Advanced Cardiovascular Imaging
(1 months)

During this rotation, the Cardiovascular Diseases (CD) fellow will be introduced into Advanced Cardiovascular Imaging – Cardiac Magnetic Resonance Imaging (CMRI) and Cardiac Computed Tomography (CCT).   The CD fellow in this month of rotation is expected to:

1) Understand the appropriate and inappropriate indications for CVMRI in the evaluation of patients presenting with cardiovascular disease

2) Understand the appropriate and inappropriate indications for CCT in the evaluation of patients presenting with cardiovascular disease

3) Recognition of patients who have contraindications to be in the MRI scanning suite and understanding the importance of safety in the MR scanning suite

4) Understanding the basic physics in MR

5) Understanding the basic physics in CT

6) Obtain the basic knowledge in the preparation of patient for a successful CCT

7) Be familiar the basic MR sequences – SPIN ECHO, GRADIENT ECHO

8) Be familiar in the use of CMRI in the assessment of cardiac function; stress perfusion sequence in the assessment of myocardial ischaemia

9) Obtain the basic skills in using standard workstations from multi-vendors

10) An understanding in the clinical presentation, underlying physiology and management of commonly seen adult congenital heart disease – including but not restricted to ASD, VSD, Tetralogy of Fallot, L- and D- Transposition of great vessels

11) Understanding the use of CMRI and CCT in the assessment, evaluation and follow-up in patients with cardiac tumour

12) Able to describe the commonly seen, but complex aortic pathology presented to the Texas Heart Institute / St. Luke's Episcopal Hospital

13) Able to correlate findings between different imaging modalities, including echocardiography, nuclear SPECT, CMRI and CCT

14) Understanding the potential complication in the indiscriminate use of CT as a result of radiation and potential nephrotoxic contrast exposure

15) Be aware of the newly described Nephrogenic Systemic Fibrosis

The CD fellow should dedicate the majority of the time in pre-reading the studies performed on the day before the reading round by the Consultant Physician. The CD fellow is also expected to assist the Consultant Physician in the preparation of patients (evaluating the patient for the appropriateness for the CT / MR study and to screen for relative or absolute contraindications) as well as supervising adenosine myocardial perfusion study.

The CD fellow is expected to attend the assigned half-day continuity clinic.

In addition, CD fellows will actively participate in scheduled teaching conferences through the week that include the Noon Cardiology Conference, the core curriculum seminars, Morbidity and Mortality case presentations, Cardiology Journal Club, research conferences. Moreover, there is a dedicated biweekly joint CMRI-CCT / Echocardiography conference with Dr. Raymond Stainback, M.D., Director of the Non-invasive Imaging Service. The CD fellows are **EXPECTED** to select the relevant patients with interesting findings who have both CMRI/CCT and TEE/2-D Echo for correlation. The fellows should be familiar with the patients with pertinent clinical details available on request for further understanding the significance of the cases.

There will also be regular journal clubs and the CD fellows will be assigned relevant papers in the imaging literature for discussion

Legend for Learning Activities	
AR/FS – Attending Rounds/Faculty Supervision	JC – Journal Club
	LR – Literature Review (independent)
CC – Core Curriculum conferences	RC – Research Conference
DPC – Direct Patient Care	IL – Imaging Conference
MM – Morbidity and Mortality Conference	

Legend for Evaluation Methods for Fellows	
AE – Attending Evaluations	360° – 360° Evaluation
PDR – Program Director's Review (twice annually)	

Principal Educational Goals by Relevant Competency

The educational goals and objectives for the CD fellow on this rotation are indicated for each of the six ACGME competencies in the tables below. The first column describes

whether the objective is knowledge, skill and/or attitude. The third column lists the most relevant learning activities for that objective, and the fourth column indicates the evaluation methods for that objective.

A. Patient Care

Goal: CD fellows must be able to proved patient care that is compassionate, appropriate, and effective for the treatment of Cardiovascular diseases.

Knowledge, Skills, Attitude	Objectives – Fellows will demonstrate the:	Learning Activities	Evaluation Methods
Knowledge, Skills	Ability to take a complete medical history and perform a careful and accurate physical examination with a cardiovascular disease focus before myocardial stress perfusion study	DPC, AR/FS	AE
Knowledge, Skills	Ability to write concise, accurate and informative procedure note	DPC, AR/FS	AE
Knowledge, Skills	Ability to formulate comprehensive and accurate problem lists, differential diagnoses and diagnostic & therapeutic plans after reviewing the study images	DPC, AR/FS, CC, LR	AE, PDR
Knowledge, Skills	Ability to supervise an adenosine myocardial perfusion study and understanding the criteria of when to terminate the examination	DPC, AR/FS, IL	AE, 360°

B. Medical Knowledge

Goal: CD fellows must demonstrate knowledge about established principles and evolving science critical to the practice of infectious diseases in hospitalized patients.

Knowledge, Skills, Attitude	Objectives – Fellows will:	Learning Activities	Evaluation Methods
Knowledge	Diagnose common cardiovascular in hospitalized patients	AR/FS, CC, DPC, JC, LR,	AE, PDR
Knowledge	Recognition of unusual or uncommon cardiovascular diseases not typically seen in the community	AR/FS, CC, DPC, JC, LR, RC	AE, PDR
Knowledge	Demonstrate growing knowledge of normal and abnormal cardiac and vascular anatomy as visualized using cardiac imaging studies (CMRI / CCT)	AR/FS, IL, LR	AE
Knowledge	Demonstrate growing knowledge of normal and abnormal cardiac physiology	AR/FS, LR, IL, RC, DPC	AE
Knowledge	Demonstrate knowledge of indications and contra-indications for CCT / CMRI	AR/FS, CC, DPC, JC, LR, RC, IL	AE, PDR
Knowledge	Understand strategies for prevention of cardiovascular	AR/FS,	

	disease through medical therapy, diet and lifestyle modification.	ICC, CC, DPC, MLR, JC, CPC	AE, PDR
Knowledge	Recognize and manage valvular heart disease including knowledge of diagnostic assessment, activity prescription, medical therapy and antibiotic prophylaxis.	AR/FS, CC, DPC, JC, LR, RC, IL	AE, PDR

C.   Interpersonal Skills and Communication

Goal: CD fellows must demonstrate the knowledge, skills and attitudes necessary to develop and maintain appropriate interpersonal relationships and to communicate effectively with patients, families, colleagues and the public.

Knowledge, Skills, Attitude	Objectives – Fellows will:	Learning Activities	Evaluation Methods
Skill	Communicate sensitively and effectively with hospitalized patients and with their families	DPC, AR/FS	AE
Skill, Attitude	Display a willingness and ability to teach medical students, pharmacy students, medical residents, nurses and ancillary service personnel	DPC, AR/FS	AE, 360°

D.   Professionalism

Goal: CD fellows must demonstrate the knowledge, skills, and attitudes necessary to practice professionally responsible, ethical and compassionate care in clinical cardiovascular diseases.

Knowledge, Skills, Attitude	Objectives – Fellows will:	Learning Activities	Evaluation Methods
Knowledge, Skill, Attitude	Interact professionally towards patients, families, colleagues, and all members of the health care team	DPC, AR/FS	AE, PDR, 360°
Attitude	Display an appreciation of the social context of illness especially in hospitalized, critically ill patients	DPC, AR/FS, CC,	AE
Attitude	Provide mentoring and act as a role model for junior members of the care delivery team	DPC	AE
Skill	Participate in the decision for diagnostic test requests or referral for intervention reviewing the ethical aspects of that decision	DPC, AR/FS	AE
Knowledge, skill, Attitude	Fulfill all the requirements to assure the privacy and confidentiality of all the medical information of the patient.	DPC, AR/FS	AE, PDR, 360°

E.   Practice-Based Learning and Improvement

Goal: CD fellows must demonstrate the knowledge, skills, and attitudes necessary to initiate self-directed and independent learning. CD fellows must keep abreast of current information and practices relevant to cardiovascular disease.

Knowledge, Skills, Attitude	Objectives – Fellows will:	Learning Activities	Evaluation Methods
Attitude	Demonstrate a commitment to professional scholarship through the systematic and critical perusal of relevant print and electronic medical literature, with an emphasis on the integration of basic science with clinical medicine, and evaluation of information in light of the principles of evidence-based medicine	DPC, AR/FS, LR, IL, CC, JC, RC	AE, PDR
Skill, Attitude	Demonstrate a commitment to learning through participation in research and producing formal presentations and/or publications	CC, CAC, JR, RC	PDR
Skill, Attitude	Integrate knowledge learned through participation in ward rounds, teaching conferences and other educational activities into their practice (e.g., observation of long-term outcome of interventions and medical care applying lessons to patients with acute illness)	DPC, AR/FS, JC, RC	AE, PDR

F.   Systems-Based Practice

Goal: CD fellows must demonstrate the knowledge, skills, and attitudes necessary to manage effectively in multiple, diverse, complex systems of care to provide effective treatment, consultation and referrals for patients.

Knowledge, Skills, Attitude	Objectives – Fellows will:	Learning Activities	Evaluation Methods
Skill, Attitude	Display a willingness and ability to work with imaging laboratory staff to efficiently deliver compassionate care	DPC, AR/FS	AE, PDR, 360°
Skill, Attitude	Integrate knowledge learned through participation in reading rounds, teaching conferences and other educational activities into their practice	DPC, AR/FS	AE, PDR
Attitude	Participate in refinement of care delivery systems ensuring provision of evidence-based care	DPC, AR/FS, RC	PDR
Attitude	Consider the cost-effectiveness of diagnostic, prevention and treatment modalities when selecting such strategies for patients.	DPC, AR/ FS, IL, JC, LR, CC	AE, PE