Course Competency

SON 2400C Echocardiography 1

Course Description

An in-depth course designed to present all aspects of clinical cardiovascular ultrasound studies. Topics discussed are: pathophysiological basis of diseases, clinical presentation and clinical data, Doppler and echocardiographic findings in disease, hemodynamic relationships, scanning pitfalls and differential diagnosis. Prerequisite: SON 1000L

Course Competency	Learning Outcomes
Competency 1: The student will demonstrate knowledge of sonographic appearance, sonographic technique, measurements, quantitative principles, and Doppler patterns of the normal heart by:	1. Communication 2. Numbers / Data 3. Critical thinking 4. Information Literacy 5. Computer / Technology Usage
a. Identifying normal appearance of the heart in all two-dimensional echocardiography views. b. Identifying normal anatomy in each echocardiography view. c. Discuss normal cardiac circulation, hemodynamics, and physiology. d. Identifying normal and abnormal measurements on M-Mode, 2 D, and Doppler. e. Identifying and discussing quantitative principles. f. Defining cardiac output, stroke volume, and ejection fraction. g. Identifying echo protocol measurements and discussing their importance and use in quantification. h. Identifying normal continuous wave and pulse wave patterns in each echocardiographic view. i. Identifying normal color Doppler patterns seen on each echocardiographic view. j. Discussing and identifying tissue Doppler. Discussing strain and how to calculate it. k. Identify anatomy displayed on Transthoracic and Transesophageal echocardiography images.	

m. Discussing console controls used to produce and optimize the image in an adult echo. n. Listing measurements necessary and normal ranges of measurements in a 2D exam. o. Measuring walls, ventricular volumes, ejection fractions, cardiac outputs on case presentations. p. Discussing the cause of abnormal measurements. q. Differentiate volume and pressure overload and describe the various causes. r. Discussing the protocol and application of contrast enhanced echocardiography. s. Describing and identifying how each protocol measurement is performed in M Mode, 2 D, and Doppler. t. Discussing the evaluation of normal and abnormal systolic and diastolic ventricular function. u. Identifying the severity of valve stenosis and regurgitation and views and measurements used to demonstrate this. v. Comparing and contrasting normal and abnormal 2 D and M Mode images.	
Competency 2: Demonstrate knowledge of mechanisms of disease, cardiovascular pathophysiology, and hemodynamics, sonographic technique, measurements, quantitative principles, and Doppler patterns in Valvular pathologies by:	1. Communication 2. Numbers / Data 3. Critical thinking 4. Information Literacy 5. Computer / Technology Usage
a. Listing and identifying the definition of each of the valvular disease. b. Describing etiology and listing risk factors of each valvular disease. c. Identifying history, signs and symptoms for each of the valvular diseases. d. Listing and identifying findings of the physical examination. e. Identifying and discussing pathophysiology and possible complications. f. Discussing how disease will affect hemodynamics of the heart. g. Discussing cardiac auscultation findings for each of the valvular diseases.	

h. Discussing findings on EKG, chest X-ray, Cardiac catheterization and stretch echocardiography for each valvular pathology.
i. Identifying treatment for each of the valvular diseases.
j. Identifying and comparing valvular disease
k. findings on M-mode.
l. Identifying and listing findings of 2D echocardiography for each of the valvular diseases.
m. Identifying pulse Doppler, continuous wave Doppler and color Doppler findings specific for each valvular disease. m. listing normal measurements and abnormal measurements on 2D and Doppler echocardiography.
n. Listing normal measurements and abnormal measurements on M-mode.
o. Calculating formulas and performing required measurements on 2D echocardiography for each of the valvular pathologies.
p. Calculating formulas and performing required measurements on Doppler for each of the valvular pathologies.
q. Discussing transesophageal echocardiography findings.
r. Identifying differential diagnosis for each of the valvular pathologies.
s. comparing and contrasting each pathology with its differential diagnosis. comparing and contrasting abnormal Doppler flow patterns from normal flow patterns and measurements.
t. Identifying and listing related abnormalities.
u. Identifying how pathology will affect left ventricular function.
v. Identifying, discussing, and performing left ventricular function measurements.
w. Discussing the scanning protocol and modification(s) based on the sonographic findings and the differential diagnoses.
x. Differentiating acute and chronic causes of valvular disease.
y. Discussing the pathophysiology of acute valvular pathologies.
z. Discussing the pathophysiology of chronic valvular disease. aa. Listing arrythmias associated with valvular disease and their effects on heart.

Competency 3: The student will demonstrate knowledge of mechanisms of disease, cardiovascular pathophysiology, and hemodynamics, sonographic technique, measurements, quantitative principles, and Doppler patterns in ischemic heart disease by:	1. Communication 2. Numbers / Data 3. Critical thinking 4. Information Literacy 5. Computer / Technology Usage
a. demonstrate awareness of scanning protocol and modification(s) based on the sonographic findings and the differential diagnoses. b. listing and identifying the definition of ischemic heart disease and myocardial infarction. c. describing the etiology and risk factors. d. discussing how ischemic heart disease will affect hemodynamics of the heart. e. Discussing pathophysiology of ischemic heart disease. f. identifying history, signs, and symptoms for each of the. g. discussing stable angina, unstable angina and variant angina. h. discussing findings of the physical examination. i. identifying and discussing pathophysiology and possible complications j. discussing findings on EKG, chest X-ray, cardiac catheterization and stress echocardiography. k. discussing treatment. l. identifying and listing findings of 2D echocardiography and M mode. m. identifying pulse Doppler, continuous wave Doppler and color Doppler findings of ischemia heart disease n. listing normal measurements and abnormal measurements on 2D and Doppler echocardiography. o. listing normal measurements and abnormal measurements on M-mode. n. Identifying formulas and required measurements on 2D echocardiography. o. Identifying formulas and performing required measurements on Doppler. p. identifying how pathology will affect left ventricular function. q. discussing and describing left ventricular function measurements. t. reviewing and identifying wall segments and coronary artery distribution u. identifying and describing wall motion abnormalities.	

Competency 4: The student will demonstrate knowledge of mechanisms of disease, cardiovascular pathophysiology, and hemodynamics, sonographic technique, measurements, quantitative principles, and Doppler patterns in infective endocarditis by:	1. Communication 2. Critical thinking 3. Information Literacy
a. Defining endocarditis b. Discussing lab and sonographic findings of endocarditis. c. Discussing acute effects of endocarditis. d. Identifying etiology and treatment of endocarditis. e. Identifying vegetations on cardiac valves. f. Discussing other types of infections: myocarditis & pericarditis. g. Discussing how infection can affect the adult heart and related echo findings in adults. h. Identifying flail leaflet. i. Discussing signs and symptoms of endocarditis. j. Identifying regurgitation. k. Evaluating severity of disease with color Doppler, Pulse wave, and continuous wave Doppler.	
Competency 5: The student will demonstrate knowledge of mechanisms of disease, cardiovascular pathophysiology, and hemodynamics, sonographic technique, measurements, quantitative principles, and Doppler patterns in pericardial effusion and tamponade by:	1. Communication 2. Critical thinking 3. Information Literacy 4. Computer / Technology Usage
a. Identifying severity of pericardial effusion. b. Listing etiology of pericardial effusion and tamponade. c. Recognizing sonographic findings of tamponade. d. Discussing ways to evaluate pericardial disease. e. Discussing changes in protocol to evaluate pericardial disease f. Discussing findings seen in each modality (2 D, M-Mode, Color Doppler, Pulse wave Doppler, g. Continuous wave Doppler). h. Discussing findings on chest x ray. i. Discussing treatment.	

Competency 6: The student will demonstrate knowledge of mechanisms of disease, cardiovascular pathophysiology, and hemodynamics, sonographic technique, measurements, quantitative principles, and Doppler patterns in congestive heart failure (CHF) by:	1. Communication 2. Critical thinking 3. Information Literacy 4. Computer / Technology Usage
a. Listing and identifying the sonographic appearance on 2D, M-Mode, color Doppler, Pulse wave Doppler, and Continuous wave Doppler. b. Defining congestive heart failure and its presentation. c. Discussing the etiology of CHF. d. Discussing quantification measurements to evaluate severity of CHF. e. Identifying associated findings of CHF. f. Discussing pathophysiology of CHF. g. Discussing other exams to evaluate CHF h. Listing signs and symptoms of CHF. i i. Discussing treatment and management with CHF. j. Discussing medications commonly used with CHF. k. Discussing findings within all echo modalities. l. Defining congestive heart failure. m. Identifying sonographic 2 D and Doppler findings of congestive heart failure. n. Discussing and identifying changes in protocol measurements..	
Competency 7: Demonstrate knowledge and comprehension of measurements done on Doppler by:	1. Communication 2. Critical thinking 3. Information Literacy 4. Computer / Technology Usage
a. Identifying Doppler measurements done in normal and abnormal cases. b. Listing the normal ranges of measurements done on Doppler exam. c. Interpreting the cause of abnormal measurements on Doppler d. Derforming measurements on case presentations.	

Competency 8: Demonstrate knowledge and comprehension of cardiac surgical procedures and invasive procedures by:	1. Communication
a. Listing and describing alternative imaging techniques used to evaluate the heart. b. Listing treatments of valvular disease including types of valvular replacements. c. Describing pericardiocentesis. d. Describing ultrasound guided procedures (i.e. TEE, intracardiac echo). e. Listing and defining the types of invasive procedures and their purpose. f. Defining the types of cardiac surgical procedures (i.e. CABG, TAVR).	

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