide carein that is of optimal valueto their cardiologypatients.		
Objectives:	**Learning Activities**	**Evaluation Methods**
Understands and utilizes themultidisciplinaryresources necessarytoperform echocardiographicstudies optimallyonacutelyill cardiac patients.	**DCP**	**AE, SE, FS**
Use evidence-based, cost-conscious strategies in the appropriateperformanceof echocardiographicstudies.	**DCP**	**AE, SE, FS**

Knowledge Expectations

Anatomy and Electrophysiology

- Anatomy and physiology of the specialized conducting system (sinoatrial node,
- atrioventricular [AV] node, His bundle, bundle branches)
- Spread of excitation in the ventricles
- Difference between unipolar and bipolar leads
- Einthoven triangle; frontal and horizontal lead reference system
- Vectorial concepts

- Significance of a positive and negative deflection in relation to lead axis
- Relation between electrical and mechanical activity

Technique and the Normal ECG

- Effect of improper electrode placement (limb and precordial)
- Effect of muscle tremor
- Effect of poor frequency response of the equipment
- Effect of uneven paper transport
- Measurement of PR, QRS, QT, normal values
- Normal ranges of axis in the frontal plane
- Effect of age, weight and body build on the axis in the frontal plane
- Normal QRS/T angle
- Differential diagnosis of normal ST-T, T wave variants (e.g., "juvenile" pattern and early repolarization syndrome)

Arrhythmias: General Concepts

- Reentry, automaticity, triggered activity
- Aberration (various mechanisms)
- Capture and fusion complexes
- Escape (passive, accelerated) complexes or rhythms, hysteresis, overdrive suppression
- Interpolated premature beat
- Parasystole (atrial, junctional, ventricular), modulated parasystole
- Vulnerability
- Exit block
- Reciprocation
- Concealed conduction
- Supernormality

Arrhythmias: Recognition of Sinoatrial Rhythm

- Sinus tachycardia, physiologic and abnormal
- Sinus bradycardia
- Sinus arrhythmia
- Sinoatrial arrest
- Sinoatrial block

Atrial Rhythms

- Atrial premature complexes (conducted, nonconducted)
- Atrial tachycardia (ectopic)
- Atrial tachycardia with AV block
- Atrial fibrillation
- Atrial flutter
- Multifocal atrial tachycardia -
- Wandering atrial pacemaker--multifocal atrial rhythm

Atrioventricular Node (Junctional)

- Premature junctional complexes
- Atrioventricular node reentrant tachycardia (common and uncommon type)
- Nonparoxysmal junctional tachycardia--accelerated junctional rhythm
- Atrioventricular reentrant or circus movement tachycardia with an accessory pathway (fast and slow)
- Escape complex or escape rhythm

Ventricular

- Ventricular ectopic complexes
- Accelerated idioventricular rhythm
- Ventricular tachycardia: uniform (monomorphic), multiform (pleomorphic or poymorphic), sustained, nonsustained, bidirectional and torsade de pointes
- Ventricular flutter, ventricular fibrillation
- Ventriculoatrial conduction
- Ventricular escape or idioventricular rhythm

Atrioventricular Dissociation Due to

- Slowing of dominant pacemaker
- Acceleration of subsidiary pacemaker
- Above with depression of AV conduction
- Third-degree AV block
- Isorhythmic AV dissociation

Atrioventricular Block

- First degree
- Second degree; 2:1, Mobitz type I (Wenckebach), Mobitz type II, high degree AV block
- Third-degree AV block (complete)
- Significance of wide versus normal QRS complex

Waveform Abnormality

- Left ventricular hypertrophy: criteria for left ventricular hypertrophy; specificity sensitivity of criteria
- Right ventricular hypertrophy: criteria for right ventricular hypertrophy; sensitivity
  specificity of the criteria
- Biventricular hypertrophy
- Electrical alternans
- Drug and electrolyte effects

Atrial Abnormalities

- Criteria for left atrial abnormality
- Criteria for right atrial abnormality
- Biatrial abnormality
- Clinical significance of atrial abnormalities

Intraventricular Conduction Disturbances

- Anatomic and electrophysiologic basis for intraventricular conduction defects
- Criteria for incomplete and complete left bundle branch block
- Criteria for the diagnosis of incomplete and complete right bundle branch block
- Criteria for left anterior and posterior fascicular blocks
- Concept of combined bundle and fascicular blocks
- Indeterminate intraventricular conduction defects
- Diagnosis and classification of pre-excitation syndromes (e.g., Wolff-Parkinson-White syndrome)
- Drug and electrolyte effects

Myocardial Ischemia and Infarction

- Transient ischemia and injury
- Normal and abnormal Q waves
- Noninfarction Q waves
- Differential diagnosis of tall R wave in right precordial leads
- Theoretic basis of the ECG changes in acute myocardial infarction (Q, ST-T waves)
- Time course of ST segment changes in acute myocardial infarction
- Diagnosis of myocardial infarction (without Q waves)
- ST segment changes in conditions other than myocardial infarction
- Localization of myocardial infarction
- QRS residuals of old myocardial infarction
- Reliability of QRS and ST segment changes of myocardial infarction in previously abnormal ECG: intraventricular conduction defects; ventricular hypertrophy
- Diagnosis of myocardial infarction in presence of LBBB and RBBB
- Overall assessment of serial ECGs as to the probability of acute myocardial infarction

Pacemaker

- Fixed-rate pacemaker
- Atrial pacing
- Ventricular demand pacing
- Atrial triggered ventricular paced
- Atrioventricular dual pacing
- Malfunctioning: demand acting as fixed rate; failure to sense; slowing of rate; acceleration of rate; failure to capture; failure to pace (inappropriate inhibition)

Clinical Diagnoses (selected)

- Hyperkalemia
- Hypokalemia
- Hypercalcemia
- Hypocalcemia
- Long QT syndromes (congenital and acquired)
- Atrial septal defect, secundum
- Atrial septal defect, primum

- Dextrocardia
- Mitral stenosis
- Chronic obstructive pulmonary disease
- Acute corpulmonale
- Pericardial effusion
- Acute pericarditis
- Hypertrophic cardiomyopathy
- Central nervous system disorder
- Myxedema
- Hypothermia
- Sick sinus syndrome
- Digitalis effect or toxicity
- Effects of other drugs (e.g., tricyclic, antiarrhythmic agents)
- Possible proarrhythmic effects

Lines of Responsibility: In all clinical in-patient rotations, cardiology fellows will interact with generalists and specialists in all areas,functioning as consultants for cardiovascular problems. This rotation is laboratory-based, and as such thefellow's primary responsibility is related to the performance and interpretation of diagnostic cardiac imagingstudies. Particularly close interactions are fostered with referring physicians (all specialties), house staff,stress lab nurse clinicians, and imaging technologists. The team is led by the attending, which bears finalresponsibility for patient management and image interpretation. The cardiology fellow is next in line,followed by medical residents if present on the rotation.

Nuclear Cardiology Rotation

ALGH Cardiovascular Disease Fellowship Program

Revised January, 2014

Overview

Nuclear cardiology imaging procedures are important elements in the evaluation and management of individuals with suspected or proven cardiovascular disease. The modern cardiologist requires expertise in the appropriate application of nuclear techniques and their interpretation. Furthermore, an understanding of the fundamentals of nuclear medicine technology will enhance the cardiologist's contribution to image acquisition, processing and patient safety.

Faculty: Nanda Khedkar, M.D., RajaramPoludasu, M.D.

Goals: Training in nuclear cardiology allows the fellow to become familiar with the fundamentals of nuclear imaging, including myocardial perfusion imaging and radionuclide angiography. Specific characteristics, practical advantages and disadvantages and cost differences among the various commonly used isotopes are stressed. The fellow becomes thoroughly familiar with the indications for exercise and pharmacological stress nuclear perfusion studies, and the diagnostic and prognostic implications of the test results. Correlations between nuclear data and clinical information and coronary anatomic findings, if available, are emphasized to maximize the learning experience.

As part of the cardiovascular fellowship program, fellows will have two (2) nuclear cardiology rotations that provide the necessary training for a clinical cardiologist to understand the role of nuclear cardiology in general practice. This satisfies the Level 1 criteria for competence. Fellows wishing to pursue additional training towards achievement of Level 2 competence may do so during elective months in their final program year.

Responsibilities of Fellows:

- Observe isotope preparation, dose administration, image acquisition and image processing.
- Perform stress testing according to the schedule determined with supervising attending
- When needed, screen studies for appropriateness, communicate with referring physicians and answer question from clinicians about any aspect of the study
- Prepare daily studies for reading as necessary
- Review all studies, before attending review if possible, and formulate an initial summary of findings and conclusions
- Obtain correlation with other imaging studies
- Flag interesting studies for case presentation at conference

Responsibilities of Attending:

- Responsible for direct supervision of the fellow at all times
- Read and report all clinical studies on the day performed
- Educate the fellow in the principles and practice of nuclear cardiology
- Recommend appropriate reading materials to fellow
- Communicate availability and reading schedule to fellow on a daily basis
- Retains ultimate responsibility for the care of the patient.

Learning Activities - Core Competency Goals and Objectives

Learning Activities Legend -Fellows			
CCON	**Core Cardiology Conference –** can include Morning Report, Electrophysiology Conference (EP), Cardiac Cath Conference (CCL), Cardiology/ED Conference (CED), Fellows Noon (Core) Conference (FNC), Research Conference (RCON), Journal Club (JC), Cardiac Imaging Conference (CICON)		
DPC	**Direct Patient Care**	**IMGR**	**Internal Medicine Grand Rounds**
DSP	**Directly Supervised Procedure**	**OCC**	**Outpatient Continuity Clinic**
FS	**Faculty Supervision**	**TR**	**Teaching Rounds**

Legend for Methods of Evaluation - Fellows			
AE	**Attending Evaluation**	**PL**	**Procedure Logs**
CCR	**Competency Committee Review**	**SE**	**Self-Evaluation**
DSP	**Directly Supervised Procedure**		

MEDICAL KNOWLEDGE – PGY IV		
Goal: Understand the goal of nuclear cardiology imaging results to guide patient care.		
Objectives	**Learning Activities**	**Evaluation Methods**
Beginning competency in use of basic operations of the computers and imaging cameras.	**DPC, FS**	**AE, PL**
Beginning competency in the principles of patient selection, performance monitoring, interpretation, and reporting of nuclear imaging stress tests.	**DPC, FS**	**AE, PL**
Beginning competency in ability to acquire, reconstruct and analyze radionuclide ventriculograms in perfusion imaging.	**DPC, FS**	**AE, PL**

INTERPERSONAL AND COMMUNICATION SKILLS – PGY IV		
Goal: Demonstrate interpersonal and communication skills in medical practice that develop and maintain effective information exchange and collaboration with cardiology patients, families and other members of the health care team.		
Objectives	**Learning Activities**	**Evaluation Methods**
Beginning competence in ability to communicate effectively the risks and benefits of procedures to patients prior to obtaining consent.	**DPC, FS**	**AE**
Beginning competence in ability to accurately report test results to ordering physicians.	**DPC**	**AE**

PATIENT CARE– PGY IV		
Goal: Understand principles of nuclear cardiology and learn to interpret studies.		
Objectives	**Learning Activities**	**Evaluation Methods**
Ability to assist in the performance of any stress test involving vital signs and EKG interpretation.	**CCON, DPC, FS**	**AE, PL**
Ability to assess the adequacy of a study and its endpoint monitoring the patient in recovery and handling and injecting the radioisotopes.	**CCON, DPC, FS**	**AE, PL**

PROFESSIONALISM – PGY IV		
Goal: Demonstrate commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse cardiology patient population.		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand the social context of illness	**DPC, TR**	**AE**
Interact professionally with patients, patients' families and other members of the health care team	**DPC, TR**	**AE**

PRACTICE BASED LEARNING AND IMPROVEMENT – PGY IV		
Goal: Learn to investigate and evaluate personal patient care practices, appraise and assimilate scientific evidence related to cardiology, and improve personal patient care services.		
Objectives	**Learning Activities**	**Evaluation Methods**
Begin to identify and acknowledge gaps in personal knowledge and skills in performing and interpreting nuclear cardiology procedures.	**CCON, DPC, FS**	**AE**
Understand the importance of commitment to scholarship and use of evidence based medicine.	**CCON, DPC, FS**	**AE**

SYSTEM BASED LEARNING – PGY IV		
Goal: Demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value to cardiology patients.		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand the importance of effective collaboration with other members of the health care team.	**DPC, TR**	**AE**

PATIENT CARE– PGY VI		
Goal: Understand principles of nuclear cardiology and learn to interpret studies.		
Objectives	**Learning Activities**	**Evaluation Methods**
Review, interpret and understand the clinical data in history, exam, resting and stress EKG, exercise data, to discuss them with the attending. Fellows will develop an understanding of the concepts of sensitivity and accuracy in the interpretation of these tests.	**CCON, DPC, FS**	**AE**

MEDICAL KNOWLEDGE – PGY VI		
Goal: Understand the goal of nuclear cardiology imaging results to guide patient care.		
Objectives	**Learning Activities**	**Evaluation Methods**
Perform and interpret at least 25 radionuclide studies, to correlate with results of other clinical parameters assessed in the course of study on subsequent clinical management.	**FS**	**AE**

PROFESSIONALISM – PGY VI		
Goal: Demonstrate commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse cardiology patient population.		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand the social context of illness	**DPC, TR**	**AE**
Interact professionally with patients, patients' families and other members of the health care team	**DPC, TR**	**AE**

INTERPERSONAL AND COMMUNICATION SKILLS – PGY VI		
Goal: Demonstrate interpersonal and communication skills in medical practice that develop and maintain effective information exchange and collaboration with cardiology patients, families and other members of the health care team.		
Objectives	**Learning Activities**	**Evaluation Methods**
Beginning competence in ability to communicate effectively the risks and benefits of procedures to patients prior to obtaining consent.	**DPC, FS**	**AE**
Beginning competence in ability to accurately report test results to ordering physicians.	**DPC**	**AE**

SYSTEM BASED PRACTICE – PGY VI		
Goal: Demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care in that is of optimal value to their cardiology patients.		
Objectives	**Learning Activities**	**Evaluation Methods**
Consider outcomes of tests and interventions associated with nuclear cardiology.	**TR**	**AE**

PRACTICE BASED LEARNING AND IMPROVEMENT – PGY VI		
Goal: Learn to investigate and evaluate personal patient care practices, appraise and assimilate scientific evidence related to cardiology, and improve personal patient care practices.		
Objectives	**Learning Activities**	**Evaluation Methods**
Commitment to scholarship and use of evidence based medicine	**CCON, DPC, FS**	**AE**

Research Rotation

ALGH Cardiovascular Disease Fellowship Program

Revised August, 2014

Overview

For the clinical cardiologist to maintain clinical competence and improve clinical knowledge at a rate consistent with progress in the discipline, it is crucial that trainees thoroughly understand the concepts, methods and challenges of the research process.

Faculty: Edward Passen M.D., Stephen Smith, M.D., collaborating attendings

Goals: All fellows will participate in and perform a research project over the course of the 36-month training program. The research endeavor should facilitate the development of critical thinking and analysis. Trainees are encouraged to enlist the guidance and support of the cardiology attending faculty in the design, implementation and analysis of the research project. Six (6) months of dedicated research time are included in the program curriculum to provide adequate time for completion, presentation and/or publication of the project.

Objectives:

- Obtain an appreciation for how to conduct cardiovascular research
    - Hypothesis generation
    - Critical literature review
    - Protocol development
    - Institutional review board submission and purpose
    - Data collection
    - Data analysis
    - Abstract preparation
    - Presentation in scientific forum
- Preparation of paper for peer review journal submission
- Obtain new skills which may have application to the future practice of cardiology
- Learn to work as part of a research 'team' (often involving several non-physicians with research expertise)
- Develop the skills and experience necessary to critically reviewer others' research.

Responsibilities of Fellows:

- Use the dedicated time for the purpose of the rotation to achieve productive results
- Utilize all division, institutional and system-wide research resources
- Maintain a steady rate of progress towards the project outcome
- Investigate internal and external funding opportunities
- Identify and meet regularly with faculty research mentor
- Provide a brief, written summary of project progress at the completion of each rotation month

Responsibilities of Attendings:

- Offer full support and appropriate guidance throughout the mentoring process
- Meet with the trainee weekly during all research rotation months
- Compete written evaluation with comments
- Provide brief verbal updates and/or feedback to program director as necessary.

Learning Activities - Core Competency Goals and Objectives

Learning Activities Legend -Fellows			
CCON	**Core Cardiology Conference –** can include Morning Report, Electrophysiology Conference (EP), Cardiac Cath Conference (CCL), Cardiology/ED Conference (CED), Fellows Noon (Core) Conference (FNC), Research Conference (RCON), Journal Club (JC), Cardiac Imaging Conference (CICON)		
DPC	**Direct Patient Care**	**IMGR**	**Internal Medicine Grand Rounds**
DSP	**Directly Supervised Procedure**	**OCC**	**Outpatient Continuity Clinic**
FS	**Faculty Supervision**	**TR**	**Teaching Rounds**

Legend for Methods of Evaluation - Fellows			
AE	**Attending Evaluation**	**PL**	**Procedure Logs**
CCR	**Competency Committee Review**	**SE**	**Self-Evaluation**
DSP	**Directly Supervised Procedure**		

PATIENT CARE – PGY IV, V, VI		
Goal: Understand principles of cardiovascular disease research and investigation.		
Objectives	**Learning Activities**	**Evaluation Methods**
Ability to assist in the performance of clinical and basic science research projects and protocols	**CCON, DPC, FS**	**AE**
Ability to assess the adequacy of a study design and its outcomes as it relates to patient care	**CCON, DPC, FS**	**AE**
Observation and interpretation review of published research projects and national guidelines documents	**CCON, DPC, FS**	**AE**

MEDICAL KNOWLEDGE – PGY IV, V, VI		
Goal: Understand the role of cardiovascular research to guide patient care and advance the state of medical knowledge.		
Objectives	**Learning Activities**	**Evaluation Methods**
Understands the systematic and critical evaluation of cardiovascular research projects	**CCON, DPC, FS**	**AE**
Understands the appropriate evaluation of proper research study design and implementation. Beginning competency in the principles of	**CCON, DPC, FS**	**AE**

patient selection, performance monitoring interpretation and reporting of clinical research		
Understands the methods and technical aspects of background information review, data acquisition, and data analysis for cardiovascular research.	**CCON, DPC, FS**	**AE**
Beginning competency in use of basic operations of computers, spreadsheets and statistical programs.	**CCON, FS**	**AE**

INTERPERSONAL AND COMMUNICATION SKILLS – PGY IV, V, VI		
Goal: Demonstrate interpersonal and communication skills in medical research that develop and maintain effective information exchange and collaboration with cardiology patients and family members as well as other professional associates and research personnel.		
Objectives	**Learning Activities**	**Evaluation Methods**
Beginning competence in ability to communicate effectively the risks and benefits of research protocols to patients before obtaining consent. Communicate effectively with physician colleagues and members of other healthcare professions to assure appropriate involvement in research activities.	**CCON, DPC, FS**	**AE**
Communicate effectively with colleagues when reporting pertinent findings of research studies. Beginning competence in ability to accurately and clearly report study results to medical professionals at seminars, meetings, and in publications.	**CCON, DPC, FS**	**AE, CCOM**

PROFESSIONALISM – PGY IV, V, VI		
Goal: Demonstrate commitment to carrying out professional research responsibilities, adherence to ethical principles and sensitivity to a diverse cardiology patient population while engaging in cardiovascular research.		
Objectives	**Learning Activities**	**Evaluation Methods**
Interact in a professional manner with patients, families and members of the health care team	**CCON, DPC, FS**	**AE**
Appreciate the social and psychological context of investigative research activities in the medical center setting	**CCON, DPC, FS**	**AE, SE**

PRACTICE BASED LEARNING AND IMPROVEMENT – PGY IV, V, VI		
Goal: Learn to investigate and evaluate high quality research practices, appraise and assimilate scientific evidence related to cardiology, and improve personal patient care practices which may derive from the involvement in research activities.		
Objectives	**Learning Activities**	**Evaluation Methods**
Begin to identify and acknowledge gaps in personal knowledge and skills in the performance and interpretation of cardiovascular disease research.	**CCON, DPC, TR**	**AE**

SYSTEM BASED PRACTICE – PGY IV, V, VI		
Goal: Demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to perform cardiovascular research in a manner that is of optimal value to the medical community.		
Objectives	**Learning**	**Evaluation**

	Activities	Methods
Understand and utilize multidisciplinary resources necessary to perform cardiovascular research studies optimally on cardiac patients in both the inpatient and outpatient settings	**CCON, DPC, FS, TR**	**AE, SE**
Understand the importance of effective collaboration with other members of the research and health care teams.	**CCON, DPC, FS, TR**	**AE, SE**
Use evidence-based, cost-conscious strategies in the appropriate performance of cardiovascular research studies	**CCON, DPC, FS, TR**	**AE, SE**

Timeline for Research Activities for Each Level of Training:

PGY IV

- Case Report (completion required for promotion to PGY V)
  - Search for an appropriate case during first six months of program
  - Conduct literature search and "write-up" case report
  - Present
- Identify
  - Research topics
  - Resources
  - Mentor
  - Literature
  - Team members
  - Funding
  - IRB needs
- Complete
  - Tutorials
  - Annual six-week, institutional research lecture series
  - Prepare and submit IRB proposal
- Consult
  - Statistician to verify tools and methods

PGY V

- Begin data collection
- Validate methods and tools
- Complete statistical analysis
- Present preliminary findings at conference
- Prepare for internal Advocate Health Care Depart of Research peer review
- Mentor junior residents and incorporate residents/students/other health professionals into project

PGY VI

- Complete manuscript draft based on feedback from internal review
- Present final project within the program
- Present at the system-wide Advocate Research Forum (held every May)
- Present at professional/national meeting
- Submit final manuscript to peer-reviewed journal(s)

Vascular Rotation

ALGH Cardiovascular Disease Fellowship Program

Revised August, 2014

Faculty: Nanda Khedkar, M.D.

Goals: This elective, one month rotation provides the fellow with a core curriculum knowledge base needed to evaluate and manage patients with peripheral vascular and thrombotic conditions (ASVD, cardiovascular, cerebrovascular, and peripheral arterial disease).

Objectives: During this rotation fellowsreceive training in the evaluation and management of arterial, venous, and lymphatic diseases, such as peripheral arterial disease, acute arterial occlusion carotid artery disease, renal artery stenosis, aortic aneurysm, vasculitis, vasospasm, venous thrombosis and insufficiency, and lymphadema. Instruction in the recognition and management of medical disorders associated with vascular diseases, including hypertension, hypercholesterolemia, diabetes mellitus, and hypercoagulable states is included.

Fellows receive training in the noninvasive vascular lab and will understand the indications for vascular tests such as segmental pressure measurements, pulse volume recordings, and duplex ultrasonography, as well as the information that can be derived from such testing. Imaging techniques that can be used to further assess the aorta, vena cava, and peripheral arteries and veins, such as computed topography, magnetic resonance imaging, conventional angiography and recognition of the indications for catheter-based interventional and surgical revascularization will be reviewed.

Responsibilities of Fellows:

1. Daily availability for assistance with imaging consultation with referring physician assistancein study scheduling, live image acquisition and study reporting.
2. Obtain clinical history by online medical record search, chart review or telephonic contact with the referring physician. This should include patient history, prior studies, and any contraindications.
3. Prepare a case presentation forvascular conference.

Responsibilities of Attendings:

Attendings on the rotation will be responsible for direct supervision of the fellow at all times. The attending will review and confirm the historical and physical findings that have been documented by the fellow. Additionally, the attendings will review and discuss the care plan and recommendations and review pertinent testing results with the fellow. Ultimate responsibility for the care of the patient lies with the attending physician.

Learning Activities - Core Competency Goals and Objectives

Learning Activities Legend -Fellows			
CCON	**Core Cardiology Conference –** can include Morning Report, Electrophysiology Conference (EP), Cardiac Cath Conference (CCL), Cardiology/ED Conference (CED), Fellows Noon (Core) Conference (FNC), Research Conference (RCON), Journal Club (JC), Cardiac Imaging Conference (CICON)		
DPC	**Direct Patient Care**	**IMGR**	**Internal Medicine Grand Rounds**
DSP	**Directly Supervised Procedure**	**OCC**	**Outpatient Continuity Clinic**
FS	**Faculty Supervision**	**TR**	**Teaching Rounds**

Legend for Methods of Evaluation - Fellows			
AE	**Attending Evaluation**	**EVAL**	**Competency Committee Review**
CCR	**Competency Committee Review**	**PL**	**Procedure Logs**
DSP	**Directly Supervised Procedure**	**SE**	**Self-Evaluation**

PATIENT CARE		
Goal: Provide compassionate, appropriate and effective health care.		
Objectives	**Learning Activities**	**Evaluation Methods**
Carries out patient management plans based on age, diagnosis and psychosocial issues, including but not limited to, management of patients with vasculitis, peripheral arterial and venous disease, coronary artery disease, and hypercoagulable states.	**CCON, DPC, TR**	**AE**
Gathers essential and accurate information about the patient through interviews, examination, and complete history and by appropriately accessing adjunctive sources of information to that obtained from the patient and/or family members.	**CCON, DPC, TR**	**AE**
Makes informed diagnostic and therapeutic decisions based on patient information, current scientific evidence, clinical judgment and patient preference.	**CCON, DPC**	**AE**

MEDICAL KNOWLEDGE		
Goal: To understand the principals of physics behind ultrasound and Doppler ultrasound that is relevant to the performing of clinical studies.		
Objectives	**Learning Activities**	**Evaluation Methods**
Develop an in-depth understanding of vascular anatomy (arterial & venous)	**CCON, TR**	**AE**
Be familiar with various imaging protocols used in the vascular lab and the data supporting their clinical use.	**CCON, DPC, TR**	**AE**
Understand alternate protocols available in literature and the relative sensitivity and specificity of the most commonly used protocols.	**CCON, DPC, TR**	**AE**

In order to be an independent reader, must develop competence and proficiency in the interpretation of : a. Extra-cranial Doppler examination b. Abdominal aorta examination c. Lower extremity arterial d. Upper extremity arterial e. Assessment of groin vascular anatomy f. Lower extremity arterial graft surveillance g. Visceral arterial duplex (especially renal) h. Lower extremity venous i. Upper extremity venous j. Rest and exercise ankle brachial indices assessment	**CCON, DPC**	**AE**
Ability to understand principles of nutrition and its effect on the cardiovascular system	**CCON, DPC**	**AE**
Familiarity with psychosocial, behavioral, and stress management aspects of cardiovascular diseases.	**CCON, DPC**	**AE**

INTERPERSONAL AND COMMUNICATION SKILLS		
Goal: Demonstrate interpersonal and communication skills in medical practice that develop and maintain effective information exchange and collaboration with cardiology patients, family members and other members of the health care team.		
Objectives	**Learning Activities**	**Evaluation Methods**
Communicate effectively with patients, colleagues and members of the health care team.	**DPC, TR**	**AE**
Effectively communicate study findings with physician colleagues in a timely fashion to assure comprehensive patient care.	**DPC, TR**	**AE, SE**
Provide educational instructions and other learning tools to patients to reinforce behavioral modification(s).	**DPEC, TR**	**AE**

PROFESSIONALISM		
Goal: Demonstrate commitment to carrying out professional responsibilities, adherence to ethical principles and sensitivity to a diverse cardiology patient population		
Objectives	**Learning Activities**	**Evaluation Methods**
Interact in a professional manner with patients, families and members of the health care team	**DPC, TR**	**AE, CCOM**
Appreciate the spiritual and social context of wellness and illness.	**DPC, TR**	**AE, CCOM**
Appropriately convey study reports to referring physicians in a timely manner		

PRACTICE BASED LEARNING AND IMPROVEMENT		
Goal: Learn to investigate and evaluate personal patient care practices, appraise and assimilate scientific evidence related to cardiology, and improve personal patient care practices.		
Objectives	**Learning Activities**	**Evaluation Methods**
Demonstrates a commitment to scholarship and the use of evidence-based preventive cardiology and rehabilitation.	**CCON, TR**	**AE**
Broad reading of cardiovascular literature with emphasis on primary and secondary prevention, wellness, and cardiac rehabilitation.	**CCON, TR**	**AE**

SYSTEM BASED PRACTICE		
Goal: Demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value to their cardiology patients.		
Objectives	**Learning Activities**	**Evaluation Methods**
Understand the complexities of patient care by a cardiac rehabilitation team and how this interaction affects the health of the patient and the community at large.	**DPC, TR**	**AE**
Understand cost effectiveness of rehabilitation, prevention, and outcome measurements strategies.	**CCON, DPC, TR**	**AE**
Know the system complexities in cardiovascular prevention and rehabilitation.	**DPC, TR**	**AE**

Knowledge Objectives

A. Arterial disease

1. Normal: anatomy and physiology of cerebrovascular, renal, and peripheral disease
2. Atherosclerosis
    a. Pathogenesis
    b. Risk factors: recognition, life-style modifications and interventions
3. Peripheral Arterial Disease
    a. Epidemiology and natural history
    b. Clinical examination and role of vascular testing
    c. Life-style and risk factor modifications
    d. Novel risk factors: hyperhomocysteinemia, lipoprotein (a), etc.
    e. Treatment
        i. Antithrombotic and other pharmacologic therapy
        ii. Exercise therapy
        iii. Percutaneous and surgical indications and therapies
    f. Complications of PAD
        i. Atheroembolism
        ii. Amputation
4. Extracranial Cerebrovascular Disease
    a. Normal anatomy and physiology
    b. Pathophysiology of CV disease
    c. Clinical presentations
    d. Physical examination
    e. Diagnostic testing and imaging modalities
    f. Treatment:
        i. Medical therapy
        ii. Percutaneous and surgical indications and therapies
5. Renovascular Disease
    A. atherosclerotic and non-atherosclerotic
    b. Renovascular hypertension: diagnostic work-up and treatment

6. Aortic Dissection, Penetrating Aortic Ulcer, Incomplete Aortic Rupture
    a. Definition and classification
    b. Etiology, natural history and clinical manifestations
    c. Diagnosis: imaging modalities
    d. Medical and surgical treatment
7. Aneurismal Disease
    a. Definition and classification
    b. Etiology, natural history and clinical manifestations
    c. Abdominal aortic aneurysms: infrarenal
        i. Risk factors, presentation and natural history
        ii. Diagnosis
        iii. Pre-operative assessment
        iv. Endovascular and surgical repair
    d. Thoracic and suprarenal abdominal aneurysms
        i. Risk factors, presentation and natural history
        ii. Diagnosis
        iii. Indications for repair
        iv. Endovascular and surgical repair

B. Venous Disease
1. Anatomy and physiology of upper and lower extremity veins
2. Venous thromboembolism
    a. Acute DVT of lower extremities
    b. Upper extremity DVT
    c. Pulmonary embolism
    d. Catheter/device related thrombosis
3. Thrombophilias (hereditary and acquired)
4. Post-thrombotic syndrome
5. Chronic venous insufficiency and venous stasis disease
6. Varicose veins

C. Lymphadema
1. Anatomy and physiology of the lymphatic system
2. Causes, diagnosis and management

D. Miscellaneous Arterial Disease
1. Thoracic outlet syndrome
2. Popliteal artery entrapment
3. Thromboangitis obliterans (Beuger's Disease)
4. Vasculitis

E. Vasospastic Disorders
1. Raynaud's Phenomenon
2. Livedo Reticularis
3. Chronic Pernio
4 Erythromelalgia

F. Hypercoagulable Disorders

1. Antiphospholipid syndrome
2. Factor V Leiden Mutation
3. Heparin Induced Thrombocytopenia
4. Protein C/S Deficiency
5. Anti-thrombin III deficiency
6. Hyperhomocystinemia

Lines of Responsibility: The cardiology fellow will interact with generalists and specialist in all areas, and will function as the consultant for cardiovascular problems. Close interactions are fostered with cardiothoracic surgery and internal medicine residents and staff. Primary care of these patients remains with the surgical or medical services, with the cardiology consult fellow available for consultation at any time. The team is lead by an attending, who bears the final responsibility for patient management or recommendations for management. The cardiology fellows are next in line, followed by medical residents and students.

Recommended Readings / Resources

1. Introduction to Vascular Ultrasonography 5th Edition. Zwiebel/Pellerito, 2004
2. Peripheral Vascular Ultrasound: How, When and Why 2010 Edition. Hartshorne/Thrush
3. 2011 Guideline on Management of Patients with Extracranial Carotid and Vertebral Artery Disease. *J. Am CollCardiol. 2011; 57(8):1002-1044*
4. ACC/AHA 2005 Guidelines for the Management of patients with Peripheral Arterial Disease. *J Am CollCardiol. 2005; 47(6):1239-1312*
5. Renal-Artery Stenosis. *NEJM. 2009:361(20):1972-8.*
6. Guidelines on the diagnosis and management of acute pulmonary embolism. *European Heart Journal. 2008:29:2276-2315*
7. American College of Cardiology / Cardiosource: http://www.cardiosource.come (Institutional Access)