BAKER COLLEGE
STUDENT LEARNING OUTCOMES

CAS2250 Advanced Cardiac Sonography

13 Semester Credit Hours

Student Learning Outcomes and Enabling Objectives

1. Utilize ultrasound equipment controls to optimize 2D images.
   a. Demonstrate proper depth and gain
   b. Demonstrate still image and loop capture for adequate review
   c. Demonstrate optimal gray scale and focus
2. Utilize Doppler and color flow Doppler (CFD) controls to optimize Doppler.
   a. Demonstrate proper gain adjustment
   b. Demonstrate proper scale and filter adjustments
   c. Demonstrate proper baseline shift
   d. Demonstrate the use of various color maps
   e. Demonstrate proper color box size and positioning
3. Demonstrate accurate measurements on 2D and M-Mode images.
   a. Perform LA volume measurements
   b. Perform Simpsons measurements
   c. Perform TAPSE
   d. Perform 2D PLAX measurements
4. Perform accurate spectral Doppler measurements and calculations using PW and CW Doppler.
   a. Demonstrate measurements for calculation of MV area
   b. Demonstrate measurements for calculation of AV are
5. Demonstrate proper use of non-imaging CW Doppler probe.
   a. Demonstrate AV and MV flow profiles from apical window
   b. Demonstrate ascending and descending aorta flow from SSN window
   c. Demonstrate AV flow from right sternal border
6. Modify normal echocardiogram to evaluate specific pathologies.
   a. Demonstrate systolic dysfunction evaluation
   b. Demonstrate diastolic dysfunction evaluation
   c. Demonstrate aortic valve or aortic root disease evaluation
   d. Demonstrate mitral valve disease evaluation
   e. Demonstrate right heart pathology evaluation
   f. Demonstrate cardiomyopathy evaluation
   g. Demonstrate pericardial pathology evaluation
   h. Demonstrate prosthetic valve evaluation
   i. Demonstrate coronary artery disease evaluation

7. Demonstrate a complete normal echocardiogram.
   a. Demonstrate quality captures of all standard views and measurements of an echocardiogram protocol
8. Evaluate pericardial disease.
   a. Identify causes, clinical signs, symptoms, and treatments of pericardial disease
   b. Differentiate types of effusions
   c. Identify cardiac tamponade
   d. Identify constrictive pericarditis
   e. Demonstrate echo views and measurements needed to evaluate pericardial disease
   f. Grade severity of disease based on echo findings
9. Evaluate Ischemic Disease.
   a. Identify clinical signs, symptoms, and treatments of ischemic disease
   b. Identify relationship between coronary arteries and regional wall motion abnormalities
   c. Identify systolic dysfunction and regional wall motion abnormalities
   d. Identify complications associated with myocardial infarction
   e. Demonstrate echo views and measurements necessary to evaluate ischemic disease
   f. Grade severity of disease based on echo findings
10. Evaluate cardiomyopathies.
    a. Identify clinical signs, symptoms, and treatments of cardiomyopathies
    b. Identify the different types of hypertrophic cardiomyopathies
    c. Identify dilated cardiomyopathies
    d. Identify restrictive cardiomyopathies
    e. Demonstrate echo views and measurements needed to evaluate cardiomyopathies
    f. Grade severity of disease based on echo findings
11. Evaluate diastolic dysfunction.
    a. Identify causes of diastolic dysfunction
    b. Identify elevated filling pressures
    c. Differentiate between constrictive pericarditis and restrictive physiology
    d. Demonstrate views and measurements needed to evaluate diastolic function
    e. Grade severity of diastolic dysfunction based on echo findings

12. Evaluate right heart disease.
    a. Identify signs, symptoms, and causes of right heart disease
    b. Interpret echo findings and perform measurements of right heart disease
    c. Demonstrate echo views and measurements needed to evaluate right heart disease
    d. Assess for and identify pulmonary hypertension
    e. Grade severity of disease based on echo findings
13. Evaluate Cardiac Masses.
    a. Differentiate between different types of cardiac masses
14. Explore transesophageal echocardiography.
    a. Identify indications, contraindications, and limitations
    b. Explore intraoperative echocardiography
    c. Identify various transesophageal echocardiography views
15. Explore congenital heart disease.

a.   Compare simple versus complex lesions
    b.   Explore embryology and fetal cardiac development
    c.   Identify congenital heart disease in the echocardiogram
16. Explore saline contrast and ultrasound enhancing agents (UEAs).
    a.   Describe the importance of UEAs and saline contrast echocardiography
    b.   Describe the administration technique used with UEAs and saline contrast echocardiography
    c.   Demonstrate use of necessary machine controls and adjustments for use of saline contrast/UEAs
17. Explore prosthetic valves
    a.   Differentiate between various types of prosthetic valves
    b.   Demonstrate proper techniques for evaluating the function of prosthetic valves
18. Explore stress echo exams.
    a.   Demonstrate technique of performing an exercise stress echo
    b.   Demonstrate technique of performing a pharmacological stress echo
    c.   Describe indications and contraindications for various stress echo exams
19. Explore 3D echocardiography.
    a.   Identify indications for and usefulness of 3D echocardiography
    b.   Demonstrate basic techniques of 3D echocardiography
20. Explain strain echocardiography.
    a.   Describe indications for and usefulness of strain echocardiography
    b.   Demonstrate performance of strain within echocardiogram study

Big Ideas and Essential Questions

Big Ideas
- 2D optimization
- 2D measurements
- M-Mode measurements
- Color Doppler optimization
- Spectral Doppler optimization
- Complete normal echocardiogram
- Diseased based echocardiogram
- Pericardial disease
- Ischemic disease
- Cardiomyopathies
- Diastolic function
- Right heart disease
- Cardiac masses
- Transesophageal echocardiography (TEE)
- Saline contrast & ultrasound enhancing agents (UEAs)
- 3D echocardiography
- Strain echocardiography
- Congenital heart disease

- Stress & dobutamine echocardiography
- Prosthetic valves

Essential Questions
1. How is the complete normal echocardiogram performed?
2. How are disease specific protocols performed?
3. How to utilize ultrasound machine controls to optimize 2D, M-Mode, spectral and color flow Doppler?
4. Why is it important to know the cause of diastolic dysfunction?
5. How does knowing the different types of cardiac masses affect patient treatment?
6. How are ventricular disease and pericardial disease evaluated?
7. How is the patient affected by ventricular disease?
8. What are advanced technologies in echocardiography and how are they performed?
9. How to evaluate congenital heart disease?
10. What is the process for performing and assessing a stress echo?
11. How are normal and malfunctioning prosthetic valves identified and evaluated?

These SLOs are not approved for experiential credit.

Effective: Spring 2024