

Rotation: Non-Invasive Cardiology - Echocardiography Laboratory (Echo-1)

Director: Dr. Mary Corretti

Faculty: Drs. Corretti, T. Abraham, J. Weiss, Fortuin, Mayer, Post, Wu,

Duty hours: Mon -Fri, 8:00 am- 7:00 pm; weekend duty: Cross cover 2 out of 4 weekends for Consult and CCU services

A. Echocardiography: Patient Care

	Principal Educational Goals	Learning Activities	Evaluation Methods
1.	Take a pertinent medical history and perform a careful and accurate physical examination with a cardiology focus for the optimal performance of an echocardiographic study.	DPC, AR, IL	AE
2.	Learn the proper techniques of performing echocardiographic procedures, including transthoracic, transesophageal, and stress echocardiography.	DPC, DSP, EC	AE, DSP
3.	Know the common medications along with potential reactions and side effects of these medications given for echocardiographic procedures.	DPC, DSP, EC	AE
4.	Perform all aspects of echocardiographic procedures, including two-dimensional, color flow Doppler, pulse and continuous wave Doppler, tissue Doppler, contrast and stress echocardiography.	DPC, DSP, EC	AE, DSP
5.	Perform all procedures with emphasis on patient comfort and safety.	DPC, DSP	AE, DSP
6.	Recognize and manage complications associated with echocardiographic procedures.	DPC, AR, EC	AE
7.	Produce accurate reports of the findings of an echocardiographic exam.	DPC, DSP	AE

B. Echocardiography: Medical Knowledge

	Principal Educational Goals	Learning Activities	Evaluation Methods
1.	Understand the indications, contra-indications, potential complications, and benefits for performing transthoracic, transesophageal, and stress echos.	DPC, AR, EC	AE
2.	Learn the methods and technical aspects of two-dimensional echo, color flow Doppler, pulse and continuous wave Doppler, tissue Doppler, contrast and stress echocardiography.	DPC, DSP, EC	AE, DSP
3.	Master the echo evaluation of valvular heart disease, cardiac systolic and diastolic function, pericardial disease, cardiomyopathies, and diseases of the aorta.	DPC, DSP, EC	AE, DSP
4.	Learn the echocardiographic evaluation of congenital heart disease, infective endocarditis, cardiac masses and tumors.	DPC, DSP, EC	AE, DSP
5.	Echocardiographic evaluation of post-surgical cardiac patients including, valvular repair/replacement, aorta repair, ventricular assist devices, pacemakers, and cardiac defibrillators.	DPC, DSP, EC	AE, DSP
6.	Access and critically evaluate current medical information and scientific evidence relevant to echocardiography.	DPC, AR, EC	AE

C. Echocardiography: Interpersonal Skills and Communication

	Principal Educational Goals	Learning Activities	Evaluation Methods
1.	Communicate effectively with patients and families in a stressful critical care environment.	DPC	AE, ECR
2.	Communicate effectively with physician colleagues and members of other health care professions to assure timely, comprehensive patient care.	DPC	AE, PR, ECR
3.	Communicate effectively with colleagues when reporting pertinent findings of echocardiographic studies.	DPC, EC	AE, PR, ECR

D. Echocardiography: Professionalism

	Principal Educational Goals	Learning Activities	Evaluation Methods
1.	Interact professionally toward patients, families, colleagues, and all members of the health care team.	DPC	AE, PR, ECR
2.	Interacting with patients and families in a professionally appropriate manner.	DPC, PC	AE, ECR
3.	Acceptance of professional responsibility as the primary care physician for patients under his/her care.	DPC, PC	AE, ECR
4.	Appreciation of the social context of illness.	DPC	AE, ECR
5.	Effective utilization of ethics knowledge and consultants. This includes guidelines for CPR and DNR and end of life cardiac care.	DPC, EI	AE, PR, ECR

E. Echocardiography: Practice-Based Learning and Improvement

	Principal Educational Goals	Learning Activities	Evaluation Methods
1.	Identify and acknowledge gaps in personal knowledge and skills in performing and interpreting echocardiographic studies.	DPC, EC, ECR	AE
2.	Develop real-time strategies for filling knowledge gaps that will benefit patients in the echo lab, coronary care units, or other intensive care units.	DPC	AE
3.	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, FS	AE

F. Echocardiography: Systems-Based Practice

	Principal Educational Goals	Learning Activities	Evaluation Methods
1.	Understand and utilize the multidisciplinary resources necessary to perform echocardiographic studies optimally on acutely ill cardiac patients.	DPC, PC	AE
2.	Collaborate with other members of the health care team to assure comprehensive care.	DPC, PC	AE
3.	Use evidence-based, cost-conscious strategies in the appropriate performance of echocardiographic studies.	DPC	AE

4.	Knowing when to ask for help and advice from senior fellows and attending physicians.	DPC	AE, PR
5.	Effective professional collaboration with residents, other fellows, and faculty consultants from other disciplines such as Radiology and Surgery.	DPC, PC	AE, ECR
6.	Learning by performance of echocardiographic studies, attending teaching conferences and other educational activities.	DPC, AR	AE
7.	Effective collaboration with other members of the health care team, including residents, medical students, nurses, clinical pharmacists, occupational therapists, physical therapists, nutrition specialists, patient educators, speech pathologists, respiratory therapists, enterostomy nurses, social workers, case managers, discharge planners, and providers of home health services.	DPC, PC	AE, ECR
8.	Effective utilization of ethics consultants, including knowing when and how to request consultation, and how best to utilize the advice provided.	DPC, PC	AE
9.	Consideration of the cost-effectiveness of diagnostic and treatment strategies.	DPC, ACS	AE
10.	Ability to lead team, including nurses, echo technicians, and stress ECG technicians.	DPC, ACS	AE, ECR
11.	Willingness and ability to teach medical students and residents.	DPC	AE, PR

Learning objectives and expectations for this rotation:

Fellows will gain a comprehensive knowledge of the following:

- To learn basic cognitive and technical skills in ultrasound technology in acquiring the basic 2D echo images, Color and Spectral Doppler exam.
- To learn the clinical indications in the evaluation and management of cardiovascular disease
- To learn the limitations and pitfalls of ultrasound physics
- To learn to generate an accurate and comprehensive echo report from the acquired echo modalities

- Disease entities evaluated by echo:
 - Left ventricular function both global and regional at rest, and during stress echo with treadmill exercise or pharmacologically.
 - Valvular structure and function –native and prosthetic valve function, infection etc.
 - Cardiomyopathies
 - Constrictive and Restrictive pericardial disease
 - Pericardial disease
 - Cardiac masses
 - Congenital heart disease
 - Diseases of the Right heart, aorta
 - Doppler principles to measure intra-cardiac and intravascular blood flow velocity.

Relevant learning activities on this rotation

- Assessment of cardiac function including LV regional and global function as well as valvular morphology and function.
- Interpretation of echocardiograms.
- Interpretation of doppler studies.
- Knowledge of the clinical application and interpretation of stress testing modalities to evaluate ischemic heart disease, cardiomyopathies and occasional valve disease.

Curriculum content and what methods are used

- Intensive independent reading with subsequent direct one-to-one instruction and corrections by an Attending Echocardiographer of studies previously read by the fellow. This includes all inpatient, outpatient transthoracic and stress echo exams performed daily.
- Fellows read approximately 30-35 studies daily Mon-Friday for 20 days two to three times in the first and last year.
- Performance of echocardiograms under the supervision of experienced sonographers.
- Attendance at weekly echo conference given by fellow and faculty to review interesting cases, and correlative cases.
- Textbooks, educational videos, CD and websites that feature material on echo.

Supervision: The supervision is direct and occurs in a one-to-one basis making the training on echocardiography probably one of the most intense in the country.

Evaluation Process: (*fellows will be evaluated on each rotation using a competency-based system on E-Value*).

Since this rotation will be taken more than once in the course of training experience, it is expected that fellows will demonstrate increasing competence and skill in the interpretation of echos and ECGs.

Feedback is given daily, with a formal end of rotation evaluation.

By the end of the first year, interpretations should need to be modified only slightly and basically for purposes of fine-tuning the assessment of function and valvular performance. By the end of the second year rotations in the lab are particularly targeted at observing the fellow functioning in a quasi independent mode, providing feedback and teaching to house staff and supervising stress tests without the need for significant attending input.

Additional information

The Johns Hopkins Hospital consists of 2 labs; one Inpatient Echo Lab which is located on Blalock 5 and the Outpatient Echo Lab located in JHOC 7th floor-in the Cardiology Clinic.

Clinical Operations:

- Transthoracic echo (2D, Color, Spectral Doppler, Saline IV contrast injection, IV Contrast image enhancing agent) is performed in both Echo Labs.
- Treadmill Stress Echo and Dobutamine Stress Echo (both labs)
- Transesophageal Echo: only JHH Lab for inpatients and outpatients

All inpatient transthoracic echos, stress echos and TEEs must be read/finalized by the Echo Attending of the day the same day the echo service is performed. Preliminary reads by sonographers and/or fellows (particularly early in their echo training) are not to be given out to requesting physicians/housestaff/nurses. Urgent/stat reads must be communicated and must be read by the fellow/echo attending.

Transthoracic reports are entered into the EnConcert digital workstation which when finalized are entered into EPR within a few hours. Stress echos and TEE reports are entered into PRS workstation and companion-and also linked to EPR. Edits to reports are made by the fellow/attending as they read the echo study-and are not made by the echo lab secretary. This ensures accuracy and timely reporting for requesting clinicians. Consultative discussions with requesting clinicians, fellows and echo attendings regarding the role of the echo data is an ongoing part of the echo rotation, and provides a forum for clinical discussions and opportunities for teaching/research.

Role of the Fellow in the Echo Labs

The basic theory and practice of echocardiography (transthoracic echo, stress echos, and TEE) are taught during this rotation. Echo-1 fellows assigned to each JHH/JHOC Echo lab. Echo-2 TEE fellow.

Echo-1 fellows: Learn 2 D echo, Doppler modalities and advanced scanning skills with interpretation with attending/sonographer. Theory and practice of echo skills are enhanced with readings from textbooks/syllabus/educational websites. The fellow reads transthoracic echos, supervises and reads stress echos independently and with Echo Attending. Fellows will learn to perform hands-on TTE scanning with sonographers and available attendings on patients scanned in the Echo labs, or at the bedside with sonographers.

Echo-2- TEE fellow: TEE are performed typically by 2nd year fellow or first year who has completed level 1 training in echo (based on volume/time/competency) under the direct supervision of Echo Attending. TEE fellow also participates in supervising and reading stress echos in the inpatient lab when Echo-1 at clinic, or needs assistance. (See TEE fellow rotation hand-out)

Evenings, Weekend and TEE night/weekend coverage: Echo-1 fellow covers one weekend for CCU fellow and one weekend for Consult fellow. The weekend coverage for Consults will also include TEE coverage to prevent all month coverage by the Echo-2 fellow. Cardiology Fellow on Consults Service-performs limited Echo exam for urgent/emergent echos only during the week and weekends.

TEE call: Echo Attending and TEE fellow call is provided daily. TEE training for the first year fellow will begin with exposure on month 1 echo rotation for this purpose. All TEE requests must have some consultative discussion with the attending to determine appropriateness for the study off-hours, and this is done in conjunction with the TEE Echo Attending on call.

Echo Conferences: Weekly Echo conference is traditionally done with Dr. Nick Fortuin-Tuesday 8am in Weisfeldt library. All fellows rotating in the lab bring cases to review and discuss. The first Tuesday of the month there will be didactic and case based echo teaching to provide a core curriculum of technologies/pathologies and correlations with other cardiovascular imaging/hemodynamic/clinical data.

Echo Attendings:

Core Echo Attendings (as of July 2004): These attendings will provide a full day coverage of reading transthoracic studies, stress echos and perform TEE, in addition to teaching fellow, and providing consultative service to requesting physicians/teams as they come to the lab. All Core Echo Attendings that perform TEE will be required to cover TEE night call

Mary Corretti

Ted Abraham

Kathy Wu

Susan Mayer (mostly at Bayview)-average one day/week at JHH Echo Lab

Supplemental Attendings: Scheduled on limited timeframe to read or perform TEE.

Nancy Strahan: TEE coverage on Wed and Friday mornings

Jim Weiss: (reads transthoracic echos and stress echo with the fellow during a 1-2 hours session 2-3 times/week)

Nick Fortuin (read transthoracic echos with fellows 2 hours/week: Wed 9-10am. and Friday 9-10 am)

Bob McCarthy (reads TTE, stress echos and performs TEE—between 3 pm and 5:30PM on Wednesday afternoon only). Wednesdays will have one core attending covering all day every week to cover gaps in coverage.

Research with Ultrasound Technologies

Most clinical research studies using ultrasound modalities are performed through another noninvasive cardiovascular research lab in Carnegie 583 (policy/procedures forthcoming July 1, 2004). Other clinical studies may by design/protocol utilize clinical lab resources. All research protocols employing ultrasound resources from

either lab will be reviewed by the Medical Director of the Echo Lab-to help facilitate the implementation of the study. Some modalities such as brachial artery vasoactivity (endothelial function testing) and carotid IMT are only done in the Noninvasive Clinical Research Lab (NCRL). Other techniques such as 3D echo images, and strain/strain rate data are new echo modalities used for clinical research at this time and not a routine part of the echo exam.