



Course Learning Objectives

Sunday, February 17 – Friday, February 22

At the conclusion of this activity, participants will be better able to:

1. Define the physical principles of ultrasound technology and its applications for two and three-dimensional (2D, 3D) imaging and use of Doppler principle to assess normal and abnormal intra-cardiac flows.
2. Distinguish normal and abnormal left and right ventricular function using qualitative and quantitative aspects of echocardiography.
3. Illustrate the normal and abnormal anatomy and function of the native and implanted intra-cardiac valves using 2D/3D imaging and Doppler derived equations of flow.
4. Illustrate the integral role of echocardiography in facilitating surgical decision-making in the operating room.
5. Develop an understanding of the multi-disciplinary applications of echocardiography in structural heart disease interventions and its role as a vital procedural adjunct.

Session Learning Objectives

Sunday, February 17

5 – 8 pm

Core Concepts – Self Assessment and Review

Moderators: Feroze Mahmood, MD; Mark Taylor, MD; Peter Panzica, MD

At the conclusion of this activity, participants will be better able to:

1. Understand the basics of the physical principles of ultrasound physics, Doppler (pulse & continuous wave, color flow Doppler and tissue Doppler), image formation, optimization, artifacts and the core concepts of hemodynamics to calculate valve areas, gradients, cardiac output, ejection fraction, intra-cardiac shunt fractions and basic ultrasound machine operation.
2. Discuss the indications, contraindications and patient safety aspects of ultrasound and transesophageal echocardiography (TEE).
3. Match the cardiac anatomical structures with echocardiographic display.
4. Recognize the echocardiographic display of cardiac anatomy in the form of intra-cardiac valves, vessels and chamber description and walls.
5. Comprehend the basic principles of identification of normal systolic and diastolic function.
6. Apply qualitative and quantitative assessment RV systolic function.
7. Identify common echocardiographic artifacts.
8. Distinguish common normal variants.
9. Elucidate the role of echocardiography in intraoperative hemodynamic evaluation.
10. Delineate the advantages and limitations of TEE in echocardiographic assessment of cardiac pathology.

Monday, February 18

7:30 – 11 am

Hands-On Porcine Heart Dissection with 2D and 3D Echocardiographic Correlation: Apply Anatomy and Imaging to Surgical and Structural Heart Decision Making

Moderator: Douglas Shook, MD

At the conclusion of this activity, participants will be better able to:

1. Identify cardiac and great vessel anatomy in the porcine heart.
2. Illustrate porcine anatomical structures to understand 2D and 3D echocardiographic display.
3. Demonstrate surgical anatomic landmarks through porcine anatomical structures.
4. Assess anatomical and echocardiographic findings with perioperative and surgical management strategies.

1 – 2:30 pm

Ventricular Function

Moderator: Annette Vegas, MDCM

At the conclusion of this activity, participants will be better able to:

1. Identify abnormal LV and RV global and focal systolic function.
2. Apply qualitative and quantitative methods to abnormalities of LV and RV systolic function.
3. Recognize the importance of diastolic function assessment in the perioperative setting and perform both qualitative and quantitative Doppler analysis of diastolic function.

3 – 4:30 pm

Tissue Doppler and Cardiac Kinetics

Moderator: Massimiliano Meineri, MD

At the conclusion of this activity, participants will be better able to:

1. Describe the limitations of current 2D and 3D imaging modalities to determine myocardial structure and function.
2. Illustrate the incremental value of tissue Doppler in assessment of myocardial function.
3. Define the rationale for strain assessment.
4. Explain the methods for assessing strain during a complete echocardiographic assessment.
5. Summarize the value of tissue Doppler and strain imaging in perioperative applications.

5 – 6:30 pm

Potpourri I

Moderator: Annette Vegas, MDCM

At the conclusion of this activity, participants will be better able to:

1. Assess the anatomy and evaluate the pericardium.
2. Identify common echocardiographic artifacts.
3. Recognize echocardiographic findings suggestive of endocarditis.
4. Distinguish common normal variants and unusual findings by echocardiography.
5. Explain the 2D and Doppler characteristics for assessment of pericardial diseases.

6:30 – 7:30 pm

Day in Review

Moderator: Peter Panzica, MD

At the conclusion of this activity, participants will be better able to:

1. Assess their acquisition of knowledge over the course of the preceding 2 days.
2. Identify areas of knowledge gaps.
3. Explain principles of left ventricular and right ventricular assessment.
4. Illustrate the principles and applications of Tissue Doppler and Cardiac Kinetics.
5. Interpret the echocardiographic assessment of the atria, great vessels, artifacts, normal and abnormal variants and pericardial disease states.

Tuesday, February 19

7:45 – 9 am

3D Symposium I

Moderator: Massimiliano Meineri, MD

At the conclusion of this activity, participants will be better able to:

1. Outline the physics of three-dimensional (3D) echocardiography and the relationship to image creation and optimization.
2. Compare 3D and 2D modalities with respect to fundamental differences in image characteristics.
3. Develop an understanding of the advantages and limitations of imaging cardiac structures in both 2D and 3D.
4. Develop an understanding of the routine clinical application of 3D imaging in the perioperative arena.

9:30 – 11:30 am

Aortic Valve Symposium

Moderator: Nikolaos Skubas, MD

At the conclusion of this activity, participants will be better able to:

1. Outline a strategy to perform a comprehensive echocardiographic aortic valve (AV) valve examination.
2. Demonstrate the utility of TEE in classification of difficult subgroups of aortic stenosis (AS) patients.
3. Discriminate the severity of stenotic and regurgitant lesions based on their Doppler patterns.
4. Identify the limitations of various modalities of quantification of AS through a case-based discussion.

11:30 am – 12:15 pm **Prosthetic Valve Symposium**
Moderator: Kim Howard-Quijano, MD

At the conclusion of this activity, participants will be better able to:

1. Understand the principles of echocardiographic visualization and assessment of different prosthetic valves.
2. Understand how to perform hemodynamic assessment of normal prosthetic valves.
3. Recognize normal and abnormal echocardiographic findings in regard to prosthetic valve examination.

1:15 – 3 pm **Tricuspid Valve Symposium**
Moderator: Douglas Shook, MD

At the conclusion of this activity, participants will be better able to:

1. Identify various components of 2D and 3D anatomy of the TV.
2. Describe the various 2D and Doppler indices for grading the severity of tricuspid regurgitation (TR).
3. Relate the echocardiographic challenges associated with diagnosis and interpretation of functional tricuspid regurgitation (FTR).
4. Categorize the severity of tricuspid stenosis using 2D and Doppler indices.

3:30 – 5:30 pm **Mitral Valve Symposium**
Moderator: Feroze Mahmood, MD

At the conclusion of this activity, participants will be better able to:

1. Examine the mitral valve (MV) qualitatively and quantitatively with 2D and 3D imaging.
2. Illustrate the various criteria (2D & 3D) of establishing severity of regurgitation.
3. Understand the pathophysiology of ischemic mitral regurgitation.
4. Interpret Doppler profiles to accurately classify various stages of mitral stenosis.
5. Recognize the value and limitations of various echocardiographic modalities in categorization of ischemic mitral regurgitation.

6:30 – 7:30 pm

Day in Review

Presenter: Peter Panzica, MD

At the conclusion of this activity, participants will be better able to:

1. Assess their acquisition of knowledge over the course of the preceding 3 days.
2. Identify areas of knowledge gaps.
3. Describe the value of TEE for the intraoperative assessment of patients undergoing cardiac surgery.
4. Summarize the role of echocardiography in intraoperative hemodynamic evaluation.
5. Illustrate the limitations of TEE in echocardiographic assessment of cardiac pathology.

Wednesday, February 20

6:45 – 7:45 am

3D Image Acquisition Workshop

At the conclusion of this activity, participants will be better able to:

1. Practice image acquisition techniques with various ultrasound systems and phantom heart models.
2. Operate various 3D imaging quantitative software.
3. Compare and contrast various modes of 3D imaging.
4. Illustrate the use of machine controls to optimize a 3D image.

8 – 9:40 am

3D Symposium II

Moderator: Feroze Mahmood, MD

At the conclusion of this activity, participants will be better able to:

1. Define the approach to the appropriate use of intraoperative 3D echocardiography.
2. Describe how to apply the qualitative and quantitative 3D echocardiographic examination.
3. Distinguish and identify various 3D imaging artifacts and pitfalls.
4. Compare and contrast the various 3D imaging platforms available to assess cardiac/valvular structure and function.

10:10 am – 12 pm

Innovations in Echocardiography

Moderator: Bruce Bollen, MD

At the conclusion of this activity, participants will be better able to:

1. Identify the major areas of innovations in echocardiography.
2. Outline their clinical approach in the context of upcoming echocardiographic innovations.
3. Recognize the clinical value and applications of the echocardiographic innovations.
4. Evaluate the impact of these innovations on the nature of various open surgical and percutaneous structural heart disease interventions.

1:30 – 3 pm

Moderates Session

Moderator: Feroze Mahmood, MD

At the conclusion of this activity, participants will be better able to:

1. Describe the diagnosis of moderate aortic stenosis, mitral regurgitation and tricuspid regurgitation.
2. Discuss the echocardiographic and surgical risk factors, which impact treatment decision-making perioperatively in patients with moderate valvular disorders.
3. Infer the effects of general anesthesia on the severity assessment of these lesions.
4. Interpret the management of patients with moderate valvular disorders in association with other cardiac surgical procedures utilizing current management guidelines.

3:30 – 5 pm

Potpourri II

Moderator: Charles Nyman, MBBCh

At the conclusion of this session, participants will be better able to:

1. Recognize the echocardiographic description of the most common adult congenital heart disease.
2. Distinguish the echocardiographic appearance of the various annuloplasty rings.
3. Outline a plan of intraoperative interrogation of various annuloplasty rings in various valvular positions.
4. Appraise the role of TEE during life threatening emergencies.

5 – 6 pm

Day in Review

Moderator: Megan Krajewski, MD

At the conclusion of this session, participants will be better able to:

1. Assess their acquisition of knowledge over the course of the preceding 3 days.
2. Identify areas of knowledge gaps.
3. Describe the value of TEE for the intraoperative assessment of patients undergoing cardiac surgery.
4. Summarize the role of echocardiography in intraoperative hemodynamic evaluation.
5. Illustrate the limitations of TEE in echocardiographic assessment of cardiac pathology.

Thursday, February 21

7:30 – 9:30 am

Decision Making in Mitral Valve Surgery

Moderator: Bruce Bollen, MD

At the conclusion of this activity, participants will be better able to:

1. Identify the mechanisms of MR, classification systems and utilization of 2D and 3D echocardiography for its quantification.
2. Recognize the requirements of a comprehensive echocardiographic examination of the mitral valve with a perspective to assist in surgical decision-making.
3. Illustrate the value of 3D and 3D imaging for repair of myxomatous (primary) mitral valve disease, the anatomic/echocardiographic risk factors for failure pre-repair and assessment of a repaired mitral valve.
4. Recognize the controversies concerning assessment of ischemic (secondary) mitral regurgitation (IMR), role of surgical intervention, and chosen therapeutic strategy.
5. Develop a multi-disciplinary approach to the complex cardiac patient.
6. Synthesize intraoperative imaging a collaborative multi-disciplinary decision-making process.

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10 – 11:30 am

Decision Making in Aortic Valve Surgery

Moderator: Timothy Maus, MD

At the conclusion of this activity, participants will be better able to:

1. Categorize AS severity in patients with low flow or low gradients scenarios.
2. Point out specific therapeutic options regarding concomitant aortic valve replacement during cardiac surgery.
3. Identify echocardiographic features suggestive of successful aortic valve repair.
4. Outline strategies for interrogating implanted aortic valve prosthesis when a high prosthetic pressure gradient is measured.
5. Develop new imaging techniques and their applications for aortic valve disease surgical decision making.
6. Develop a multi-disciplinary approach to the complex cardiac patient.
7. Synthesize echocardiographic imaging knowledge imaging into multi-disciplinary decision-making.

Noon – 12:45 pm

12th Annual Arthur E. Weyman, MD Lecture

Moderators: Feroze Mahmood, MD and Mark Taylor, MD

At the conclusion of this activity, participants will be better able to:

1. Appraise the recent advances in cardiovascular echo imaging.
2. Review the role of echo imaging in the surgical, interventional or critical care environments.
3. Relate the contemporary challenges for perioperative echocardiographers.

1 – 2:30 pm

Advanced Clinical Decision Making – Mechanical Support Devices

Moderator: Peter Panzica, MD

At the conclusion of this activity, participants will be better able to:

1. Recognize the applications of echocardiography in patients with LV, RV and bi-ventricular (LVAD, RVAD and BIVAD) assist devices.
2. Demonstrate the echocardiographic assessment of patients on extra-corporeal membrane oxygenation (ECMO) support.
3. Summarize echocardiographic assessment relevant for placement of ventricular assist devices and ECMO devices.
4. Recognize the value of imaging based multi-disciplinary approach to the complex cardiac patient.
5. Formulate strategies to incorporate information obtained from imaging into decision-making process.

3 – 5 pm

Structural Heart Disease Symposium I

Moderator: Alina Nicoara, MD

At the conclusion of this session, participants will be better able to:

1. Name the various structural heart disease interventions that require echocardiographic guidance.
2. Illustrate the role of TEE for specific structural heart disease interventions.
3. Show the various two and three-dimensional echocardiographic views for specific structural heart disease interventions.
4. Outline the conduct of the entire procedure with specific role of echocardiography.
5. Summarize the role of three-dimensional imaging during various structural heart disease interventions.
6. Outline a multi-disciplinary approach to the complex cardiac patient.
7. Synthesize imaging into the multi-disciplinary decision-making process.

5 – 6 pm

Day in Review

Moderator: Feroze Mahmood, MD

At the conclusion of this session, participants will be better able to:

1. Assess their acquisition of knowledge over the course of the preceding 5 days.
2. Identify areas of knowledge gaps.
3. Describe the value of TEE for the intraoperative assessment of patients undergoing cardiac surgery.
4. Summarize the role of echocardiography in advanced perioperative clinical decision making.
5. Outline echocardiographic applications for patients with structural heart disease undergoing a variety of procedures.

5:15 – 8:15 pm

3D Imaging and Laptop Computer Workshop

At the conclusion of this session, participants will be better able to:

1. Manipulate 3D datasets for clinical decision-making.
2. Recognize the utility of multi-planar analysis of 3D volume data sets.
3. Illustrate the limitations of 3D imaging for qualitative and quantitative analysis.
4. Use 3D for clinical decision making.

5:15 – 8:15 pm

Hands-On Structural Heart Disease Workshop

At the conclusion of this session, participants will be better able to:

1. Distinguish the cardiac anatomical correlations between various imaging modalities.
2. Identify the various intra-cardiac devices.
3. Recognize the spatial orientation of intra-cardiac devices within the cardiac chambers and their echocardiographic and fluoroscopic display.
4. Develop skills to guide the maneuvering of intra-cardiac catheters and deployment of devices.
5. Choose the appropriate echocardiographic views and images to assist in the conduct of a structural heart disease intervention.

Friday, February 22

7:30 – 9:30 am

Structural Heart Disease Symposium II

Moderator: Charles Nyman, MBBCh

At the conclusion of this activity, participants will be better able to:

1. Outline an echocardiographic approach to total endoscopic heart surgery.
2. Describe the immediate and follow-up evaluation of patients after percutaneous aortic valve replacement (TAVR).
3. Compare and contrast various percutaneous approaches to TV and the role of intraoperative imaging for procedural guidance.
4. Categorize the advantages and limitations of using TEE to guide complex mitral valve interventions using percutaneous approaches.
5. Appraise the value of a multi-disciplinary approach to the perioperative management approach to the complex cardiac patient.
6. Synthesize imaging into the multi-disciplinary decision-making process.

9:45 am – 12:15 pm

Echo Week Post-Test

Moderators: Megan Krajewski, MD; Feroze Mahmood, MD; Peter Panzica, MD

At the conclusion of this session, participants will be better able to:

1. Assess the knowledge level of the attendees after the training course.
2. Identify areas of knowledge gaps regarding perioperative and peri-procedural echocardiography.
3. Modify their educational approach in light of the identified knowledge deficiencies.
4. Evaluate the value of the training course in comprehensively enhancing their perioperative echocardiographic knowledge.