

Adult Echocardiography Examination Content Outline

(Outline Summary)

#	Domain	Subdomain	Percentage
1	Anatomy and Physiology	• Normal Anatomy • Normal Physiology	17%
2	Pathology	• Abnormal Physiology and Perfusion • Postoperative Evaluation	46%
3	Clinical Care and Safety	• Clinical Care • Safety	8%
4	Measurement Techniques, Maneuvers, and Sonographic Views	• Measurement Techniques • Maneuvers • Sonographic Imaging Views	23%
5	Instrumentation, Optimization, and Contrast	• Instrumentation and Optimization • Contrast	6%

(Detailed Outline)

1	Anatomy and Physiology 17%	Knowledge, skill, and/or ability related to normal anatomy and physiology
1.A	Normal anatomy	
1.A.1	Assess great vessels (aorta, pulmonary arteries, etc.)	• Knowledge of normal cardiac anatomy and vessels • Knowledge of anatomic variants related to the heart • Ability to recognize and document normal cardiac anatomy and vessels • Ability to recognize and document anatomic variants related to the heart • Knowledge of normal hemodynamic response to stress testing and maneuvers • Knowledge of normal systolic and diastolic function • Knowledge of normal valve function and measurements • Knowledge of normal arterial and venous return • Knowledge of the phases of the cardiac cycle • Knowledge of normal Doppler changes with respiration • Knowledge of appearance of normal arterial and venous waveforms • Ability to recognize and document normal hemodynamic response to stress testing and maneuvers
1.A.2	Assess cardiac anatomy and variants (chambers, false tendon, eustachian valve, Chiari network, etc.)	
1.A.3	Assess pericardium	
1.A.4	Assess valve structure	
1.A.5	Assess vessels of arterial and venous return (venae cavae, hepatic veins, coronary sinus, pulmonary veins)	
1.A.6	Assess wall segments (structure, nomenclature, etc.)	
1.B	Normal physiology	
1.B.1	Assess normal response to stress testing (blood pressure, wall augmentation, pharmacologic reaction, exercise type, etc.)	• Knowledge of the phases of the cardiac cycle • Knowledge of normal Doppler changes with respiration • Knowledge of appearance of normal arterial and venous waveforms • Ability to recognize and document normal hemodynamic response to stress testing and maneuvers
1.B.2	Assess normal systolic and diastolic function	

1.B.3	Assess normal valve function (gradient, pressure half-time, acceleration time, trivial regurgitation)	• Ability to recognize and document normal systolic and diastolic function • Ability to recognize and document normal valve function and measurements • Ability to recognize and document normal arterial and venous return • Ability to identify and document the phases of the cardiac cycle • Ability to recognize and document normal Doppler changes with respiration • Ability to recognize and document normal arterial and venous waveforms • Ability to document normal physiologic information • Ability to perform, evaluate, and document Doppler interrogation of normal cardiac structures and associated vessels
1.B.4	Assess normal arterial and venous return	
1.B.5	Identify the phases of the cardiac cycle	
1.B.6	Evaluate normal physiologic changes with maneuvers (Valsalva, respiratory, handgrip, postural)	
2	Pathology 46%	Knowledge, skill, and/or ability related to pathology
2.A	Abnormal physiology and perfusion	
2.A.1	Assess ventricular aneurysms (true, pseudo)	• Knowledge of the appearance of abnormal cardiac structures and related vascular anatomy • Knowledge of abnormal hemodynamic response to stress testing • Knowledge of appropriate Doppler interrogation techniques for abnormal cardiac structures and associated vessels • Knowledge of abnormal arterial and venous waveforms • Knowledge of conditions that affect the heart and its vascular structures • Knowledge of abnormal Doppler changes with respiration • Knowledge of abnormal EKG findings • Knowledge of types of cardiac masses • Knowledge of types of wall motion abnormalities • Knowledge of common congenital cardiac anomalies • Ability to document abnormal cardiac structures and related vascular anatomy • Ability to recognize and document abnormal hemodynamic response to stress testing • Ability to perform and evaluate proper Doppler interrogation of pathologic states • Ability to recognize and evaluate abnormal arterial and venous waveforms • Ability to identify and document conditions that affect the heart and its vascular structures
2.A.2	Assess aorta and sinus of Valsalva (aneurysm, dissection, prior repair, intramural hematoma, etc.)	
2.A.3	Assess aortic valve regurgitation (etiology, type, mechanisms, associated findings)	
2.A.4	Assess aortic valve stenosis (etiology, type, mechanisms, associated findings)	
2.A.5	Assess arrhythmias and conduction disturbances (Electrocardiography (EKG) changes, flutter, fibrillation, ventricular tachycardia, etc.)	
2.A.6	Assess cardiac masses (thrombi, vegetations, tumors)	
2.A.7	Assess abnormal diastolic function (grades, associated abnormalities, hemodynamics)	
2.A.8	Assess endocarditis (complications, associated findings)	
2.A.9	Assess ischemic cardiac diseases (mechanical complications of myocardial infarction)	
2.A.10	Assess abnormal left ventricle (cardiomyopathies, left ventricular hypertrophy, etc.)	
2.A.11	Assess abnormal left ventricle (strain)	

2.A.12	Assess mitral valve regurgitation (etiology, type, mechanisms, associated findings)	• Ability to recognize and evaluate abnormal Doppler changes with respiration • Ability to perform and evaluate Doppler interrogation of abnormal cardiac structures and associated vessels • Ability to recognize abnormal EKG findings • Ability to identify and document cardiac masses • Ability to demonstrate and evaluate wall motion abnormalities • Ability to identify and document common congenital cardiac anomalies • Ability to perform a comprehensive evaluation of cardiac pathologies • Knowledge of types of heart valve repair and replacement and their sonographic appearance • Knowledge of intracardiac devices and their sonographic appearance • Ability to perform echocardiographic evaluation of heart valve repairs, heart valve replacements, and intracardiac devices • Ability to recognize and evaluate normal and abnormal postoperative findings
2.A.13	Assess mitral valve stenosis (etiology, type, mechanisms, associated findings)	
2.A.14	Assess pericardial disease	
2.A.15	Assess abnormal pulmonary artery (clot, dilatation, catheter, changes due to pulmonary hypertension)	
2.A.16	Assess pulmonic valve regurgitation (etiology, type, mechanisms, associated findings)	
2.A.17	Assess pulmonic valve stenosis (etiology, type, mechanisms, associated findings)	
2.A.18	Assess abnormal right ventricle (pulmonary hypertension, pulmonary embolism)	
2.A.19	Assess segmental wall motion abnormalities (corresponding coronary arteries; abnormal rest and stress)	
2.A.20	Assess septal defects	
2.A.21	Identify and assess abnormal systolic function (ejection fraction in the setting of valvular dysfunction, etc.)	
2.A.22	Assess tricuspid valve regurgitation (etiology, type, mechanisms, associated findings)	
2.A.23	Assess tricuspid valve stenosis (etiology, type, mechanisms, associated findings)	
2.A.24	Assess abnormal arterial and venous return (venae cavae, hepatic veins, coronary sinus, pulmonary veins)	
2.A.25	Assess abnormal structure and function of atria (volume, etc.)	
2.A.26	Identify and evaluate Ebstein anomaly	
2.A.27	Identify and evaluate patent ductus arteriosus	
2.A.28	Identify and evaluate tetralogy of Fallot	
2.A.29	Identify and evaluate coarctation of aorta	
2.A.30	Identify and evaluate endocardial cushion defect	
2.A.31	Identify and evaluate Marfan syndrome and associated findings	

2.B	Postoperative evaluation	
2.B.1	Assess valve repair or replacement (normal and abnormal prosthetic valve, transcatheter aortic valve replacement (TAVR), etc.)	
2.B.2	Identify and evaluate intracardiac devices (closure devices, assist devices)	
3	Clinical Care and Safety 8%	Knowledge, skill, and/or ability related to clinical care and safety
3.A	Clinical care	
3.A.1	Evaluate patient history and incorporate outside data (clinical assessment, physical history, other imaging modalities)	• Knowledge and ability to apply patient history information to exam performed • Knowledge of proper patient preparations, including fasting state, based on exam performed • Knowledge of how to properly position the patient based on the needs and limitations of the exam • Knowledge of EKG findings • Knowledge of proper placement of EKG leads • Knowledge of sonographer's responsibility regarding intravenous line management • Knowledge of critical echocardiographic findings and their characteristics • Knowledge of proper ergonomic techniques • Ability to position the patient to obtain optimal results, based on exam protocol and the limitations of the patient or exam • Ability to properly apply EKG leads and optimize signal • Ability to carry out tasks related to sonographer's responsibility regarding intravenous line management • Ability to obtain accurate blood pressure reading and understand readings • Ability to practice proper ergonomic techniques • Knowledge of contraindications for echocardiographic procedures • Knowledge of types of medical emergencies that may occur in the echocardiography lab and how to identify them • Knowledge of sonographer's role in managing medical emergencies • Ability to identify contraindications for echocardiographic procedures • Ability to react to and appropriately manage medical emergencies
3.A.2	Prepare patient (positioning, EKG signal, blood pressure, fasting state, intravenous line)	
3.A.3	Identify and communicate critical findings	
3.B	Safety	
3.B.1	Identify relative and absolute contraindications for echocardiographic procedures	
3.B.2	Identify and manage medical emergencies	
4	Measurement Techniques, Maneuvers, and Sonographic Views 23%	Knowledge, skill, and/or ability related to measurement techniques, maneuvers, and sonographic views

4.A	Measurement techniques	
4.A.1	Measure aortic valve (M-mode, planimetry, Doppler, left ventricular outflow tract measurement)	• Knowledge of measurement techniques, including 2-D, 3-D, M-mode, and Doppler, and their application to the heart's chambers, vessels, and valves • Knowledge of pressure half-time, planimetry, arterial pressure, diameter, and shunt ratio measurement techniques and their application to the heart's chambers, vessels, and valves • Ability to perform all cardiac-related measurements • Knowledge of types of provocative maneuvers and their application • Ability to provide meaningful instructions to the patient regarding the performance of provocative maneuvers • Knowledge of standard echocardiographic views and their application • Ability to obtain standard echocardiographic views and modify views based on clinical situation and findings
4.A.2	Measure parameters of diastolic function	
4.A.3	Measure great vessels and veins (dimensions, pulsed wave Doppler)	
4.A.4	Measure left atrium (2-D, M-mode, Doppler)	
4.A.5	Measure left ventricle (2-D, M-mode, Doppler)	
4.A.6	Measure left ventricle (3-D)	
4.A.7	Measure mitral valve (M-mode, planimetry, Doppler)	
4.A.8	Measure pulmonary artery pressure	
4.A.9	Measure pulmonic valve (diameter, Doppler, M-mode)	
4.A.10	Measure right ventricle (2-D, Doppler, M-mode)	
4.A.11	Measure shunt ratios	
4.A.12	Measure tricuspid valve (2-D, Doppler)	
4.B	Maneuvers	
4.B.1	Perform provocative maneuvers (Valsalva, cough, sniff, squat)	
4.C	Sonographic imaging views	
4.C.1	Obtain and optimize apical views	
4.C.2	Obtain and optimize parasternal views (right and left)	
4.C.3	Obtain and optimize subcostal views	
4.C.4	Obtain and optimize suprasternal notch views	
5	Instrumentation, Optimization, and Contrast 6%	Knowledge, skill, and/or ability related to instrumentation, optimization, and contrast
5.A	Instrumentation and optimization	
5.A.1	Recognize imaging artifacts (2-D, Doppler)	• Knowledge of types of artifacts and their appearance • Knowledge of function of non-imaging transducer • Knowledge of settings on ultrasound console and their function as related to imaging, including Doppler • Ability to recognize artifacts and modify scanning technique based on findings • Ability to utilize non-imaging transducer
5.A.2	Utilize non-imaging transducer	
5.A.3	Adjust console settings to achieve optimal Doppler recording	
5.A.4	Adjust console settings to achieve optimal imaging display, including harmonics	
5.B	Contrast	

5.B.1	Utilize ultrasound contrast agents (saline, echo-enhancing agents)	• Ability to properly adjust ultrasound console settings to optimize imaging, including Doppler • Knowledge of harmonic imaging • Knowledge of physical principles of contrast agents • Knowledge of types of saline and echo-enhancing contrast agents and their application • Ability to appropriately utilize contrast agents, including understanding contraindications • Ability to optimize images when utilizing contrast agents
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