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

2.A.12	Assess mitral valve regurgitation (etiology, type, mechanisms, associated findings)	• Ability to recognize and evaluate abnormal Doppler changes with respiration
2.A.13	Assess mitral valve stenosis (etiology, type, mechanisms, associated findings)	• Ability to perform and evaluate Doppler interrogation of abnormal cardiac structures and associated vessels
2.A.14	Assess pericardial disease	• Ability to recognize abnormal EKG findings
		• Ability to identify and document cardiac masses
2.A.15	Assess abnormal pulmonary artery (clot, dilatation, catheter, changes due to pulmonary hypertension)	• Ability to demonstrate and evaluate wall motion abnormalities
2.A.16	Assess pulmonic valve regurgitation (etiology, type, mechanisms, associated findings)	• Ability to identify and document common congenital cardiac anomalies
		• Ability to perform a comprehensive evaluation of cardiac pathologies
2.A.17	Assess pulmonic valve stenosis (etiology, type, mechanisms, associated findings)	• Knowledge of types of heart valve repair and replacement and their sonographic appearance
2.A.18	Assess abnormal right ventricle (pulmonary hypertension, pulmonary embolism)	• Knowledge of intracardiac devices and their sonographic appearance
2.A.19	Assess segmental wall motion abnormalities (corresponding coronary arteries; abnormal rest and stress)	• Ability to perform echocardiographic evaluation of heart valve repairs, heart valve replacements, and intracardiac devices
2.A.20	Assess septal defects	• Ability to recognize and evaluate normal and abnormal postoperative findings
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
3.A.2	Prepare patient (positioning, EKG signal, blood pressure, fasting state, intravenous line)	• Knowledge of how to properly position the patient based on the needs and limitations of the exam • Knowledge of EKG findings
3.A.3	Identify and communicate critical findings	• Knowledge of proper placement of EKG leads
3.B	**Safety**	• Knowledge of sonographer's responsibility regarding intravenous line management
3.B.1	Identify relative and absolute contraindications for echocardiographic procedures	• Knowledge of critical echocardiographic findings and their characteristics • Knowledge of proper ergonomic techniques
3.B.2	Identify and manage medical emergencies	• 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
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
4.A.2	Measure parameters of diastolic function	• 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
4.A.3	Measure great vessels and veins (dimensions, pulsed wave Doppler)	
4.A.4	Measure left atrium (2-D, M-mode, Doppler)	• Ability to perform all cardiac-related measurements
4.A.5	Measure left ventricle (2-D, M-mode, Doppler)	• Knowledge of types of provocative maneuvers and their application
4.A.6	Measure left ventricle (3-D)	• Ability to provide meaningful instructions to the patient regarding the performance of provocative maneuvers
4.A.7	Measure mitral valve (M-mode, planimetry, Doppler)	
4.A.8	Measure pulmonary artery pressure	• Knowledge of standard echocardiographic views and their application
4.A.9	Measure pulmonic valve (diameter, Doppler, M-mode)	• Ability to obtain standard echocardiographic views and modify views based on clinical situation and findings
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
5.A.2	Utilize non-imaging transducer	• Knowledge of function of non-imaging transducer
5.A.3	Adjust console settings to achieve optimal Doppler recording	• Knowledge of settings on ultrasound console and their function as related to imaging, including Doppler
5.A.4	Adjust console settings to achieve optimal imaging display, including harmonics	• Ability to recognize artifacts and modify scanning technique based on findings
5.B	**Contrast**	• Ability to utilize non-imaging transducer

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