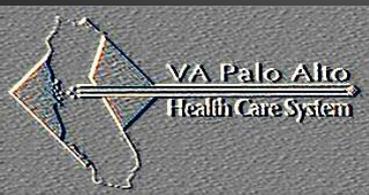


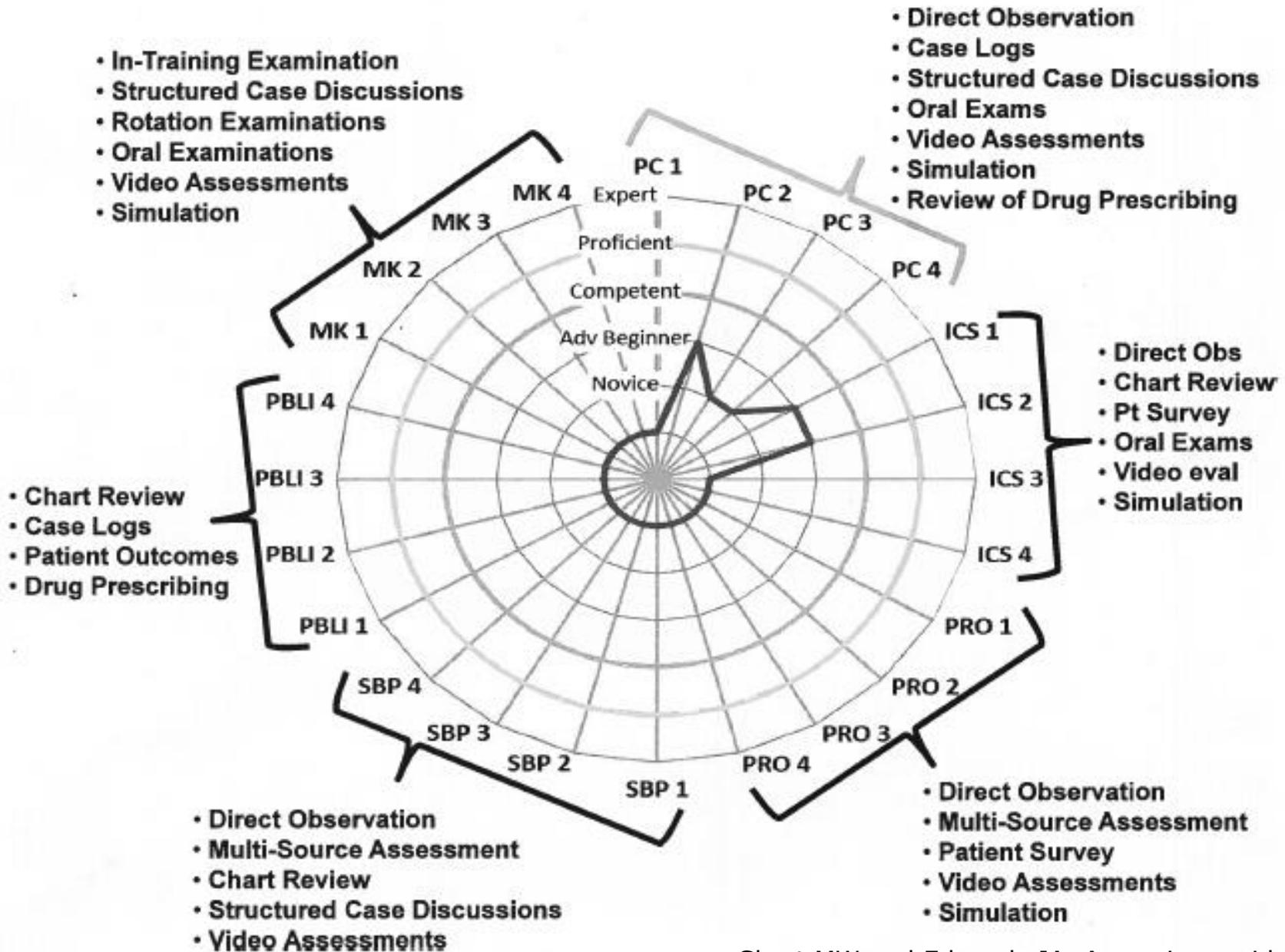
TSDA—ACGME Milestones

How can we make Milestones work?

James Fann

Stanford University





Short MW and Edwards JA. Assessing resident milestones using a CASPE March 2012

- In-Training Examination
- Structured Case Discussions
- Rotation Examinations
- Oral Examinations
- Video Assessments
- Simulation

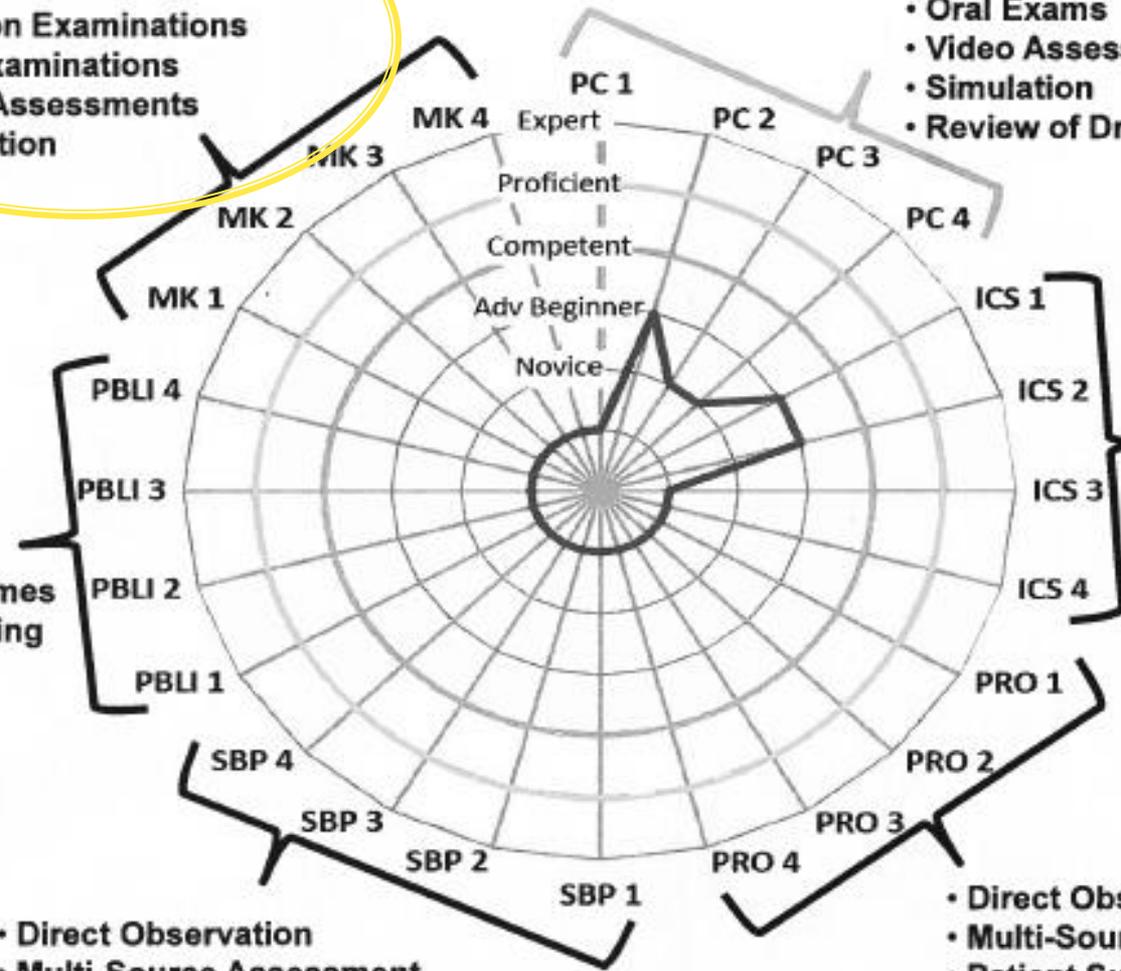
- Direct Observation
- Case Logs
- Structured Case Discussions
- Oral Exams
- Video Assessments
- Simulation
- Review of Drug Prescribing

- Direct Obs
- Chart Review
- Pt Survey
- Oral Exams
- Video eval
- Simulation

- Chart Review
- Case Logs
- Patient Outcomes
- Drug Prescribing

- Direct Observation
- Multi-Source Assessment
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- Video Assessments

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Medical Knowledge: Ischemic Heart Disease

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Knows basic anatomy and pathology (identifies coronary anatomy on angiogram) • Knows basic cellular and vascular physiology • Lists clinical manifestations of ischemic heart disease (e.g., angina, myocardial infarction) • Lists diagnostic tools available for evaluation of ischemic heart disease • Lists treatment options for ischemic heart disease (e.g., CABG, PCI) • Knows basic complications for ischemic heart disease 	<ul style="list-style-type: none"> • Understands common variations in anatomy and pathology (e.g., left dominant system) • Understands physiologic changes accompanying ischemic heart disease (e.g., ischemia, ischemia reperfusion injury, infarction, recovering myocardium) • Generates differential diagnosis of disease with similar manifestations (e.g., esophageal and aortic problems, pleurisy) • Understands advantages and disadvantages of diagnostic tools in evaluating ischemic heart disease (e.g., EKG vs. echocardiogram vs. angiogram) • Understands advantages and disadvantages of various treatment options for ischemic heart disease • Understands risks, benefits and complications of treatment modalities 	<ul style="list-style-type: none"> • Understands complex integrations between anatomy and pathology (e.g., anomalous coronary artery) • Understands the role of treatment on physiology of ischemic heart disease • Identifies the common variants of the clinical manifestations of ischemic heart disease (e.g., unstable angina, acute myocardial infarction, silent ischemia) • Interprets normal and common abnormalities associated with ischemic heart disease (e.g., reads coronary angiogram, complex EKG) • Identifies appropriate treatment for routine patient with ischemic heart disease. • Familiar with ACC/STS/AATS guidelines • Knows basic outcome literature for ischemic heart disease (e.g., SYNTAX Trial) 	<ul style="list-style-type: none"> • Understands complex variations in anatomy and pathology, including congenital (e.g., able to identify coronary anatomy in reoperative surgery) • Adapts therapeutic management based on understanding of physiology of complications of ischemic heart disease (e.g., post infarct VSD, ischemic mitral regurgitation) • Distinguishes the complex clinical manifestations and complications of ischemic heart disease • Interprets and integrates complex abnormalities associated with ischemic heart disease • Identifies appropriate treatment for complex patient with ischemic heart disease (e.g., hybrid CABG) • Knows outcomes for all treatment modalities and complications, including databases and clinical trials (e.g., STS Database) 	<ul style="list-style-type: none"> • Understands implications of SYNTAX score • Presents on outcomes of ischemic heart disease at local, regional or national meeting

Comments:

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Comments:

ISCHEMIC HEART DISEASE – CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge	1 Basic anatomy and pathology (e.g., angiogram)	2 Common variations anatomy/pathology (e.g., left dominant)	3 Complex integrate anatomy/pathology (e.g., anomalous CA)	4 Complex variations anatomy/pathology (e.g., reoperative)
Additional Comments:					
2. Physiology	0 No knowledge	1 Basic cellular and vascular physiology	2 Changes with IHD (e.g., ischemia, reperfusion, infarction)	3 Role of treatment on physiology IHD	4 Adapts treatment based on complications (e.g., VSD, MR)
Additional Comments:					
3. Clinical manifestations	0 No knowledge	1 List manifestations (e.g., angina, MI)	2 Differential diagnosis of similar manifestations (e.g., esophageal, aortic)	3 Common variants of IHD (e.g., unstable angina, acute MI)	4 Complex clinical manifestations and complications
Additional Comments:					
4. Diagnostic tools	0 No knowledge	1 List diagnostic tools for IHD	2 Advantages and disadvantages of tools (e.g., EKG, echo, angio)	3 Interprets normal and common abnormalities (e.g., angio, complex EKG)	4 Interprets/integrates complex abnormalities
Additional Comments:					
5. Treatment plan	0 No knowledge	1 List treatment options (e.g., CABG, PCI)	2 Advantages and disadvantages of treatment of treatment options	3 Appropriate treatment for routine IHD	4 Appropriate treatment complex IHD (e.g., hybrid CABG)
Additional Comments:					
6. Complications/outcomes	0 No knowledge	1 Basic complications	2 Risk, benefits, complications	3 ACC/STS/AATS guidelines, basic outcome data (e.g., SYNTAX)	4 Outcomes of all treatment modalities and complications, database (STS)/trials
Additional Comments:					

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5. Treatment plan	0 No knowledge	1 List treatment options (e.g., CABG, PCI)	2 Advantages and disadvantages of treatment of treatment options	3 Appropriate treatment for routine IHD	4 Appropriate treatment complex IHD (e.g., hybrid CABG)
Additional Comments:					

6. Complications/outcomes	0 No knowledge	1 Basic complications	2 Risk, benefits, complications	3 ACC/STS/AATS guidelines, basic outcome data (e.g., SYNTAX)	4 Outcomes of all treatment modalities and complications, database (STS)/trials
Additional Comments:					

Medical Knowledge: Valvular Disease

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Knows basic anatomy and pathology of valvular heart disease • Knows basic normal valve physiology • Lists clinical manifestations of isolated valvular heart disease (e.g., dyspnea, angina, edema, syncope) • Lists diagnostic tools available for evaluation of valvular heart disease • Lists treatment options for valvular heart disease • Knows basic complications for valvular heart disease (e.g., peri-operative complications for aortic valve replacement) 	<ul style="list-style-type: none"> • Knows common variations in anatomy and pathology of valvular heart disease (e.g., Mitral Prolapse, Type 1,2 and 3) • Explains physiologic changes accompanying valvular heart disease (e.g., pulmonary hypertension) • Generates differential diagnosis of diseases with similar manifestations (e.g., coronary artery disease, emphysema) • Explains advantages and disadvantages of diagnostic tools in evaluating valvular heart disease (e.g., surface vs. transesophageal echo) • Recites advantages and disadvantages of various treatment options for valvular heart disease (e.g., repair vs. replacement) • Recites risks, benefits and complications of treatment modalities (e.g., cites frequency of common complications) 	<ul style="list-style-type: none"> • Explains complex integrations between anatomy and pathology of valvular heart disease(e.g., bicuspid aortic valve and stenosis, functional mitral and tricuspid regurgitation) • Explains the role of treatment on physiology of valvular heart disease, including arrhythmia management,(e.g., the mechanism of surgical atrial fibrillation treatment) • Identifies the common variants of the clinical manifestations of valvular heart disease(e.g., fatigue, exercise intolerance) • Interprets normal and common abnormalities associated with valvular heart disease, including intraoperative transesophageal echocardiography • Identifies appropriate treatment for routine patient with valvular heart disease • Familiar with ACC/STS/AATS guidelines • Explains basic outcome literature for valvular heart disease(e.g., durability of mitral valve repair) 	<ul style="list-style-type: none"> • Explains complex variations in anatomy and pathology, including congenital (e.g., contribution of coronary disease to mitral regurgitation, bicuspid aortic valve and ascending aneurysm) • Adapts therapeutic management based on understanding of physiology (e.g., explains when to correct mitral or tricuspid regurgitation in setting of aortic stenosis or coronary artery disease) • Distinguishes the complex clinical manifestations and complications of valvular heart disease (e.g., staging of congestive heart failure) • Interprets and integrates complex abnormalities associated with valvular heart disease (e.g., hypertrophic obstructive cardiomyopathy) • Identifies appropriate treatment for complex patient with valvular heart disease (e.g., combined coronary, aneurysm or root enlargement) • Explains outcomes for all treatment modalities and complications, including databases and clinical trials (e.g., outcome after minimally invasive valves, success of sinus restoration in surgery for atrial fibrillation) 	<ul style="list-style-type: none"> • Presents on outcomes valvular heart disease at local, regional or national meeting

Comments:

Medical Knowledge: Valvular Disease

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Knows basic anatomy and pathology of valvular heart disease • Knows basic normal valve physiology • Lists clinical manifestations of isolated valvular heart disease (e.g., dyspnea, angina, edema, syncope) • Lists diagnostic tools available for evaluation of valvular heart disease • Lists treatment options for valvular heart disease • Knows basic complications for valvular heart disease (e.g., peri-operative complications for aortic valve replacement) 	<ul style="list-style-type: none"> • Knows common variations in anatomy and pathology of valvular heart disease (e.g., Mitral Prolapse, Type 1,2 and 3) • Explains physiologic changes accompanying valvular heart disease (e.g., pulmonary hypertension) • Generates differential diagnosis of diseases with similar manifestations (e.g., coronary artery disease, emphysema) • Explains advantages and disadvantages of diagnostic tools in evaluating valvular heart disease (e.g., surface vs. transesophageal echo) • Recites advantages and disadvantages of various treatment options for valvular heart disease (e.g., repair vs. replacement) • Recites risks, benefits and complications of treatment modalities (e.g., cites frequency of common complications) 	<ul style="list-style-type: none"> • Explains complex integrations between anatomy and pathology of valvular heart disease (e.g., bicuspid aortic valve and stenosis, functional mitral and tricuspid regurgitation) • Explains the role of treatment on physiology of valvular heart disease, including arrhythmia management, (e.g., the mechanism of surgical atrial fibrillation treatment) • Identifies the common variants of the clinical manifestations of valvular heart disease (e.g., fatigue, exercise intolerance) • Interprets normal and common abnormalities associated with valvular heart disease, including intraoperative transesophageal echocardiography • Identifies appropriate treatment for routine patient with valvular heart disease • Familiar with ACC/STS/AATS guidelines • Explains basic outcome literature for valvular heart disease (e.g., durability of mitral valve repair) 	<ul style="list-style-type: none"> • Explains complex variations in anatomy and pathology, including congenital (e.g., contribution of coronary disease to mitral regurgitation, bicuspid aortic valve and ascending aneurysm) • Adapts therapeutic management based on understanding of physiology (e.g., explains when to correct mitral or tricuspid regurgitation in setting of aortic stenosis or coronary artery disease) • Distinguishes the complex clinical manifestations and complications of valvular heart disease (e.g., staging of congestive heart failure) • Interprets and integrates complex abnormalities associated with valvular heart disease (e.g., hypertrophic obstructive cardiomyopathy) • Identifies appropriate treatment for complex patient with valvular heart disease (e.g., combined coronary, aneurysm or root enlargement) • Explains outcomes for all treatment modalities and complications, including databases and clinical trials (e.g., outcome after minimally invasive valves, success of sinus restoration in surgery for atrial fibrillation) 	<ul style="list-style-type: none"> • Presents on outcomes valvular heart disease at local, regional or national meeting
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p>Comments:</p>				

Medical Knowledge: Valvular Disease

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Knows basic anatomy and pathology of valvular heart disease • Knows basic normal valve physiology • Lists clinical manifestations of isolated valvular heart disease (e.g., dyspnea, angina, edema, syncope) • Lists diagnostic tools available for evaluation of valvular heart disease • Lists treatment options for valvular heart disease • Knows basic complications for valvular heart disease (e.g., peri-operative complications for aortic valve replacement) 	<ul style="list-style-type: none"> • Knows common variations in anatomy and pathology of valvular heart disease (e.g., Mitral Prolapse, Type 1,2 and 3) • Explains physiologic changes accompanying valvular heart disease (e.g., pulmonary hypertension) • Generates differential diagnosis of diseases with similar manifestations (e.g., coronary artery disease, emphysema) • Explains advantages and disadvantages of diagnostic tools in evaluating valvular heart disease (e.g., surface vs. transesophageal echo) • Recites advantages and disadvantages of various treatment options for valvular heart disease (e.g., repair vs. replacement) • Recites risks, benefits and complications of treatment modalities (e.g., cites frequency of common complications) 	<ul style="list-style-type: none"> • Explains complex integrations between anatomy and pathology of valvular heart disease (e.g., bicuspid aortic valve and stenosis, functional mitral and tricuspid regurgitation) • Explains the role of treatment on physiology of valvular heart disease, including arrhythmia management, (e.g., the mechanism of surgical atrial fibrillation treatment) • Identifies the common variants of the clinical manifestations of valvular heart disease (e.g., fatigue, exercise intolerance) • Interprets normal and common abnormalities associated with valvular heart disease, including intraoperative transesophageal echocardiography • Identifies appropriate treatment for routine patient with valvular heart disease • Familiar with ACC/STS/AATS guidelines • Explains basic outcome literature for valvular heart disease (e.g., durability of mitral valve repair) 	<ul style="list-style-type: none"> • Explains complex variations in anatomy and pathology, including congenital (e.g., contribution of coronary disease to mitral regurgitation, bicuspid aortic valve and ascending aneurysm) • Adapts therapeutic management based on understanding of physiology (e.g., explains when to correct mitral or tricuspid regurgitation in setting of aortic stenosis or coronary artery disease) • Distinguishes the complex clinical manifestations and complications of valvular heart disease (e.g., staging of congestive heart failure) • Interprets and integrates complex abnormalities associated with valvular heart disease (e.g., hypertrophic obstructive cardiomyopathy) • Identifies appropriate treatment for complex patient with valvular heart disease (e.g., combined coronary, aneurysm or root enlargement) • Explains outcomes for all treatment modalities and complications, including databases and clinical trials (e.g., outcome after minimally invasive valves, success of sinus restoration in surgery for atrial fibrillation) 	<ul style="list-style-type: none"> • Presents on outcomes valvular heart disease at local, regional or national meeting

Comments:

Medical Knowledge: Valvular Disease

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Knows basic anatomy and pathology of valvular heart disease • Knows basic normal valve physiology • Lists clinical manifestations of isolated valvular heart disease (e.g., dyspnea, angina, edema, syncope) • Lists diagnostic tools available for evaluation of valvular heart disease • Lists treatment options for valvular heart disease • Knows basic complications for valvular heart disease (e.g., peri-operative complications for aortic valve replacement) 	<ul style="list-style-type: none"> • Knows common variations in anatomy and pathology of valvular heart disease (e.g., Mitral Prolapse, Type 1,2 and 3) • Explains physiologic changes accompanying valvular heart disease (e.g., pulmonary hypertension) • Generates differential diagnosis of diseases with similar manifestations (e.g., coronary artery disease, emphysema) • Explains advantages and disadvantages of diagnostic tools in evaluating valvular heart disease (e.g., surface vs. transesophageal echo) • Recites advantages and disadvantages of various treatment options for valvular heart disease (e.g., repair vs. replacement) • Recites risks, benefits and complications of treatment modalities (e.g., cites frequency of common complications) 	<ul style="list-style-type: none"> • Explains complex integrations between anatomy and pathology of valvular heart disease (e.g., bicuspid aortic valve and stenosis, functional mitral and tricuspid regurgitation) • Explains the role of treatment on physiology of valvular heart disease, including arrhythmia management, (e.g., the mechanism of surgical atrial fibrillation treatment) • Identifies the common variants of the clinical manifestations of valvular heart disease (e.g., fatigue, exercise intolerance) • Interprets normal and common abnormalities associated with valvular heart disease, including intraoperative transesophageal echocardiography • Identifies appropriate treatment for routine patient with valvular heart disease • Familiar with ACC/STS/AATS guidelines • Explains basic outcome literature for valvular heart disease (e.g., durability of mitral valve repair) 	<ul style="list-style-type: none"> • Explains complex variations in anatomy and pathology, including congenital (e.g., contribution of coronary disease to mitral regurgitation, bicuspid aortic valve and ascending aneurysm) • Adapts therapeutic management based on understanding of physiology (e.g., explains when to correct mitral or tricuspid regurgitation in setting of aortic stenosis or coronary artery disease) • Distinguishes the complex clinical manifestations and complications of valvular heart disease (e.g., staging of congestive heart failure) • Interprets and integrates complex abnormalities associated with valvular heart disease (e.g., hypertrophic obstructive cardiomyopathy) • Identifies appropriate treatment for complex patient with valvular heart disease (e.g., combined coronary, aneurysm or root enlargement) • Explains outcomes for all treatment modalities and complications, including databases and clinical trials (e.g., outcome after minimally invasive valves, success of sinus restoration in surgery for atrial fibrillation) 	<ul style="list-style-type: none"> • Presents on outcomes valvular heart disease at local, regional or national meeting

Comments:

Medical Knowledge: Valvular Disease				
Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Knows basic anatomy and pathology of valvular heart disease • Knows basic normal valve physiology • Lists clinical manifestations of isolated valvular heart disease (e.g., dyspnea, angina, edema, syncope) • Lists diagnostic tools available for evaluation of valvular heart disease • Lists treatment options for valvular heart disease • Knows basic complications for valvular heart disease (e.g., peri-operative complications for aortic valve replacement) 	<ul style="list-style-type: none"> • Knows common variations in anatomy and pathology of valvular heart disease (e.g., Mitral Prolapse, Type 1,2 and 3) • Explains physiologic changes accompanying valvular heart disease (e.g., pulmonary hypertension) • Generates differential diagnosis of diseases with similar manifestations (e.g., coronary artery disease, emphysema) • Explains advantages and disadvantages of diagnostic tools in evaluating valvular heart disease (e.g., surface vs. transesophageal echo) • Recites advantages and disadvantages of various treatment options for valvular heart disease (e.g., repair vs. replacement) • Recites risks, benefits and complications of treatment modalities (e.g., cites frequency of common complications) 	<ul style="list-style-type: none"> • Explains complex integrations between anatomy and pathology of valvular heart disease (e.g., bicuspid aortic valve and stenosis, functional mitral and tricuspid regurgitation) • Explains the role of treatment on physiology of valvular heart disease, including arrhythmia management, (e.g., the mechanism of surgical atrial fibrillation treatment) • Identifies the common variants of the clinical manifestations of valvular heart disease (e.g., fatigue, exercise intolerance) • Interprets normal and common abnormalities associated with valvular heart disease, including intraoperative transesophageal echocardiography • Identifies appropriate treatment for routine patient with valvular heart disease • Familiar with ACC/STS/AATS guidelines • Explains basic outcome literature for valvular heart disease (e.g., durability of mitral valve repair) 	<ul style="list-style-type: none"> • Explains complex variations in anatomy and pathology, including congenital (e.g., contribution of coronary disease to mitral regurgitation, bicuspid aortic valve and ascending aneurysm) • Adapts therapeutic management based on understanding of physiology (e.g., explains when to correct mitral or tricuspid regurgitation in setting of aortic stenosis or coronary artery disease) • Distinguishes the complex clinical manifestations and complications of valvular heart disease (e.g., staging of congestive heart failure) • Interprets and integrates complex abnormalities associated with valvular heart disease (e.g., hypertrophic obstructive cardiomyopathy) • Identifies appropriate treatment for complex patient with valvular heart disease (e.g., combined coronary, aneurysm or root enlargement) • Explains outcomes for all treatment modalities and complications, including databases and clinical trials (e.g., outcome after minimally invasive valves, success of sinus restoration in surgery for atrial fibrillation) 	<ul style="list-style-type: none"> • Presents on outcomes valvular heart disease at local, regional or national meeting
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Comments:

Medical Knowledge: Valvular Disease

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Knows basic anatomy and pathology of valvular heart disease • Knows basic normal valve physiology • Lists clinical manifestations of isolated valvular heart disease (e.g., dyspnea, angina, edema, syncope) • Lists diagnostic tools available for evaluation of valvular heart disease • Lists treatment options for valvular heart disease • Knows basic complications for valvular heart disease (e.g., peri-operative complications for aortic valve replacement) 	<ul style="list-style-type: none"> • Knows common variations in anatomy and pathology of valvular heart disease (e.g., Mitral Prolapse, Type 1,2 and 3) • Explains physiologic changes accompanying valvular heart disease (e.g., pulmonary hypertension) • Generates differential diagnosis of diseases with similar manifestations (e.g., coronary artery disease, emphysema) • Explains advantages and disadvantages of diagnostic tools in evaluating valvular heart disease (e.g., surface vs. transesophageal echo) • Recites advantages and disadvantages of various treatment options for valvular heart disease (e.g., repair vs. replacement) • Recites risks, benefits and complications of treatment modalities (e.g., cites frequency of common complications) 	<ul style="list-style-type: none"> • Explains complex integrations between anatomy and pathology of valvular heart disease (e.g., bicuspid aortic valve and stenosis, functional mitral and tricuspid regurgitation) • Explains the role of treatment on physiology of valvular heart disease, including arrhythmia management, (e.g., the mechanism of surgical atrial fibrillation treatment) • Identifies the common variants of the clinical manifestations of valvular heart disease (e.g., fatigue, exercise intolerance) • Interprets normal and common abnormalities associated with valvular heart disease, including intraoperative transesophageal echocardiography • Identifies appropriate treatment for routine patient with valvular heart disease • Familiar with ACC/STS/AATS guidelines • Explains basic outcome literature for valvular heart disease (e.g., durability of mitral valve repair) 	<ul style="list-style-type: none"> • Explains complex variations in anatomy and pathology, including congenital (e.g., contribution of coronary disease to mitral regurgitation, bicuspid aortic valve and ascending aneurysm) • Adapts therapeutic management based on understanding of physiology (e.g., explains when to correct mitral or tricuspid regurgitation in setting of aortic stenosis or coronary artery disease) • Distinguishes the complex clinical manifestations and complications of valvular heart disease (e.g., staging of congestive heart failure) • Interprets and integrates complex abnormalities associated with valvular heart disease (e.g., hypertrophic obstructive cardiomyopathy) • Identifies appropriate treatment for complex patient with valvular heart disease (e.g., combined coronary, aneurysm or root enlargement) • Explains outcomes for all treatment modalities and complications, including databases and clinical trials (e.g., outcome after minimally invasive valves, success of sinus restoration in surgery for atrial fibrillation) 	<ul style="list-style-type: none"> • Presents on outcomes valvular heart disease at local, regional or national meeting

Comments:

VALVULAR DISEASE—CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge	1 Basic anatomy and pathology	2 Common variations anatomy/pathology (e.g., type of MR)	3 Complex integrate anatomy/pathology (e.g., bicuspid AS, functional MR)	4 Complex variations anatomy/pathology (e.g., CAD and MR, bicuspid AV and ascending aneurysm)
Additional Comments:					

2. Physiology	0 No knowledge	1 Basic valve physiology	2 Changes with valve dis (e.g., pulm HTN)	3 Role of treatment on physiology valve dis (e.g., A fib treatment)	4 Adapts treatment based on physiology (e.g., MR and TR in AS or CAD)
Additional Comments:					

3. Clinical manifestations	0 No knowledge	1 List manifestations (e.g., dyspnea, angina, syncope)	2 Differential diagnosis of similar manifestations (e.g., CAD, emphysema)	3 Common variants of valve disease (e.g., fatigue, exercise intolerance)	4 Complex clinical manifestations and complications (e.g., staging CHF)
Additional Comments:					

4. Diagnostic tools	0 No knowledge	1 List diagnostic tools for valve disease	2 Advantages and disadvantages of tools (e.g., TTE vs. TEE)	3 Interprets normal and common abnormalities (e.g., intraop TEE)	4 Interprets/integrates complex abnormalities (e.g., IHSS)
Additional Comments:					

5. Treatment plan	0 No knowledge	1 List treatment options for valve disease	2 Advantages and disadvantages of treatment options	3 Appropriate treatment for routine valve disease	4 Appropriate treatment for complex valve dis (e.g., combined CABG, aortic aneurysm, root enlargement)
Additional Comments:					

6. Complications/outcomes	0 No knowledge	1 Basic complications (e.g., periop AVR)	2 Risk, benefits, complications (e.g., frequency of common complications)	3 ACC/STS/AATS guidelines, basic outcome data (e.g., valve durability)	4 Outcomes of all treatment modalities and complications, database/trials
Additional Comments:					

Medical Knowledge: Cardiopulmonary Bypass, Myocardial Protection and Temporary Circulatory Support

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Lists basic components of cardiopulmonary bypass apparatus (e.g., oxygenator, pump heads, heat exchanger, low level alarm, in line monitoring) • Understands pulsatile vs. non-pulsatile pump physiology • Understands basic myocardial protection. (e.g., O2 requirement, O2 delivery, myocardial relaxation) • Understands coagulation cascade (e.g., intrinsic and extrinsic pathways) • Lists complications of cardiopulmonary bypass (e.g., bleeding, renal failure, pulmonary dysfunction) 	<ul style="list-style-type: none"> • Discusses options for myocardial protection (e.g., cardioplegia vs. beating heart) • Discusses cannulation techniques and options for cardiopulmonary bypass (e.g., single venous, bicaval, aortic, peripheral arteries, cold, full or partial) • Understands intra-aortic balloon pump physiology (e.g., diastolic augmentation and presystolic dip) • Understands coagulation cascade inhibitors (e.g., heparin, argatroban) • Understands complications of cardiopulmonary bypass • Lists treatment strategies for cardiac injury without cardiac bypass, including trauma 	<ul style="list-style-type: none"> • Demonstrates knowledge of cardioplegia solutions and delivery modes (e.g., crystalloid, blood, antegrade, retrograde) • Demonstrates knowledge of acid-base and anticoagulation management on cardiopulmonary bypass (e.g., pH stat, alpha stat, ACT) • Demonstrates knowledge of pharmacologic management of postcardiotomy hemodynamics (e.g., inotropes, vasodilators) • Discusses advantages and disadvantages of different myocardial protection strategies • Lists management strategies of routine complications related to cardiopulmonary bypass (e.g., air in the heart, inadequate drainage, incomplete arrest) • Demonstrates knowledge of postoperative sequelae from cardiopulmonary bypass (e.g., low cardiac output syndrome, coagulopathies, arrhythmias, HIT) 	<ul style="list-style-type: none"> • Explains advanced cardiopulmonary support (e.g., circulatory arrest or ECMO) • Explains the management of postcardiotomy shock syndrome (e.g., inotropes, IABP, mechanical support) • Explains management strategies of complex complications related to cardiopulmonary bypass (e.g., aortic dissection, air embolism) • Explains treatment strategies for postoperative sequelae from cardiopulmonary bypass (e.g., low cardiac output syndrome, coagulopathies, arrhythmias, HIT) 	<ul style="list-style-type: none"> • Develops simulation scenarios for complications related to cardiopulmonary bypass

Comments:

CARDIOPULMONARY BYPASS, MYOCARDIAL PROTECTION, TEMPORARY CIRCULATORY SUPPORT

CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
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1. Components/Circuit	0 No knowledge	1 List basic CPB components (e.g., oxygenator, pump heads, heat exchanger)	2 Cannulation techniques and options (e.g., single bicaval, aortic, peripheral, cold, full or partial)	3 Cardioplegia soln and delivery modes (e.g., crystalloid, blood, antegrade, retrograde)	4 Advanced CPB support (e.g., circ arrest or ECMO)
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Additional Comments: _____

2. Physiology/pharmacology	0 No knowledge	1 Pulsatile vs. non-pulsatile	2 IABP physiology (e.g., diastolic augment, presystolic dip)	3 Pharma. management postcardiotomy hemodynamics (e.g., inotrope, vasodilator)	4 Postcardiotomy shock syndrome (e.g., inotropes, IABP, mechanical support)
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Additional Comments: _____

3. Myocardial protection	0 No knowledge	1 Basic (e.g., O ₂ requirement, O ₂ delivery, myocardial relaxation)	2 Options for myocardial protection (e.g., cardioplegia vs. beating heart)	3 Advantages/disadvantages of different myocardial protection strategies	4
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Additional Comments: _____

4. Coagulation/myocardial protection	0 No knowledge	1 Coagulation (e.g., intrinsic vs. extrinsic pathway)	2 Coagulation cascade inhibitors (e.g., heparin, argatroban)	3 Acid-base, anticoagulation management on CPB (e.g., pH or alpha stat)	4
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Additional Comments: _____

5. Complications of CPB	0 No knowledge	1 List complications of CPB (e.g., bleeding, renal failure, pulmonary dysfunction)	2 Understands complications of CPB	3 List management routine complications (e.g., air in heart, inadequate drainage, incomplete arrest)	4 Manage complex complications of CPB (e.g., aortic dissection, air embolism)
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Additional Comments: _____

6. Trauma/postoperative	0 No knowledge	1	2 List treatment of cardiac injury w/o CPB, trauma	3 Postop sequelae of CPB (e.g., low output, coagulopathy, arrhythmia, HIT)	4 Treatment of postop sequelae of CPB (e.g., low cardiac output, coagulopathy, arrhythmia, HIT)
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Additional Comments: _____

GREAT VESSEL DISEASE**CLINICAL INTERACTION OR MOCK ORAL EXAMINATION**

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge	1 Basic anatomy and pathology (e.g., aortic dissection, spinal cord, CVA)	2 Common variations anatomy/pathology, acquired or traumatic (e.g., desc aortic tear from trauma)	3 Complex integrate anatomy/pathology, acquired, congenital, traumatic (e.g., PAU aortic dissection)	4 Complex variations anatomy/pathology, acquired, congenital, traumatic (e.g., congenital arch)
Additional Comments: _____					
2. Clinical manifestations	0 No knowledge	1 List manifestations, acquired/trauma (e.g, chest pain)	2 Differential diagnosis of similar manifestations (e.g., MI, esoph spasm)	3 Common variants, acquired, congenital, traumatic (e.g., bowel ischemia, renal dysfxn)	4 Complex clinical manifestations and complications (e.g., MI vs. acute dissection)
Additional Comments: _____					
3. Diagnostic tools	0 No knowledge	1 List diagnostic tools for great disease	2 Advantages and disadvantages of tools (e.g., CT vs. MRI vs.echo vs. angio)	3 Interprets normal and common abnormalities (e.g., sensitivity, specificity, accuracy)	4 Interprets/integrates complex abnormalities (e.g., aneurysm, dissection, PAU)
Additional Comments: _____					
4. Treatment plan	0 No knowledge	1 List treatment options for great vessel dz	2 Advantages and disadvantages of treatment options (endovasc vs. open)	3 Appropriate/adjunct treatment for routine great vessel disease (neuroprotection, spinal cord and renal Protection)	4 Appropriate treatment for complex great vessel dz (e.g., CPB techniques)
Additional Comments: _____					
5. Complications/outcomes	0 No knowledge	1 Basic complications (e.g., natural history)	2 Risk, benefits, complications	3 Basic outcome literature	4 Outcomes of all treatment modalities and complications, database/trials
Additional Comments: _____					

END STAGE CARDIOPULMONARY DISEASE

CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YEAR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge	1 Basic cardiac thoracic anatomy	2 Basic pathology relating to cardiac and pulmonary failure (e.g., pneumonia, ARDS, end-stage lung dz, MI, cardiomyopathy)	3 Common variations in anatomy/pathology (e.g., adv valve dis, pulm fibrosis, sarcoid)	4 Complex integrate anatomy/pathology (e.g., adult congenital)
Additional Comments:					
2. Physiology	0 No knowledge	1 Basic normal respiratory and CV physiology	2 Changes with cardiac and pulmonary failure (e.g., work of breathing, hypoxemia, hypercarbia, lactate, tachycardia, hypotension, decr CO)	3 Role of treatment on physiology of cardiac/pulmonary failure (e.g., medical tx vs. IABP vs mech support, med tx vs. mech ventilation)	4 Adapts treatment based on physiology of cardiac/pulmonary failure (e.g., VAD, mechanical ventilation)
Additional Comments:					
3. Clinical manifestations	0 No knowledge	1 List clinical manifestations cardiac/pulm failure (e.g., dyspnea, fatigue, periph and pulm edema)	2 Differential diagnosis of causes of cardiac/pulmonary failure (e.g., cardiomyopathy, CAD, interstitial lung dz, trauma)	3 Common variants of manifestations of cardiac/pulmonary failure (e.g., ischemic, post-viral, post-partum, idiopathic; lung injury/ARDS, infectious)	4 Complex clinical manifestations and complications of cardiac and pulmonary failure (e.g., adult congenital, mechanical cx of MI)
Additional Comments:					
4. Diagnostic tools	0 No knowledge	1 List diagnostic tools for cardiac/pulm failure (e.g., ABG, CXR, PA line, echo)	2 Advantages and disadvantages of tools in cardiac/pulm failure (e.g., PA cath, echo, cath, MRI; transbronch bx vs. open bx, pulm stress test)	3 Interprets normal and common abnormalities with cardiac/pulm failure (e.g., types of shock; bx, acute vs. chronic failure)	4 Interprets/integrates complex abnormalities with cardiac/pulm failure (e.g., RV vs. LV vs. bivent failure)
Additional Comments:					
5. Treatment plan	0 No knowledge	1 Understand natural history of cardiac/pulm failure (e.g., emphysema)	2 List treatment options for cardiac/pulmonary failure (e.g., med vs surgical)	3 Advantages and disadvantages of various treatment cardiac/pulm failure	4 Appropriate treatment cardiac/pulmonary failure, indications for tx or MCS (e.g., selection criteria for transplant)
Additional Comments:					
6. Complications/outcomes	0 No knowledge	1	2 Signs of decompensation, need for intervention	3 Risk, benefits, and complications of treatment	4 Basic outcome for cardiac/pulm failure, knows limits of mech support (risk/benefit)
Additional Comments:					

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____
 EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge	1 Basic anatomy and pathology (e.g., GI , innervation, blood supply)	2 Common variations anatomy/pathology (e.g., lymphatic)	3 Complex integrate anatomy/pathology (e.g., fascial planes in mediastinitis)	4 Complex variations anatomy/pathology, congenital (e.g., esoph atresia)
Additional Comments:					
2. Physiology	0 No knowledge	1 Basic foregut physiology (e.g., motility)	2 Changes with malignancy and motility disorders (e.g., achalasia, reflux. esoph spasm)	3 Role of treatment on physiology (e.g., postop esophagectomy cx (e.g., dumping)	4 Adapts treatment based on physiology (e.g., partial vs. total fundoplication)
Additional Comments:					
3. Clinical manifestations	0 No knowledge	1 List manifestations (e.g., heartburn, chest pain, dysphagia)	2 Differential diagnosis of similar manifestations (e.g., achalasia vs. pseudo-achalasia, coronary synd, vs. esoph spasm)	3 Common variants of esoph disease (e.g., benign vs. malignant stricture)	4 Complex clinical manifestations and complications (e.g., Type IV hernia, TEF)
Additional Comments:					
4. Diagnostic tools	0 No knowledge	1 List diagnostic tools for esoph dz (e.g., manometry, pH testing, EUS)	2 Advantages and disadvantages of tools (e.g., endoscopy vs. EUS vs. barium swallow)	3 Interprets normal and common abnormalities (e.g., EUS, motility tracings)	4 Interprets/integrates complex abnormalities (e.g., short esoph, achalasia with sigmoid esophagus)
Additional Comments:					
5. Treatment plan	0 No knowledge	1 List treatment options for esoph dz (e.g., surg vs. chemo/ XRT alone)	2 Advantages and disadvantages of treatment, staging (e.g., for cancer, dilation vs. myotomy for achalasia)	3 Appropriate treatment for routine esoph dz (e.g., high grade dysplasia—EMR vs. esophagectomy)	4 Appropriate treatment for complex esoph dz (e.g., primary vs. redo Nissen, redo myotomy v esophagectomy)
Additional Comments:					
6. Complications/outcomes	0 No knowledge	1 Basic complications (e.g., perforation, recurrent reflux, pulm. aspiration)	2 Risk, benefits, complications (e.g., slipped Nissen, anast. leak)	3 Basic outcomes and literature (benign and malignant)	4 Outcomes of all treatment modalities and complications, database/trials
Additional Comments:					

LUNG AND AIRWAY

CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____
 EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge	1 Basic anatomy and pathology (e.g., segmental anatomy, types of lung CA)	2 Common variations anatomy/pathology (e.g., azygous lobe, mixed lung CA histo)	3	4 Complex variations anatomy/pathology and congenital (e.g., cystic adenomatoid, AV malformation, TEF, pulm sequest, adenoCA)
Additional Comments:					
2. Physiology	0 No knowledge	1 Basic pulmonary physiology (e.g., A-a gradient, PFTs, V/Q scan and mismatch,)	2 Changes with pulm dz (e.g., pulm shunt, tension Ptx, 2° pulm HT w/ COPD, PVR)	3 Role of treatment on physiology pulm dz (e.g., pneumonectomy incr. pulm pressure and RV strain)	4 Adapts treatment based on physiology (e.g., changes w/ lung volume reduction)
Additional Comments:					
3. Clinical manifestations	0 No knowledge	1 List manifestations (e.g., COPD, s/s adv. metast. CA, traumatic injury, gas exchange)	2 Differential diagnosis of similar manifestations (e.g., lung nodules, airway tumors, hemoptysis w/u)	3 Common variants (e.g., various bronchial adenomas, traumatic trach-bronch injuries)	4 Complex clinical manifestations and complications (e.g., post-pneumonect. BPF, TEF, traumatic disrupt mainstem bronchi)
Additional Comments:					
4. Diagnostic tools	0 No knowledge	1 List diagnostic tools for pulm dz (e.g., CXR, CT, PET, EBUS, PFTs, mediastinoscopy, flex/rigid bronch)	2 Advantages and disadvantages of tools (e.g., CXR vs. CT, EBUS vs. mediastinoscopy, CT vs. angiogram)	3 Interprets normal and common abnormalities (e.g., PET, EBUS, PFTs, acid-base)	4 Interprets/integrates complex abnormalities (e.g., quant V/Q, mVO ₂ max for lung resection)
Additional Comments:					
5. Treatment plan	0 No knowledge	1 List treatment options (e.g., lobectomy, hemothorax)	2 Advantages and disadvantages of treatment options, impact of staging (e.g., induction therapy, airway stents)	3 Appropriate treatment for routine pulm dz (e.g., medical Rx for pulm fibrosis, <lobect. for poor lung fxn, sublobar resection)	4 Appropriate treatment for complex pulm dz (e.g., RFA for high risk lung reduct. surgery, stents for AVM, trach disorders)
Additional Comments:					
6. Complications/outcomes	0 No knowledge	1 Basic outcomes (e.g., morbidity and mortality for lobectomy)	2 Risk, benefits, complications (e.g., morbidity and mortality for VATS and open lobectomy)	3 Basic outcome (e.g., IASLC survival data, survival for COPD and IPF)	4 Outcomes of all treatments and cx, database/trials (e.g., NETT, induction for Stage IIIa disease)
Additional Comments:					

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Physiology	0 No knowledge	1 Basic normal cardiopulmonary physiology	2 Pathophysiologic changes (e.g., Frank-Starling)	3 Role of treatment on pathophysiology (e.g., CO, LAP, bp)	4 Adapts treatment based on pathophysiology (e.g, inotropes for CO, bp)

Additional Comments:

2. Clinical manifestations	0 No knowledge	1 List manifestations (e.g., chest pain, dyspnea,	2 Differential diagnosis of critically-ill, (e.g, chest pain-MI, angina, pericarditis, HOCM,	3 Common variants (e.g., differential dx postop CT surg w/ chest pain)	4 Complex clinical (e.g., low CO from RV failure, low CO w/ elevated R-sided filling pressures & low L-sided filling pressures)
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Additional Comments:

3. Diagnostic tools	0 No knowledge	1 List diagnostic tools (e.g., S-G catheter, ECG, angio, cath, echo	2 Advantages and disadvantages of tools	3 Interprets normal and common abnormalities (e.g., echo-systolic diastolic dysfxn)	4 Interprets/integrates complex abnormalities
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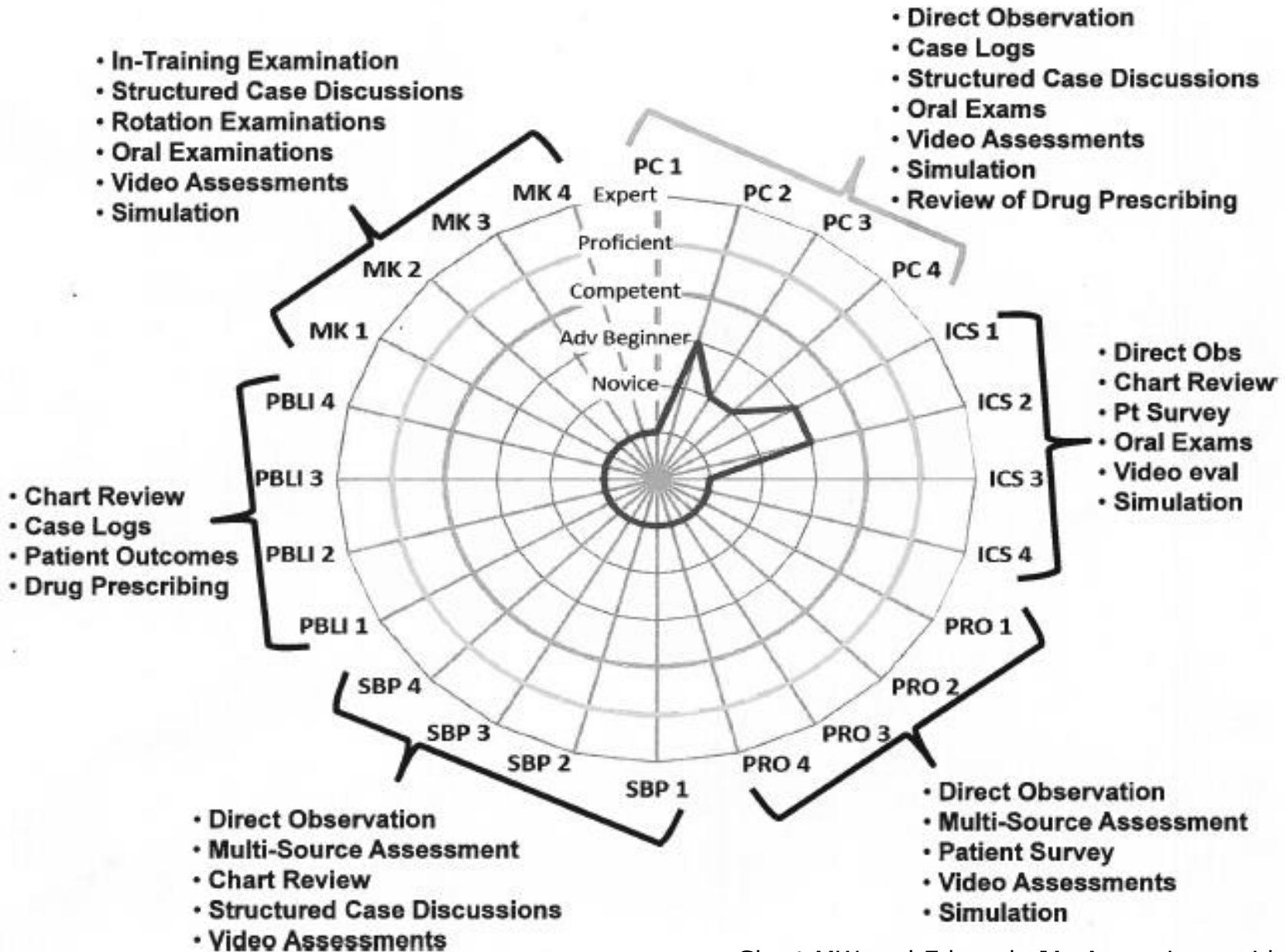
Additional Comments:

4. Treatment plan	0 No knowledge	1 List treatment options (e.g., inotropic and vasodilator drugs, IABP, circ assist)	2 Advantages and disadvantages of options (e.g., indications inotropes, IABP, VADs)	3 Appropriate treatment for routine (e.g., postop arrhythmias, nutrition, ventilation modes)	4 Appropriate treatment for complex disease (e.g., wall motion abnl post CABG, dialysis options)
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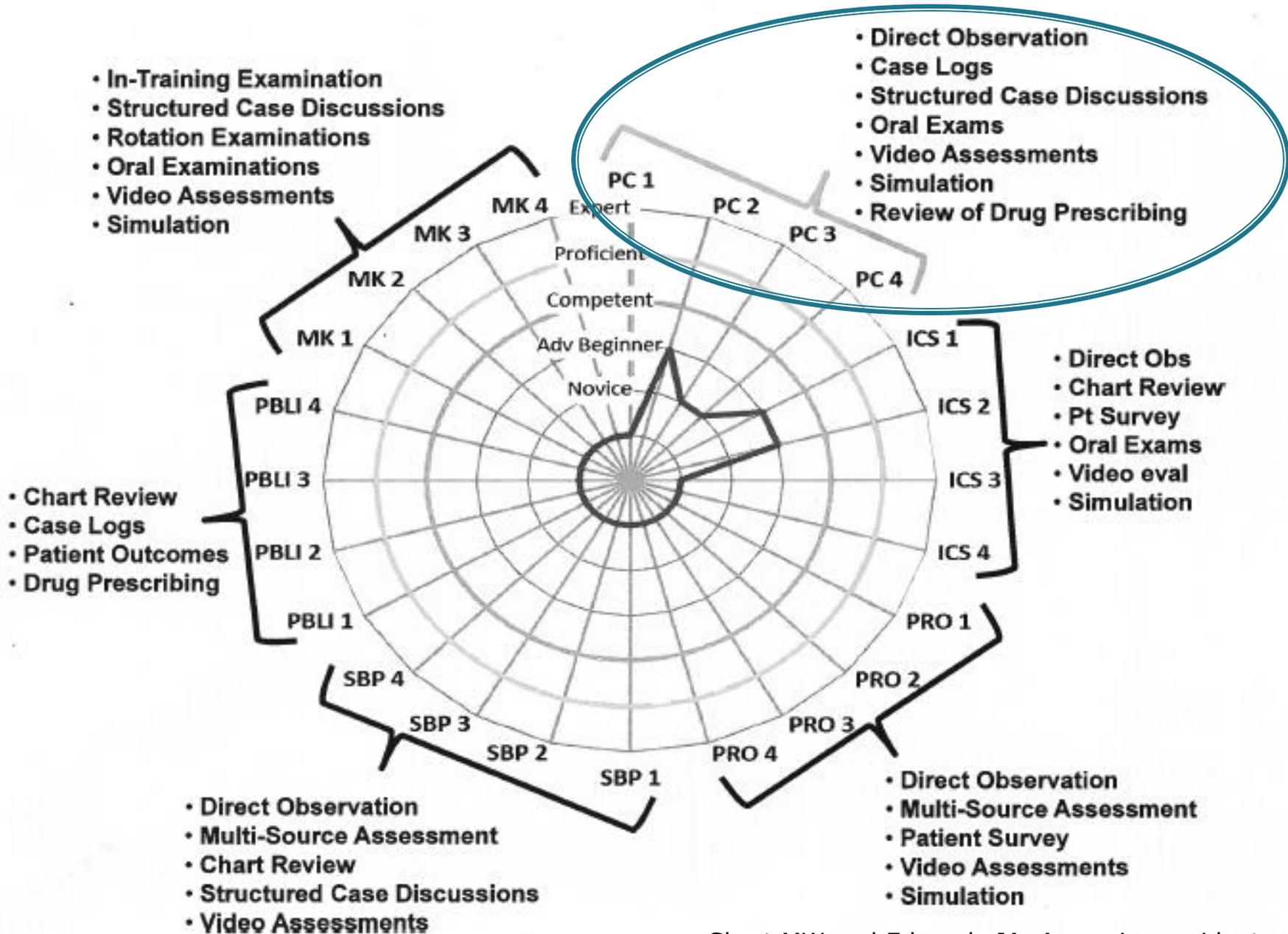
Additional Comments:

5. Complications/outcomes	0 No knowledge	1	2	3 Manage postop low cardiac output, knows basic outcome literature	4 Understands risk adjustment and outcome databases (e.g., scoring systems)
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Additional Comments:



Short MW and Edwards JA. Assessing resident milestones using a CASPE March 2012



Short MW and Edwards JA. Assessing resident milestones using a CASPE March 2012

Patient Care and Technical SKILLS: Ischemic Heart Disease

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Orders basic diagnostic and preoperative assessment tests for ischemic heart disease (e.g., cardiac cath, stress test) • Lists basic treatment options for routine ischemic heart disease (e.g., medical management, PCI vs. CABG) • Demonstrates basic surgical skills (simulation vs. OR) 	<ul style="list-style-type: none"> • Interprets and prioritizes diagnostic and physiologic assessment tests for routine patient with ischemic heart disease • Recognizes routine post-operative complications (e.g., CVA, shock, tamponade, interprets abnormal EKG) • Suggests treatment plan for patient with routine ischemic heart disease • Assesses and harvests conduits (e.g., vein mapping) • Performs surgical opening and closing • Provides basic intraoperative assisting • Performs proximal coronary anastomosis 	<ul style="list-style-type: none"> • Establishes a diagnostic and assessment plan for patients with routine ischemic heart disease (e.g., role of functional testing in ischemic heart disease) • Manages routine post-operative complications (e.g., return to the OR vs. return to cath lab) • Selects ideal treatment option for patient with routine ischemic heart disease.(e.g., institutes treatment per ACC/STS/AATS guidelines) • Institutes and weans patient from cardiopulmonary bypass • Performs routine CABG 	<ul style="list-style-type: none"> • Establishes a diagnostic and assessment plan for complex patients with ischemic heart disease • Manages complex post-operative complications(e.g., need for ventricular assist) • Selects ideal treatment option for patient with complex ischemic heart disease (e.g., combined coronary and carotid disease) • Manages complex coronary disease (e.g., redo CABG, VSD, ischemic MR, off pump) 	<ul style="list-style-type: none"> • Independently performs reoperative coronary bypass grafting • Independently performs coronary enterectomy

Comments:

Patient Care and Technical SKILLS: Ischemic Heart Disease

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Orders basic diagnostic and preoperative assessment tests for ischemic heart disease (e.g., cardiac cath, stress test) • Lists basic treatment options for routine ischemic heart disease (e.g., medical management, PCI vs. CABG) • Demonstrates basic surgical skills (simulation vs. OR) 	<ul style="list-style-type: none"> • Interprets and prioritizes diagnostic and physiologic assessment tests for routine patient with ischemic heart disease • Recognizes routine post-operative complications (e.g., CVA, shock, tamponade, interprets abnormal EKG) • Suggests treatment plan for patient with routine ischemic heart disease • Assesses and harvests conduits (e.g., vein mapping) • Performs surgical opening and closing • Provides basic intraoperative assisting • Performs proximal coronary anastomosis 	<ul style="list-style-type: none"> • Establishes a diagnostic and assessment plan for patients with routine ischemic heart disease (e.g., role of functional testing in ischemic heart disease) • Manages routine post-operative complications (e.g., return to the OR vs. return to cath lab) • Selects ideal treatment option for patient with routine ischemic heart disease.(e.g., institutes treatment per ACC/STS/AATS guidelines) • Institutes and weans patient from cardiopulmonary bypass • Performs routine CABG 	<ul style="list-style-type: none"> • Establishes a diagnostic and assessment plan for complex patients with ischemic heart disease • Manages complex post-operative complications(e.g., need for ventricular assist) • Selects ideal treatment option for patient with complex ischemic heart disease (e.g., combined coronary and carotid disease) • Manages complex coronary disease (e.g., redo CABG, VSD, ischemic MR, off pump) 	<ul style="list-style-type: none"> • Independently performs reoperative coronary bypass grafting • Independently performs coronary enterectomy

Comments:

Patient Care and Technical SKILLS: Ischemic Heart Disease

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Orders basic diagnostic and preoperative assessment tests for ischemic heart disease (e.g., cardiac cath, stress test) • Lists basic treatment options for routine ischemic heart disease (e.g., medical management, PCI vs. CABG) • Demonstrates basic surgical skills (simulation vs. OR) 	<ul style="list-style-type: none"> • Interprets and prioritizes diagnostic and physiologic assessment tests for routine patient with ischemic heart disease • Recognizes routine post-operative complications (e.g., CVA, shock, tamponade, interprets abnormal EKG) • Suggests treatment plan for patient with routine ischemic heart disease • Assesses and harvests conduits (e.g., vein mapping) • Performs surgical opening and closing • Provides basic intraoperative assisting • Performs proximal coronary anastomosis 	<ul style="list-style-type: none"> • Establishes a diagnostic and assessment plan for patients with routine ischemic heart disease (e.g., role of functional testing in ischemic heart disease) • Manages routine post-operative complications (e.g., return to the OR vs. return to cath lab) • Selects ideal treatment option for patient with routine ischemic heart disease.(e.g., institutes treatment per ACC/STS/AATS guidelines) • Institutes and weans patient from cardiopulmonary bypass • Performs routine CABG 	<ul style="list-style-type: none"> • Establishes a diagnostic and assessment plan for complex patients with ischemic heart disease • Manages complex post-operative complications(e.g., need for ventricular assist) • Selects ideal treatment option for patient with complex ischemic heart disease (e.g., combined coronary and carotid disease) • Manages complex coronary disease (e.g., redo CABG, VSD, ischemic MR, off pump) 	<ul style="list-style-type: none"> • Independently performs reoperative coronary bypass grafting • Independently performs coronary enterectomy

Comments:

Patient Care and Technical SKILLS: Ischemic Heart Disease

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Orders basic diagnostic and preoperative assessment tests for ischemic heart disease (e.g., cardiac cath, stress test) • Lists basic treatment options for routine ischemic heart disease (e.g., medical management, PCI vs. CABG) • Demonstrates basic surgical skills (simulation vs. OR) 	<ul style="list-style-type: none"> • Interprets and prioritizes diagnostic and physiologic assessment tests for routine patient with ischemic heart disease • Recognizes routine post-operative complications (e.g., CVA, shock, tamponade, interprets abnormal EKG) • Suggests treatment plan for patient with routine ischemic heart disease • Assesses and harvests conduits (e.g., vein mapping) • Performs surgical opening and closing • Provides basic intraoperative assisting • Performs proximal coronary anastomosis 	<ul style="list-style-type: none"> • Establishes a diagnostic and assessment plan for patients with routine ischemic heart disease (e.g., role of functional testing in ischemic heart disease) • Manages routine post-operative complications (e.g., return to the OR vs. return to cath lab) • Selects ideal treatment option for patient with routine ischemic heart disease.(e.g., institutes treatment per ACC/STS/AATS guidelines) • Institutes and weans patient from cardiopulmonary bypass • Performs routine CABG 	<ul style="list-style-type: none"> • Establishes a diagnostic and assessment plan for complex patients with ischemic heart disease • Manages complex post-operative complications(e.g., need for ventricular assist) • Selects ideal treatment option for patient with complex ischemic heart disease (e.g., combined coronary and carotid disease) • Manages complex coronary disease (e.g., redo CABG, VSD, ischemic MR, off pump) 	<ul style="list-style-type: none"> • Independently performs reoperative coronary bypass grafting • Independently performs coronary enterectomy

Comments:

Patient Care and Technical SKILLS: Ischemic Heart Disease

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Orders basic diagnostic and preoperative assessment tests for ischemic heart disease (e.g., cardiac cath, stress test) • Lists basic treatment options for routine ischemic heart disease (e.g., medical management, PCI vs. CABG) • Demonstrates basic surgical skills (simulation vs. OR) 	<ul style="list-style-type: none"> • Interprets and prioritizes diagnostic and physiologic assessment tests for routine patient with ischemic heart disease • Recognizes routine post-operative complications (e.g., CVA, shock, tamponade, interprets abnormal EKG) • Suggests treatment plan for patient with routine ischemic heart disease • Assesses and harvests conduits (e.g., vein mapping) • Performs surgical opening and closing • Provides basic intraoperative assisting • Performs proximal coronary anastomosis 	<ul style="list-style-type: none"> • Establishes a diagnostic and assessment plan for patients with routine ischemic heart disease (e.g., role of functional testing in ischemic heart disease) • Manages routine post-operative complications (e.g., return to the OR vs. return to cath lab) • Selects ideal treatment option for patient with routine ischemic heart disease.(e.g., institutes treatment per ACC/STS/AATS guidelines) • Institutes and weans patient from cardiopulmonary bypass • Performs routine CABG 	<ul style="list-style-type: none"> • Establishes a diagnostic and assessment plan for complex patients with ischemic heart disease • Manages complex post-operative complications(e.g., need for ventricular assist) • Selects ideal treatment option for patient with complex ischemic heart disease (e.g., combined coronary and carotid disease) • Manages complex coronary disease (e.g., redo CABG, VSD, ischemic MR, off pump) 	<ul style="list-style-type: none"> • Independently performs reoperative coronary bypass grafting • Independently performs coronary enterectomy
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

ISCHEMIC HEART DISEASE – CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge	1 Basic anatomy and pathology (e.g., angiogram)	2 Common variations anatomy/pathology (e.g., left dominant)	3 Complex integrate anatomy/pathology (e.g., anomalous CA)	4 Complex variations anatomy/pathology (e.g., reoperative)
Additional Comments:					
2. Physiology	0 No knowledge	1 Basic cellular and vascular physiology	2 Changes with IHD (e.g., ischemia, reperfusion, infarction)	3 Role of treatment on physiology IHD	4 Adapts treatment based on complications (e.g., VSD, MR)
Additional Comments:					
3. Clinical manifestations	0 No knowledge	1 List manifestations (e.g., angina, MI)	2 Differential diagnosis of similar manifestations (e.g., esophageal, aortic)	3 Common variants of IHD (e.g., unstable angina, acute MI)	4 Complex clinical manifestations and complications
Additional Comments:					
4. Diagnostic tools	0 No knowledge	1 List diagnostic tools for IHD	2 Advantages and disadvantages of tools (e.g., EKG, echo, angio)	3 Interprets normal and common abnormalities (e.g., angio, complex EKG)	4 Interprets/integrates complex abnormalities
Additional Comments:					
5. Treatment plan	0 No knowledge	1 List treatment options (e.g., CABG, PCI)	2 Advantages and disadvantages of treatment of treatment options	3 Appropriate treatment for routine IHD	4 Appropriate treatment complex IHD (e.g., hybrid CABG)
Additional Comments:					
6. Complications/outcomes	0 No knowledge	1 Basic complications	2 Risk, benefits, complications	3 ACC/STS/AATS guidelines, basic outcome data (e.g., SYNTAX)	4 Outcomes of all treatment modalities and complications, database (STS)/trials
Additional Comments:					

ISCHEMIC HEART DISEASE – CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge	1 Basic anatomy and pathology (e.g., angiogram)	2 Common variations anatomy/pathology (e.g., left dominant)	3 Complex integrate anatomy/pathology (e.g., anomalous CA)	4 Complex variations anatomy/pathology (e.g., reoperative)

Additional Comments:

2. Physiology	0 No knowledge	1 Basic cellular and vascular physiology	2 Changes with IHD (e.g., ischemia, reperfusion, infarction)	3 Role of treatment on physiology IHD	4 Adapts treatment based on complications (e.g., VSD, MR)
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Additional Comments:

3. Clinical manifestations	0 No knowledge	1 List manifestations (e.g., angina, MI)	2 Differential diagnosis of similar manifestations (e.g., esophageal, aortic)	3 Common variants of IHD (e.g., unstable angina, acute MI)	4 Complex clinical manifestations and complications
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Additional Comments:

4. Diagnostic tools	0 No knowledge	1 List diagnostic tools for IHD	2 Advantages and disadvantages of tools (e.g., EKG, echo, angio)	3 Interprets normal and common abnormalities (e.g., angio, complex EKG)	4 Interprets/integrates complex abnormalities
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Additional Comments:

5. Treatment plan	0 No knowledge	1 List treatment options (e.g., CABG, PCI)	2 Advantages and disadvantages of treatment of treatment options	3 Appropriate treatment for routine IHD	4 Appropriate treatment complex IHD (e.g., hybrid CABG)
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Additional Comments:

6. Complications/outcomes	0 No knowledge	1 Basic complications	2 Risk, benefits, complications	3 ACC/STS/AATS guidelines, basic outcome data (e.g., SYNTAX)	4 Outcomes of all treatment modalities and complications, database (STS)/trials
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Additional Comments:

Patient Care and Technical SKILLS: Ischemic Heart Disease

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Orders basic diagnostic and preoperative assessment tests for ischemic heart disease (e.g., cardiac cath, stress test) • Lists basic treatment options for routine ischemic heart disease (e.g., medical management, PCI vs. CABG) • Demonstrates basic surgical skills (simulation vs. OR) 	<ul style="list-style-type: none"> • Interprets and prioritizes diagnostic and physiologic assessment tests for routine patient with ischemic heart disease • Recognizes routine post-operative complications (e.g., CVA, shock, tamponade, interprets abnormal EKG) • Suggests treatment plan for patient with routine ischemic heart disease • Assesses and harvests conduits (e.g., vein mapping) • Performs surgical opening and closing • Provides basic intraoperative assisting • Performs proximal coronary anastomosis 	<ul style="list-style-type: none"> • Establishes a diagnostic and assessment plan for patients with routine ischemic heart disease (e.g., role of functional testing in ischemic heart disease) • Manages routine post-operative complications (e.g., return to the OR vs. return to cath lab) • Selects ideal treatment option for patient with routine ischemic heart disease.(e.g., institutes treatment per ACC/STS/AATS guidelines) • Institutes and weans patient from cardiopulmonary bypass • Performs routine CABG 	<ul style="list-style-type: none"> • Establishes a diagnostic and assessment plan for complex patients with ischemic heart disease • Manages complex post-operative complications(e.g., need for ventricular assist) • Selects ideal treatment option for patient with complex ischemic heart disease (e.g., combined coronary and carotid disease) • Manages complex coronary disease (e.g., redo CABG, VSD, ischemic MR, off pump) 	<ul style="list-style-type: none"> • Independently performs reoperative coronary bypass grafting • Independently performs coronary enterectomy
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

Patient Care and Technical Skills: Valvular Disease

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Orders basic diagnostic and preoperative assessment tests for valvular heart disease • Lists basic treatment options for routine valvular heart disease • Demonstrates basic surgical skills (simulation vs. OR) 	<ul style="list-style-type: none"> • Interprets and prioritizes diagnostic and physiologic assessment tests for routine patient with valvular heart disease (e.g., echocardiogram, cardiac cath) • Suggests treatment plan for patient with routine single valvular heart disease (e.g., single valve replacement in a symptomatic patient with aortic stenosis) • Recognizes routine post-operative complications (e.g., identifies surgically significant bleeding) • Identifies surgical approach for each valve • Performs surgical opening and closing • Performs basic intraoperative assisting 	<ul style="list-style-type: none"> • Provides a diagnostic and assessment plan for patients with routine valvular heart disease (e.g., intra-operative transesophageal echocardiogram) • Selects ideal treatment option for patient with acquired valvular heart disease (e.g., double valve replacement) • Manages routine post-operative complications (e.g., decides to return to operating room, management of heart block) • Institutes and weans patient from cardiopulmonary bypass • Performs optimal myocardial protection strategy • Performs routine valvular replacement 	<ul style="list-style-type: none"> • Forms a diagnostic and assessment plan for complex patients with valvular heart disease (e.g., intra-operative mitral regurgitation on a patient scheduled for isolated coronary artery bypass) • Selects ideal treatment option for patient with complex valvular heart disease (e.g., valvular repair, congenital valve repair) • Manages complex post-operative complications, including arrhythmias (e.g., management of paravalvular leak or SAM) • Performs complex valvular replacement • Performs valvular repair 	<ul style="list-style-type: none"> • Selects ideal plan for a patient with prior transcatheter valve, minimally invasive valve • Performs minimally invasive, percutaneous, or robotic approaches to valvular heart disease • Performs atrial and ventricular arrhythmia surgery • Performs reconstruction of fibrous trigone in patient with endocarditis of mitral and aortic valves
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

VALVULAR DISEASE—CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge	1 Basic anatomy and pathology	2 Common variations anatomy/pathology (e.g., type of MR)	3 Complex integrate anatomy/pathology (e.g., bicuspid AS, functional MR)	4 Complex variations anatomy/pathology (e.g., CAD and MR, bicuspid AV and ascending aneurysm)

Additional Comments: _____

2. Physiology	0 No knowledge	1 Basic valve physiology	2 Changes with valve dis (e.g., pulm HTN)	3 Role of treatment on physiology valve dis (e.g., A fib treatment)	4 Adapts treatment based on physiology (e.g., MR and TR in AS or CAD)
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Additional Comments: _____

3. Clinical manifestations	0 No knowledge	1 List manifestations (e.g., dyspnea, angina, syncope)	2 Differential diagnosis of similar manifestations (e.g., CAD, emphysema)	3 Common variants of valve disease (e.g., fatigue, exercise intolerance)	4 Complex clinical manifestations and complications (e.g., staging CHF)
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Additional Comments: _____

4. Diagnostic tools	0 No knowledge	1 List diagnostic tools for valve disease	2 Advantages and disadvantages of tools (e.g., TTE vs. TEE)	3 Interprets normal and common abnormalities (e.g., intraop TEE)	4 Interprets/integrates complex abnormalities (e.g., IHSS)
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Additional Comments: _____

5. Treatment plan	0 No knowledge	1 List treatment options for valve disease	2 Advantages and disadvantages of treatment options	3 Appropriate treatment for routine valve disease	4 Appropriate treatment for complex valve dis (e.g., combined CABG, aortic aneurysm, root enlargement)
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Additional Comments: _____

6. Complications/outcomes	0 No knowledge	1 Basic complications (e.g., periop AVR)	2 Risk, benefits, complications (e.g., frequency of common complications)	3 ACC/STS/AATS guidelines, basic outcome data (e.g., valve durability)	4 Outcomes of all treatment modalities and complications, database/trials
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Additional Comments: _____

Patient Care and Technical Skills: Valvular Disease

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Orders basic diagnostic and preoperative assessment tests for valvular heart disease • Lists basic treatment options for routine valvular heart disease • Demonstrates basic surgical skills (simulation vs. OR) 	<ul style="list-style-type: none"> • Interprets and prioritizes diagnostic and physiologic assessment tests for routine patient with valvular heart disease (e.g., echocardiogram, cardiac cath) • Suggests treatment plan for patient with routine single valvular heart disease (e.g., single valve replacement in a symptomatic patient with aortic stenosis) • Recognizes routine post-operative complications (e.g., identifies surgically significant bleeding) • Identifies surgical approach for each valve • Performs surgical opening and closing • Performs basic intraoperative assisting 	<ul style="list-style-type: none"> • Provides a diagnostic and assessment plan for patients with routine valvular heart disease (e.g., intra-operative transesophageal echocardiogram) • Selects ideal treatment option for patient with acquired valvular heart disease (e.g., double valve replacement) • Manages routine post-operative complications (e.g., decides to return to operating room, management of heart block) • Institutes and weans patient from cardiopulmonary bypass • Performs optimal myocardial protection strategy • Performs routine valvular replacement 	<ul style="list-style-type: none"> • Forms a diagnostic and assessment plan for complex patients with valvular heart disease (e.g., intra-operative mitral regurgitation on a patient scheduled for isolated coronary artery bypass) • Selects ideal treatment option for patient with complex valvular heart disease (e.g., valvular repair, congenital valve repair) • Manages complex post-operative complications, including arrhythmias (e.g., management of paravalvular leak or SAM) • Performs complex valvular replacement • Performs valvular repair 	<ul style="list-style-type: none"> • Selects ideal plan for a patient with prior transcatheter valve, minimally invasive valve • Performs minimally invasive, percutaneous, or robotic approaches to valvular heart disease • Performs atrial and ventricular arrhythmia surgery • Performs reconstruction of fibrous trigone in patient with endocarditis of mitral and aortic valves
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

Milestones—CARDIOTHORACIC SURGERY TECHNICAL SKILLS—PART I

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____
 EVALUATOR _____ initials _____

Level	Novice	Advanced Beginner	Intermediate	Competent
1. Ischemic Heart Disease	1 Demonstrates basic surgical skills (sim or OR)	2 Assesses /harvests conduits (e.g., vein mapping) Performs surgical opening and closing Provides basic intraop assist Performs proximal anastomosis	3 Institutes /weans from CPB Performs routine CABG	4 Manages complex CAD (e.g., redo CABG, VSD, ischemic MR, off-pump CABG)

Additional Comments:

2. Cardiopulmonary Bypass	1 Demonstrates basic surgical skills (sim or OR)	2 Performs axillary, femoral, arterial, or venous cannulation Performs peripheral vasc access Performs surgical opening and closing Assists perfusionist w/ CPB setup and pump run	3 Cannulates , institutes CPB, incl myocardial protection in routine cases Manages CPB and myocardial protection in routine cases Weans and decannulates from CPB for routine cases Recognizes /manages common acute cx (e.g., coagulopathy, pump failure)	4 Cannulates , institutes CPB, incl myocardial protection in complex cases Manages CPB and myocardial protection in complex cases Weans and decannulates from CPB for complex cases Institutes temp circ support for cardiogenic shock (e.g., IABP, ECMO, short-term LV assist Recognizes /manages unusual cx (e.g., aortic dissection)
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Additional Comments:

3. Valve Disease	1 Demonstrates basic surgical skills (sim or OR)	2 Identifies surgical approach for each valve Performs surgical opening and closing Provides basic intraop assist	3 Institutes /weans from CPB Performs optimal myocardial protection Performs routine valve replacement	4 Performs complex valve replacement Performs valve repair
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Additional Comments:

4. Great Vessel Disease	1 Demonstrates basic surgical skills (sim or OR)	2 Identifies surgical approach Performs surgical opening, closing, vascular access Provides basic intraop assist	3 Institutes /weans from CPB Performs optimal perfusion and myocardial/neuro protection Performs routine aortic replacement Performs simple vasc anastomosis	4 Performs complex great replacement Performs aortic repair Participates in endovasc aortic surgery
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Additional Comments:

Milestones—CARDIOTHORACIC SURGERY TECHNICAL SKILLS—PART II

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ Initials _____

Level	Novice	Advanced Beginner	Intermediate	Competent
5. Esophagus	<p>1</p> <p>Demonstrates basic surgical skills (sim or OR)</p>	<p>2</p> <p>Demonstrates basic endoscopic skills</p> <p>Demonstrates basic min. invasive skills (FLS)</p> <p>Provides basic intraop assistance</p> <p>Performs basic hand-sewn and stapled anastomosis</p>	<p>3</p> <p>Demonstrates advanced endoscopic skills (endomucosal resection (EMR), EUS, stenting)</p> <p>Performs routine open and minimally invasive motility operations</p>	<p>4</p> <p>Performs routine esophageal resections</p> <p>Operatively manages esophageal perforation/trauma</p>

Additional Comments:

6. Lung and Airway	<p>1</p> <p>Demonstrates basic surgical skills (sim or OR)(e.g., positioning patient, suturing)</p>	<p>2</p> <p>Demonstrates basic endoscopic skills (e.g., ports, running videoscope)</p> <p>Demonstrates basic min. invasive skills (FLS)</p> <p>Provides basic op assist</p> <p>Performs common bedside procedures (e.g, trach, tube, central lines)</p>	<p>3</p> <p>Demonstrates advanced endoscopic skills (e.g., EBUS, stenting, proper port placement)</p> <p>Performs routine open lung resection</p> <p>Performs basic VATS procedures</p>	<p>4</p> <p>Performs complex open lung resection (e.g., Pancoast, sleeve)</p> <p>Performs VATS lobectomies</p>
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Additional Comments:

7. Chest wall/Pleura/Mediastinum	<p>1</p> <p>Demonstrates basic surgical skills (sim or OR)(e.g., knot-tying, suturing)</p> <p>Performs common bedside procedures (e.g., chest drain/tube, thoracentesis, pleurodesis)</p>	<p>2</p> <p>Demonstrates basic endoscopic and U/S guidance skills (e.g., handling video scope)</p> <p>Demonstrates basic min. invasive skills</p> <p>Provides basic intraop assistance</p>	<p>3</p> <p>Demonstrates advanced endoscopic skills (e.g., uncomplicated EBUS or mediastinoscopy)</p> <p>Performs open and VATS procedures for uncomplicated pleural/mediastinal dz (e.g., VATS bx, open Stage I/II thymectomy)</p> <p>Performs simple chest wall resection (e.g., resect small lateral chondrosarc (<3cm))</p>	<p>4</p> <p>Performs open and VATS procedures for complex dz (e.g., open decort for complex loculated pleural effusion, thymectomy for Stage III thymoma)</p> <p>Performs complex chest wall resection/reconstruction (e.g., large chest wall lesion w/ reconstruction)</p>
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Additional Comments:

8. Critical Care	<p>1</p> <p>Demonstrates basic ICU surg skills (sim or bedside), incl. IV, art. line, Foley, NG tube</p>	<p>2</p> <p>Performs cardioversion</p> <p>Demonstrates advanced ICU surg skills (sim or bedside), incl. central line, PA cath, chest tube</p> <p>Demonstrates routine ventilator management</p> <p>Manages temp. pacemaker</p>	<p>3</p> <p>Demonstrates complex ventilator management</p> <p>Performs open chest resuscitation</p> <p>Performs emergency pericardiocentesis</p>	<p>4</p> <p>Troubleshoots assist devices</p>
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Additional Comments:

Assessment--Vessel Anastomosis

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ TIME TO COMPLETION _____

	Poor				Excellent
1. Arteriotomy	1	2	3	4	5
	Not identify artery Off-midline Multiple "tracks" Injury to back wall Marked irregular edge		Partial artery exposure Mainly midline Thick single "track" Close to back wall Mild irregular edge		Full artery exposure Consistent midline Thin single "track" No injury to back wall Smooth edge

Additional Comments:

2. Graft orientation	1	2	3	4	5
	Unable to orient Not know start point Not know end point Marked hesitation		Orient with some hesitation Start with some hesitation Knows end point with Some hesitation		Proper heel-toe orientation Consistent start Knows end point No hesitation

Additional Comments:

3. Bite	1	2	3	4	5
	Irregular entry/exit Hesitant, multiple punctures Inconsistent distance from edge		Mostly regular entry/exit Mostly single puncture Mostly consistent from edge		Consistent regular entry/exit Consistent single puncture Consistent from edge

Additional Comments:

4. Spacing	1	2	3	4	5
	Uneven/irregular spacing Irregular distance from previous bite		Mostly even spacing Mostly consistent distance from previous bite		Consistent even spacing Consistent distance from previous bite

Additional Comments:

5. Needle holder use	1	2	3	4	5
	Awkward finger placement Unable to rotate instrument Awkward and not facile Inconsistent needle placement		Functional finger placement Hesitant when rotating Moderate facility Generally good placement		Comfortable, smooth finger placement Smooth rotation High facility Consistent proper placement

Additional Comments:

6. Use of forceps	1	2	3	4	5
	Awkward or no traction Unable to expose Not use to stabilize needle		Moderate proper traction Able to assist in exposure Able to stabilize but rough		Consistent proper traction Consistent proper exposure Knows when to stabilize, gentle

Additional Comments:

7. Needle angles	1	2	3	4	5
	Not aware of angles Not compensate for depth Does not consider subsequent angles		Understand angles, not consistent Partial compensation for depth Partial consideration of subsequent angles		Consistent correct angles Compensate for depth Consistent adjustment for subsequent angles

Additional Comments:

8. Needle transfer	1	2	3	4	5
	Marked hesitation in mounting needle		Able to mount needle with hand and partial manipulation		Able to mount needle and manipulate needle easily

Additional Comments:

9. Suture management	1	2	3	4	5
	Not use tension Suture entangled		Tension use inconsistent Sutures occasionally get in way		Proper use of tension Suture consistently not in way

Additional Comments:

10. Knot tying	1	2	3	4	5
	Marked hesitancy, slow speed No follow through Not able to tie, breakage Loose or "air" knot		Moderate facility, moderate speed intermittent follow through Able to tie and tension, intermittently loose		Consistent facility, no hesitancy Consistent follow through Consistent tension and tight

Additional Comments:

11 .Hand Mechanics	1 No pronation or supination Awkward finger/hand motion No wrist motion	2	3 Incomplete pronation or supination Hesitant finger/hand motion Incomplete wrist motion	4	5 Able to modulate pronation/supination Smooth, comfortable motion Smooth, appropriate wrist motion
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Additional Comments:

12. Use of both hands	1 Awkward /not coordinated use Non-dominant hand neglect	2	3 Moderately coordinated use Moderate use of non-dominant hand to assist/expose	4	5 Smooth, seamless coordination Full use of non- dominant hand to assist/expose
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Additional Comments:

13. Economy of time and motion	1 Marked hesitation Not aware of goal Unable to do task	2	3 Some hesitation Some awareness of goal Able to do task but discontinuous	4	5 No hesitation Fully aware of goal Able to do task smoothly
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Additional
Comments:

Level of competence	1	2	3	4	5
Overall	Pass	Fail			

General Definitions:

5. Excellent, able to accomplish goal without hesitation, showing excellent progress and flow
4. Good, able to accomplish goal deliberately, with minimal hesitation, showing good progress and flow
3. Average, able to accomplish goal with hesitation, discontinuous progress and flow
2. Below average, able to partially accomplish goal with hesitation
1. Poor, unable to accomplish goal; marked hesitation

Assessment—Aortic Valve Replacement

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____

	Poor		Ave		Excel
1. Aortotomy and stay suture	1	2	3	4	5
	Initial aortotomy too low or too high and in wrong orientation Improper use of scalpel/scissors Not correct stay sutures Marked irregular edge Marked hesitation		Initial aortotomy correct but going in slightly wrong orientation Hesitation with scalpel/scissor Partially correct stay sutures Mild irregular edge Some unsteadiness/hesitation		Proper location of aortotomy and correct orientation Controlled use of scalpel/scissor Proper stay suture placement Smooth edge No hesitation

Additional Comments:

2. Excise aortic leaflets	1	2	3	4	5
	Not identify leaflet hinge/annulus Not know start point Injury to annulus Not able to decalcify Not aware of debris		Inconsistent leaflet excision Start with some hesitation Some injury to annulus Partially able to decalcify Partial awareness of debris		Proper leaflet excision Consistent start No injury to annulus Good decalcification Aware and removed debris

Additional Comments:

3. Sizing annulus	1	2	3	4	5
	Not know how to size Not understand valve chart Not know sizer-valve discrepancy		Able to size with some hesitation Some understanding of chart Some knowledge of sizer		Proper use of sizer Proper use of chart Understand sizer-valve discrepancy

Additional Comments:

4. Needle holder use	1	2	3	4	5
	Awkward finger placement Unable to rotate instrument Awkward and not facile Inconsistent needle placement		Functional finger placement Hesitant when rotating Moderate facility Generally good needle placement		Comfortable, smooth finger placement Smooth rotation High facility Consistent proper needle placement

Additional Comments:

5. Needle angles	1	2	3	4	5
	Not aware of angles Not compensate for depth Does not consider subsequent angles		Understand angles, not consistent Partial compensation for depth Partial consideration of subsequent angles		Consistently correct angles Compensate for depth Consistent adjustment for subsequent angles

Additional Comments:

6. Needle removal from annulus	1 Not follow needle curve Excess trauma to annulus	2	3 Incomplete follow needle curve Some trauma to annulus	4	5 Proper follow needle curve No additional trauma
Additional Comments:					
<hr/>					
7. Needle transfer	1 Marked hesitation and difficulty mounting needle	2	3 Able to mount needle with hand and some difficulty with needle manipulation	4	5 Able to mount needle and manipulate needle easily
Additional Comments:					
<hr/>					
8. Tissue handling	1 Awkward or no traction Unable to expose Rough with tissue/trauma	2	3 Moderate proper traction Able to assist in exposure Able to stabilize tissue but rough	4	5 Consistent proper traction Consistent proper exposure Knows when to stabilize, gentle
Additional Comments:					
<hr/>					
9. Depth of bite	1 Irregular entry/exit Hesitant, multiple punctures Inconsistent distance from edge Injured conduction system	2	3 Mostly regular entry/exit Mostly single puncture Mostly consistent from edge Close to conduction system	4	5 Consistent regular entry/exit Consistent single puncture Consistent from edge Purposely avoided conduction system
Additional Comments:					
<hr/>					
10. Suture advance along annulus	1 Uneven/irregular advance Irregular distance from previous bite Too small or too large	2	3 Mostly even advance Mostly consistent distance from previous bite Occasional small or large	4	5 Consistent even advance Consistent distance from previous bite Not too small or too large
Additional Comments:					
<hr/>					
11. Seating of the prosthesis	1 Trauma to aorta No annular contact Loose/stray sutures Not identify "bag-etts"	2	3 Minimal trauma to aorta Mostly in contact Attempt to resolve stray sutures Understand "bag-etts"	4	5 No trauma to aorta Assure annular contact No stray sutures Identify "bag-etts"
Additional Comments:					
<hr/>					

12. Knot-tying	1	2	3	4	5
	Marked hesitancy, slow speed No follow through Not able to tie, breakage Loose or "air" knot		Moderate facility, moderate speed Intermittent follow through Able to tie and tension Concern about being loose		Consistent facility, no hesitancy Consistent follow through Consistent tension and tight

Additional Comments:

13. Hand mechanics	1	2	3	4	5
	No pronation or supination Awkward finger/hand motion No wrist motion Awkward /not coordinated use Non-dominant hand neglect		Incomplete pronation/supination Hesitant finger/hand motion Incomplete wrist motion Moderately coordinated use Moderate use of non-dominant hand to assist/expose		Able to modulate pronation/supination Smooth, comfortable motion Smooth, appropriate wrist motion Smooth, seamless coordination Full use of non- dominant hand to assist/expose

Additional Comments:

14. Suture management/tension	1	2	3	4	5
	Not use tension Sutures entangled Not use tension to assist exposure		Tension use inconsistent Sutures occasionally get in way Partial use of suture tension to expose		Proper use of tension Sutures consistently not in way Proper consistent use to expose

Additional Comments:

15. Economy of time and motion	1	2	3	4	5
	Marked hesitation Not aware of goals Unable to do task		Some hesitation Some awareness of goals Able to do task but discontinuous		No hesitation Fully aware of goals Able to do task smoothly

Additional Comments:

Level of competence	1	2	3	4	5
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Overall Pass Fail

General Definitions:

5. Excellent, able to accomplish goal without hesitation, showing excellent progress and flow
4. Good, able to accomplish goal deliberately, with minimal hesitation, showing good progress and flow
3. Average, able to accomplish goal with hesitation, discontinuous progress and flow
2. Below average, able to partially accomplish goal with hesitation
1. Poor, unable to accomplish goal; marked hesitation

Patient Care and technical Skills: Cardiopulmonary Bypass, Myocardial Protection and Temporary Circulatory Support

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Demonstrates basic surgical skills (simulation vs. OR) 	<ul style="list-style-type: none"> • Performs axillary, femoral, arterial or venous cannulation • Performs peripheral vascular access • Performs surgical opening and closing • Assists perfusionist with cardiopulmonary bypass setup and pump run 	<ul style="list-style-type: none"> • Cannulates and institutes cardiopulmonary bypass including myocardial protection in routine cases • Manages cardiopulmonary bypass and myocardial protection in routine cases • Weans and decannulates from cardiopulmonary bypass for routine cases • Recognizes and manage common acute complications (e.g., coagulopathy, pump failure) 	<ul style="list-style-type: none"> • Cannulates and institutes cardiopulmonary bypass including myocardial protection in complex cases • Manages cardiopulmonary bypass and myocardial protection in complex cases • Weans and decannulates from cardiopulmonary bypass for complex cases • Institutes temporary circulatory support for cardiogenic shock (e.g., intraaortic balloon pump, ECMO, short term LV assist) • Recognizes and manages unusual acute complications (e.g., aortic dissection) 	<ul style="list-style-type: none"> • Operates in a hostile chest (e.g., radiation, porcelain aorta, use of epiaortic probe, patent grafts) • Performs left ventricular assist device procedures or transplant

Comments:

Cardiopulmonary Bypass

Assessment

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____
EVALUATOR _____

Steps

Satisfactory

Comments

Initiation:

Assure adequate activated clotting time	Y	N
Communicate with perfusionist	Y	N
Check line pressure	Y	N
Assess venous drainage	Y	N
Vent placement	Y	N
Cardioplegia	Y	N
Cross-clamp	Y	N

Termination:

Removal of cross-clamp	Y	N
De-airing procedures	Y	N
Vent removal	Y	N
Weaning CPB:		
Ventilator is on	Y	N
Temperature satisfactory	Y	N
TEE to assess intracardiac air	Y	N
TEE to assess cardiac function	Y	N
No bleeding in inaccessible areas	Y	N
Acceptable rhythm / pacing wires	Y	N
Need for inotropic support	Y	N
Termination of bypass	Y	N
Decannulation	Y	N

Economy of time and motion 1 2 3 4 5
1= many unnecessary/
disorganized movements 3=organized time/motion,
some unnecessary movement 5=maximum economy of
movement and efficiency

Final rating (circle one)

Demonstrates competence

Needs further practice

Additional comments:

TSDA—ACGME Milestones

JCTSE Milestones Project—Medical Knowledge

James Fann, Stephen Yang, Ara Vaporciyan, Craig Baker, Ed Verrier

SESATS:

Each of the following preoperative patient variables is associated with an increased requirement for postoperative blood transfusion EXCEPT:

- A. aspirin
- B. heparin
- C. low blood volume
- D. low molecular weight heparin
- E. prolonged bleeding time

SESATS:

Each of the following preoperative patient variables is associated with an increased requirement for postoperative blood transfusion EXCEPT:

- A. aspirin
- B. heparin
- C. low blood volume
- D. low molecular weight heparin
- E. prolonged bleeding time

Comments:

Low molecular weight heparin is recommended for treatment of unstable coronary syndromes because of greater bioavailability and longer half-life than unfractionated heparin. Because of the longer half-life, the failure to stop LMWH for more than 12 hours before operation results in increased postoperative bleeding and blood transfusion.

Aspirin is important because it limits platelet activation in acute coronary syndromes, but it also results in increased postoperative blood requirement when emergent/urgent operative intervention is necessary. Because of the irreversible alteration of platelets, the effect is apparent for several days after stopping aspirin therapy. Detailed studies have implicated bleeding time as a risk for excessive postoperative blood transfusion. Aspirin therapy may play some part, as one of its effects is prolongation of the bleeding time.

One of the most common causes of excessive postoperative transfusion is low preoperative blood volume superimposed on obligatory perioperative blood loss associated with cardiopulmonary bypass. Euvolemic anemia and patients with decreased blood volume frequently have significant decreases in red cell mass. Cardiopulmonary bypass and hemodilution will result in hematocrit values below reasonable "trigger" levels for patients who are anemic before operation. Re-exploration for postoperative bleeding often reveals no identifiable cause of bleeding and so-called 'dilutional' coagulopathy may be especially vexing and require massive blood component therapy. The effects of unfractionated (standard) heparin are relatively short-lived and are readily reversible with protamine. Preoperative heparin administration is not an independent determinant of excessive postoperative blood transfusion.

Based on question and comments, two possible subcomponents of Milestones Medical Knowledge are covered by this question.

Cardiopulmonary Bypass, Myocardial Protection, Temporary Circulatory Support (CPB)

Coagulation (4)-subcomponent 2

Complications (6)-subcomponent 4

CARDIOPULMONARY BYPASS, MYOCARDIAL PROTECTION, TEMPORARY CIRCULATORY SUPPORT

CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Components/Circuit	0 No knowledge	1 List basic CPB components (e.g., oxygenator, pump heads, heat exchanger)	2 Cannulation techniques and options (e.g., single bicaval, aortic, peripheral, cold, full or partial)	3 Cardioplegia soln and delivery modes (e.g., crystalloid, blood, antegrade, retrograde)	4 Advanced CPB support (e.g., circ arrest or ECMO)
Additional Comments: _____					
2. Physiology/pharmacology	0 No knowledge	1 Pulsatile vs. non-pulsatile	2 IABP physiology (e.g., diastolic augment, presystolic dip)	3 Pharma. management postcardiotomy hemodynamics (e.g., inotrope, vasodilator)	4 Postcardiotomy shock syndrome (e.g., inotropes, IABP, mechanical support)
Additional Comments: _____					
3. Myocardial protection	0 No knowledge	1 Basic (e.g., O ₂ requirement, O ₂ delivery, myocardial relaxation)	2 Options for myocardial protection (e.g., cardioplegia vs. beating heart)	3 Advantages/disadvantages of different myocardial protection strategies	4
Additional Comments: _____					
4. Coagulation/myocardial protection	0 No knowledge	1 Coagulation (e.g., intrinsic vs. extrinsic pathway)	2 Coagulation cascade inhibitors (e.g., heparin, argatroban)	3 Acid-base, anticoagulation management on CPB (e.g., pH or alpha stat)	4
Additional Comments: _____					
5. Complications of CPB	0 No knowledge	1 List complications of CPB (e.g., bleeding, renal failure, pulmonary dysfunction)	2 Understands complications of CPB	3 List management routine complications (e.g., air in heart, inadequate drainage, incomplete arrest)	4 Manage complex complications of CPB (e.g., aortic dissection, air embolism)
Additional Comments: _____					
6. Trauma/postoperative	0 No knowledge	1	2 List treatment of cardiac injury w/o CPB, trauma	3 Postop sequelae of CPB (e.g., low output, coagulopathy, arrhythmia, HIT)	4 Treatment of postop sequelae of CPB (e.g., low cardiac output, coagulopathy, arrhythmia, HIT)
Additional Comments: _____					

CARDIOPULMONARY BYPASS, MYOCARDIAL PROTECTION, TEMPORARY CIRCULATORY SUPPORT

CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Components/Circuit	0 No knowledge	1 List basic CPB components (e.g., oxygenator, pump heads, heat exchanger)	2 Cannulation techniques and options (e.g., single bicaval, aortic, peripheral, cold, full or partial)	3 Cardioplegia soln and delivery modes (e.g., crystalloid, blood, antegrade, retrograde)	4 Advanced CPB support (e.g., circ arrest or ECMO)
Additional Comments: _____					
2. Physiology/pharmacology	0 No knowledge	1 Pulsatile vs. non-pulsatile	2 IABP physiology (e.g., diastolic augment, presystolic dip)	3 Pharma. management postcardiotomy hemodynamics (e.g., inotrope, vasodilator)	4 Postcardiotomy shock syndrome (e.g., inotropes, IABP, mechanical support)
Additional Comments: _____					
3. Myocardial protection	0 No knowledge	1 Basic (e.g., O ₂ requirement, O ₂ delivery, myocardial relaxation)	2 Options for myocardial protection (e.g., cardioplegia vs. beating heart)	3 Advantages/disadvantages of different myocardial protection strategies	4
Additional Comments: _____					
4. Coagulation/myocardial protection	0 No knowledge	1 Coagulation (e.g., intrinsic vs. extrinsic pathway)	2 Coagulation cascade inhibitors (e.g., heparin, argatroban)	3 Acid-base, anticoagulation management on CPB (e.g., pH or alpha stat)	4
Additional Comments: _____					
5. Complications of CPB	0 No knowledge	1 List complications of CPB (e.g., bleeding, renal failure, pulmonary dysfunction)	2 Understands complications of CPB	3 List management routine complications (e.g., air in heart, inadequate drainage, incomplete arrest)	4 Manage complex complications of CPB (e.g., aortic dissection, air embolism)
Additional Comments: _____					
6. Trauma/postoperative	0 No knowledge	1	2 List treatment of cardiac injury w/o CPB, trauma	3 Postop sequelae of CPB (e.g., low output, coagulopathy, arrhythmia, HIT)	4 Treatment of postop sequelae of CPB (e.g., low cardiac output, coagulopathy, arrhythmia, HIT)
Additional Comments: _____					

CARDIOPULMONARY BYPASS, MYOCARDIAL PROTECTION, TEMPORARY CIRCULATORY SUPPORT

CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Components/Circuit	0 No knowledge	1 List basic CPB components (e.g., oxygenator, pump heads, heat exchanger)	2 Cannulation techniques and options (e.g., single bicaval, aortic, peripheral, cold, full or partial)	3 Cardioplegia soln and delivery modes (e.g., crystalloid, blood, antegrade, retrograde)	4 Advanced CPB support (e.g., circ arrest or ECMO)
Additional Comments: _____					
2. Physiology/pharmacology	0 No knowledge	1 Pulsatile vs. non-pulsatile	2 IABP physiology (e.g., diastolic augment, presystolic dip)	3 Pharma. management postcardiotomy hemodynamics (e.g., inotrope, vasodilator)	4 Postcardiotomy shock syndrome (e.g., inotropes, IABP, mechanical support)
Additional Comments: _____					
3. Myocardial protection	0 No knowledge	1 Basic (e.g., O ₂ requirement, O ₂ delivery, myocardial relaxation)	2 Options for myocardial protection (e.g., cardioplegia vs. beating heart)	3 Advantages/disadvantages of different myocardial protection strategies	4
Additional Comments: _____					
4. Coagulation/myocardial protection	0 No knowledge	1 Coagulation (e.g., intrinsic vs. extrinsic pathway)	2 Coagulation cascade inhibitors (e.g., heparin, argatroban)	3 Acid-base, anticoagulation management on CPB (e.g., pH or alpha stat)	4
Additional Comments: _____					
5. Complications of CPB	0 No knowledge	1 List complications of CPB (e.g., bleeding, renal failure, pulmonary dysfunction)	2 Understands complications of CPB	3 List management routine complications (e.g., air in heart, inadequate drainage, incomplete arrest)	4 Manage complex complications of CPB (e.g., aortic dissection, air embolism)
Additional Comments: _____					
6. Trauma/postoperative	0 No knowledge	1	2 List treatment of cardiac injury w/o CPB, trauma	3 Postop sequelae of CPB (e.g., low output, coagulopathy, arrhythmia, HIT)	4 Treatment of postop sequelae of CPB (e.g., low cardiac output, coagulopathy, arrhythmia, HIT)
Additional Comments: _____					

Medical Knowledge: Cardiopulmonary Bypass, Myocardial Protection and Temporary Circulatory Support

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Lists basic components of cardiopulmonary bypass apparatus (e.g., oxygenator, pump heads, heat exchanger, low level alarm, in line monitoring) • Understands pulsatile vs. non-pulsatile pump physiology • Understands basic myocardial protection. (e.g., O₂ requirement, O₂ delivery, myocardial relaxation) • Understands coagulation cascade (e.g., intrinsic and extrinsic pathways) • Lists complications of cardiopulmonary bypass (e.g., bleeding, renal failure, pulmonary dysfunction) 	<ul style="list-style-type: none"> • Discusses options for myocardial protection (e.g., cardioplegia vs. beating heart) • Discusses cannulation techniques and options for cardiopulmonary bypass (e.g., single venous, bicaval, aortic, peripheral arteries, cold, full or partial) • Understands intra-aortic balloon pump physiology (e.g., diastolic augmentation and presystolic dip) • Understands coagulation cascade inhibitors (e.g., heparin, argatroban) • Understands complications of cardiopulmonary bypass • Lists treatment strategies for cardiac injury without cardiac bypass, including trauma 	<ul style="list-style-type: none"> • Demonstrates knowledge of cardioplegia solutions and delivery modes (e.g., crystalloid, blood, antegrade, retrograde) • Demonstrates knowledge of acid-base and anticoagulation management on cardiopulmonary bypass (e.g., pH stat, alpha stat, ACT) • Demonstrates knowledge of pharmacologic management of postcardiotomy hemodynamics (e.g., inotropes, vasodilators) • Discusses advantages and disadvantages of different myocardial protection strategies • Lists management strategies of routine complications related to cardiopulmonary bypass (e.g., air in the heart, inadequate drainage, incomplete arrest) • Demonstrates knowledge of postoperative sequelae from cardiopulmonary bypass (e.g., low cardiac output syndrome, coagulopathies, arrhythmias, HIT) 	<ul style="list-style-type: none"> • Explains advanced cardiopulmonary support (e.g., circulatory arrest or ECMO) • Explains the management of postcardiotomy shock syndrome (e.g., inotropes, IABP, mechanical support) • Explains management strategies of complex complications related to cardiopulmonary bypass (e.g., aortic dissection, air embolism) • Explains treatment strategies for postoperative sequelae from cardiopulmonary bypass (e.g., low cardiac output syndrome, coagulopathies, arrhythmias, HIT) 	<ul style="list-style-type: none"> • Develops simulation scenarios for complications related to cardiopulmonary bypass

Comments:

Medical Knowledge: Cardiopulmonary Bypass, Myocardial Protection and Temporary Circulatory Support

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Lists basic components of cardiopulmonary bypass apparatus (e.g., oxygenator, pump heads, heat exchanger, low level alarm, in line monitoring) • Understands pulsatile vs. non-pulsatile pump physiology • Understands basic myocardial protection. (e.g., O2 requirement, O2 delivery, myocardial relaxation) • Understands coagulation cascade (e.g., intrinsic and extrinsic pathways) • Lists complications of cardiopulmonary bypass (e.g., bleeding, renal failure, pulmonary dysfunction) 	<ul style="list-style-type: none"> • Discusses options for myocardial protection (e.g., cardioplegia vs. beating heart) • Discusses cannulation techniques and options for cardiopulmonary bypass (e.g., single venous, bicaval, aortic, peripheral arteries, cold, full or partial) • Understands intra-aortic balloon pump physiology (e.g., diastolic augmentation and presystolic dip) • Understands coagulation cascade inhibitors (e.g., heparin, argatroban) • Understands complications of cardiopulmonary bypass • Lists treatment strategies for cardiac injury without cardiac bypass, including trauma 	<ul style="list-style-type: none"> • Demonstrates knowledge of cardioplegia solutions and delivery modes (e.g., crystalloid, blood, antegrade, retrograde) • Demonstrates knowledge of acid-base and anticoagulation management on cardiopulmonary bypass (e.g., pH stat, alpha stat, ACT) • Demonstrates knowledge of pharmacologic management of postcardiotomy hemodynamics (e.g., inotropes, vasodilators) • Discusses advantages and disadvantages of different myocardial protection strategies • Lists management strategies of routine complications related to cardiopulmonary bypass (e.g., air in the heart, inadequate drainage, incomplete arrest) • Demonstrates knowledge of postoperative sequelae from cardiopulmonary bypass (e.g., low cardiac output syndrome, coagulopathies, arrhythmias, HIT) 	<ul style="list-style-type: none"> • Explains advanced cardiopulmonary support (e.g., circulatory arrest or ECMO) • Explains the management of postcardiotomy shock syndrome (e.g., inotropes, IABP, mechanical support) • Explains management strategies of complex complications related to cardiopulmonary bypass (e.g., aortic dissection, air embolism) • Explains treatment strategies for postoperative sequelae from cardiopulmonary bypass (e.g., low cardiac output syndrome, coagulopathies, arrhythmias, HIT) 	<ul style="list-style-type: none"> • Develops simulation scenarios for complications related to cardiopulmonary bypass

Comments:

Medical Knowledge: Cardiopulmonary Bypass, Myocardial Protection and Temporary Circulatory Support

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Lists basic components of cardiopulmonary bypass apparatus (e.g., oxygenator, pump heads, heat exchanger, low level alarm, in line monitoring) • Understands pulsatile vs. non-pulsatile pump physiology • Understands basic myocardial protection. (e.g., O2 requirement, O2 delivery, myocardial relaxation) • Understands coagulation cascade (e.g., intrinsic and extrinsic pathways) • Lists complications of cardiopulmonary bypass (e.g., bleeding, renal failure, pulmonary dysfunction) 	<ul style="list-style-type: none"> • Discusses options for myocardial protection (e.g., cardioplegia vs. beating heart) • Discusses cannulation techniques and options for cardiopulmonary bypass (e.g., single venous, bicaval, aortic, peripheral arteries, cold, full or partial) • Understands intra-aortic balloon pump physiology (e.g., diastolic augmentation and presystolic dip) • Understands coagulation cascade inhibitors (e.g., heparin, argatroban) • Understands complications of cardiopulmonary bypass • Lists treatment strategies for cardiac injury without cardiac bypass, including trauma 	<ul style="list-style-type: none"> • Demonstrates knowledge of cardioplegia solutions and delivery modes (e.g., crystalloid, blood, antegrade, retrograde) • Demonstrates knowledge of acid-base and anticoagulation management on cardiopulmonary bypass (e.g., pH stat, alpha stat, ACT) • Demonstrates knowledge of pharmacologic management of postcardiotomy hemodynamics (e.g., inotropes, vasodilators) • Discusses advantages and disadvantages of different myocardial protection strategies • Lists management strategies of routine complications related to cardiopulmonary bypass (e.g., air in the heart, inadequate drainage, incomplete arrest) • Demonstrates knowledge of postoperative sequelae from cardiopulmonary bypass (e.g., low cardiac output syndrome, coagulopathies, arrhythmias, HIT) 	<ul style="list-style-type: none"> • Explains advanced cardiopulmonary support (e.g., circulatory arrest or ECMO) • Explains the management of postcardiotomy shock syndrome (e.g., inotropes, IABP, mechanical support) • Explains management strategies of complex complications related to cardiopulmonary bypass (e.g., aortic dissection, air embolism) • Explains treatment strategies for postoperative sequelae from cardiopulmonary bypass (e.g., low cardiac output syndrome, coagulopathies, arrhythmias, HIT) 	<ul style="list-style-type: none"> • Develops simulation scenarios for complications related to cardiopulmonary bypass

Comments:

A 73-year-old man was evaluated for worsening angina, shortness of breath, and dyspnea on exertion. A diastolic murmur had been noted for many years. Cardiac catheterization revealed a 90% proximal LAD stenosis, a 70% mid circumflex stenosis, and an 80% ostial right coronary stenosis. His left ventricular ejection fraction was 45% and his left ventricular end-systolic volume index was estimated by echo to be 95ml/m². The aortic root injection done at the time of his cardiac catheterization is shown. The best recommendation for this man is:

- A. combined coronary artery bypass surgery and aortic valve replacement
- B. coronary artery bypass surgery
- C. optimization of his medical therapy with beta blockers and nitrates
- D. percutaneous intervention for his coronary artery disease
- E. percutaneous intervention for his coronary artery disease and aortic valve repair

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- A. combined coronary artery bypass surgery and aortic valve replacement
- B. coronary artery bypass surgery
- C. optimization of his medical therapy with beta blockers and nitrates
- D. percutaneous intervention for his coronary artery disease
- E. percutaneous intervention for his coronary artery disease and aortic valve repair

Comments:

This patient has symptoms which are likely due to both his coronary artery disease and aortic valve regurgitation. Percutaneous intervention alone for his coronary artery disease is not indicated, as his severe three-vessel disease with decreased LV function is best treated with surgical revascularization. This is particularly true given the involvement of his proximal LAD. Data from large registries suggests that patients with severe proximal LAD stenosis and/or 3-vessel disease achieve improved survival with CABG. Although several recent studies have documented similar morbidity and mortality rates following percutaneous versus surgical revascularization, PTCI patients in general had higher reintervention rates while CABG patients experienced greater reduction in recurrent angina.

The aortic root injection reveals severe aortic regurgitation. This patient's aortic valve pathology should be treated at the same time as his coronary revascularization. The objective data provided (LVEF of 45%, and LVESVI of 95ml/m²) indicate left ventricular dysfunction. He has had a murmur for many years and his left ventricle is dilated; continued observation is inappropriate. Delaying valve replacement will result in worse LV function and suboptimal surgical and long-term results.

Based on question and comments, many subcomponents of Milestones are covered by this question.

Ischemic Heart Disease (IHD):

Anatomy (1)-subcomponents 1 and 2

Clinical manifestations (3)-subcomponents 1 and 2

Diagnostic tool (4)-subcomponents 1

Treatment plan (5)-subcomponents 1,2,3 and 4

Complications/outcomes (6)-subcomponent 3

Since AI is present on root injection,

Valve Disease (VD) :

Anatomy (1)-subcomponents 1 and 2

Diagnostic (4)-subcomponents 1 and 3

Treatment (5)-subcomponents 1 and 3.

In summary on the spreadsheet:

IHD 1-1,1-2,3-1,3-2,4-1,5-1,5-2,5-3,5-4,6-3

VD 1-1,1-2,4-1,4-3,5-1,5-3

ISCHEMIC HEART DISEASE – CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge	1 Basic anatomy and pathology (e.g., angiogram)	2 Common variations anatomy/pathology (e.g., left dominant)	3 Complex integrate anatomy/pathology (e.g., anomalous CA)	4 Complex variations anatomy/pathology (e.g., reoperative)
Additional Comments:					
2. Physiology	0 No knowledge	1 Basic cellular and vascular physiology	2 Changes with IHD (e.g., ischemia, reperfusion, infarction)	3 Role of treatment on physiology IHD	4 Adapts treatment based on complications (e.g., VSD, MR)
Additional Comments:					
3. Clinical manifestations	0 No knowledge	1 List manifestations (e.g., angina, MI)	2 Differential diagnosis of similar manifestations (e.g., esophageal, aortic)	3 Common variants of IHD (e.g., unstable angina, acute MI)	4 Complex clinical manifestations and complications
Additional Comments:					
4. Diagnostic tools	0 No knowledge	1 List diagnostic tools for IHD	2 Advantages and disadvantages of tools (e.g., EKG, echo, angio)	3 Interprets normal and common abnormalities (e.g., angio, complex EKG)	4 Interprets/integrates complex abnormalities
Additional Comments:					
5. Treatment plan	0 No knowledge	1 List treatment options (e.g., CABG, PCI)	2 Advantages and disadvantages of treatment of treatment options	3 Appropriate treatment for routine IHD	4 Appropriate treatment complex IHD (e.g., hybrid CABG)
Additional Comments:					
6. Complications/outcomes	0 No knowledge	1 Basic complications	2 Risk, benefits, complications	3 ACC/STS/AATS guidelines, basic outcome data (e.g., SYNTAX)	4 Outcomes of all treatment modalities and complications, database (STS)/trials
Additional Comments:					

ISCHEMIC HEART DISEASE – CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
<div style="border: 2px solid yellow; padding: 5px;">1. Anatomy</div> <p>Additional Comments:</p>	0 No knowledge	1 Basic anatomy and pathology (e.g., angiogram)	2 Common variations anatomy/pathology (e.g., left dominant)	3 Complex integrate anatomy/pathology (e.g., anomalous CA)	4 Complex variations anatomy/pathology (e.g., reoperative)
2. Physiology <p>Additional Comments:</p>	0 No knowledge	1 Basic cellular and vascular physiology	2 Changes with IHD (e.g., ischemia, reperfusion, infarction)	3 Role of treatment on physiology IHD	4 Adapts treatment based on complications (e.g., VSD, MR)
<div style="border: 2px solid gray; padding: 5px;">3. Clinical manifestations</div> <p>Additional Comments:</p>	0 No knowledge	1 List manifestations (e.g., angina, MI)	2 Differential diagnosis of similar manifestations (e.g., esophageal, aortic)	3 Common variants of IHD (e.g., unstable angina, acute MI)	4 Complex clinical manifestations and complications
<div style="border: 2px solid green; padding: 5px;">4. Diagnostic tools</div> <p>Additional Comments:</p>	0 No knowledge	1 List diagnostic tools for IHD	2 Advantages and disadvantages of tools (e.g., EKG, echo, angio)	3 Interprets normal and common abnormalities (e.g., angio, complex EKG)	4 Interprets/integrates complex abnormalities
<div style="border: 2px solid purple; padding: 5px;">5. Treatment plan</div> <p>Additional Comments:</p>	0 No knowledge	1 List treatment options (e.g., CABG, PCI)	2 Advantages and disadvantages of treatment of treatment options	3 Appropriate treatment for routine IHD	4 Appropriate treatment complex IHD (e.g., hybrid CABG)
<div style="border: 2px solid darkgreen; padding: 5px;">6. Complications/outcomes</div> <p>Additional Comments:</p>	0 No knowledge	1 Basic complications	2 Risk, benefits, complications	3 ACC/STS/AATS guidelines, basic outcome data (e.g., SYNTAX)	4 Outcomes of all treatment modalities and complications, database (STS)/trials

Medical Knowledge: Ischemic Heart Disease

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Knows basic anatomy and pathology (identifies coronary anatomy on angiogram) • Knows basic cellular and vascular physiology • Lists clinical manifestations of ischemic heart disease (e.g., angina, myocardial infarction) • Lists diagnostic tools available for evaluation of ischemic heart disease • Lists treatment options for ischemic heart disease (e.g., CABG, PCI) • Knows basic complications for ischemic heart disease 	<ul style="list-style-type: none"> • Understands common variations in anatomy and pathology (e.g., left dominant system) • Understands physiologic changes accompanying ischemic heart disease (e.g., ischemia, ischemia reperfusion injury, infarction, recovering myocardium) • Generates differential diagnosis of disease with similar manifestations (e.g., esophageal and aortic problems, pleurisy) • Understands advantages and disadvantages of diagnostic tools in evaluating ischemic heart disease (e.g., EKG vs. echocardiogram vs. angiogram) • Understands advantages and disadvantages of various treatment options for ischemic heart disease • Understands risks, benefits and complications of treatment modalities 	<ul style="list-style-type: none"> • Understands complex integrations between anatomy and pathology (e.g., anomalous coronary artery) • Understands the role of treatment on physiology of ischemic heart disease • Identifies the common variants of the clinical manifestations of ischemic heart disease (e.g., unstable angina, acute myocardial infarction, silent ischemia) • Interprets normal and common abnormalities associated with ischemic heart disease (e.g., reads coronary angiogram, complex EKG) • Identifies appropriate treatment for routine patient with ischemic heart disease. • Familiar with ACC/STS/AATS guidelines • Knows basic outcome literature for ischemic heart disease (e.g., SYNTAX Trial) 	<ul style="list-style-type: none"> • Understands complex variations in anatomy and pathology, including congenital (e.g., able to identify coronary anatomy in reoperative surgery) • Adapts therapeutic management based on understanding of physiology of complications of ischemic heart disease (e.g., post infarct VSD, ischemic mitral regurgitation) • Distinguishes the complex clinical manifestations and complications of ischemic heart disease • Interprets and integrates complex abnormalities associated with ischemic heart disease • Identifies appropriate treatment for complex patient with ischemic heart disease (e.g., hybrid CABG) • Knows outcomes for all treatment modalities and complications, including databases and clinical trials (e.g., STS Database) 	<ul style="list-style-type: none"> • Understands implications of SYNTAX score • Presents on outcomes of ischemic heart disease at local, regional or national meeting

Comments:

VALVULAR DISEASE

CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____

YR OF TRAINING _____

DATE _____

EVALUATOR _____

initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge	1 Basic anatomy and pathology	2 Common variations anatomy/pathology (e.g., type of MR)	3 Complex integrate anatomy/pathology (e.g., bicuspid AS, functional MR)	4 Complex variations anatomy/pathology (e.g., CAD and MR, bicuspid AV and ascending aneurysm)
Additional Comments: _____					
2. Physiology	0 No knowledge	1 Basic valve physiology	2 Changes with valve dis (e.g., pulm HTN)	3 Role of treatment on physiology valve dis (e.g., A fib treatment)	4 Adapts treatment based on physiology (e.g., MR and TR in AS or CAD)
Additional Comments: _____					
3. Clinical manifestations	0 No knowledge	1 List manifestations (e.g., dyspnea, angina, syncope)	2 Differential diagnosis of similar manifestations (e.g., CAD, emphysema)	3 Common variants of valve disease (e.g., fatigue, exercise intolerance)	4 Complex clinical manifestations and complications (e.g., staging CHF)
Additional Comments: _____					
4. Diagnostic tools	0 No knowledge	1 List diagnostic tools for valve disease	2 Advantages and disadvantages of tools (e.g., TTE vs. TEE)	3 Interprets normal and common abnormalities (e.g., intraop TEE)	4 Interprets/integrates complex abnormalities (e.g., IHSS)
Additional Comments: _____					
5. Treatment plan	0 No knowledge	1 List treatment options for valve disease	2 Advantages and disadvantages of treatment options	3 Appropriate treatment for routine valve disease	4 Appropriate treatment for complex valve dis (e.g., combined CABG, aortic aneurysm, root enlargement)
Additional Comments: _____					
6. Complications/outcomes	0 No knowledge	1 Basic complications (e.g., periop AVR)	2 Risk, benefits, complications (e.g., frequency of common complications)	3 ACC/STS/AATS guidelines, basic outcome data (e.g., valve durability)	4 Outcomes of all treatment modalities and complications, database/trials
Additional Comments: _____					

VALVULAR DISEASE—CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge	1 Basic anatomy and pathology	2 Common variations anatomy/pathology (e.g., type of MR)	3 Complex integrate anatomy/pathology (e.g., bicuspid AS, functional MR)	4 Complex variations anatomy/pathology (e.g., CAD and MR, bicuspid AV and ascending aneurysm)

Additional Comments:

2. Physiology	0 No knowledge	1 Basic valve physiology	2 Changes with valve dis (e.g., pulm HTN)	3 Role of treatment on physiology valve dis (e.g., A fib treatment)	4 Adapts treatment based on physiology (e.g., MR and TR in AS or CAD)
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Additional Comments:

3. Clinical manifestations	0 No knowledge	1 List manifestations (e.g., dyspnea, angina, syncope)	2 Differential diagnosis of similar manifestations (e.g., CAD, emphysema)	3 Common variants of valve disease (e.g., fatigue, exercise intolerance)	4 Complex clinical manifestations and complications (e.g., staging CHF)
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Additional Comments:

4. Diagnostic tools	0 No knowledge	1 List diagnostic tools for valve disease	2 Advantages and disadvantages of tools (e.g., TTE vs. TEE)	3 Interprets normal and common abnormalities (e.g., intraop TEE)	4 Interprets/integrates complex abnormalities (e.g., IHSS)
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Additional Comments:

5. Treatment plan	0 No knowledge	1 List treatment options for valve disease	2 Advantages and disadvantages of treatment options	3 Appropriate treatment for routine valve disease	4 Appropriate treatment for complex valve dis (e.g., combined CABG, aortic aneurysm, root enlargement)
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Additional Comments:

6. Complications/outcomes	0 No knowledge	1 Basic complications (e.g., periop AVR)	2 Risk, benefits, complications (e.g., frequency of common complications)	3 ACC/STS/AATS guidelines, basic outcome data (e.g., valve durability)	4 Outcomes of all treatment modalities and complications, database/trials
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Additional Comments:

Medical Knowledge: Valvular Disease

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Knows basic anatomy and pathology of valvular heart disease • Knows basic normal valve physiology • Lists clinical manifestations of isolated valvular heart disease (e.g., dyspnea, angina, edema, syncope) • Lists diagnostic tools available for evaluation of valvular heart disease • Lists treatment options for valvular heart disease • Knows basic complications for valvular heart disease (e.g., peri-operative complications for aortic valve replacement) 	<ul style="list-style-type: none"> • Knows common variations in anatomy and pathology of valvular heart disease (e.g., Mitral Prolapse, Type 1,2 and 3) • Explains physiologic changes accompanying valvular heart disease (e.g., pulmonary hypertension) • Generates differential diagnosis of diseases with similar manifestations (e.g., coronary artery disease, emphysema) • Explains advantages and disadvantages of diagnostic tools in evaluating valvular heart disease (e.g., surface vs. transesophageal echo) • Recites advantages and disadvantages of various treatment options for valvular heart disease (e.g., repair vs. replacement) • Recites risks, benefits and complications of treatment modalities (e.g., cites frequency of common complications) 	<ul style="list-style-type: none"> • Explains complex integrations between anatomy and pathology of valvular heart disease (e.g., bicuspid aortic valve and stenosis, functional mitral and tricuspid regurgitation) • Explains the role of treatment on physiology of valvular heart disease, including arrhythmia management, (e.g., the mechanism of surgical atrial fibrillation treatment) • Identifies the common variants of the clinical manifestations of valvular heart disease (e.g., fatigue, exercise intolerance) • Interprets normal and common abnormalities associated with valvular heart disease, including intraoperative transesophageal echocardiography • Identifies appropriate treatment for routine patient with valvular heart disease • Familiar with ACC/STS/AATS guidelines • Explains basic outcome literature for valvular heart disease (e.g., durability of mitral valve repair) 	<ul style="list-style-type: none"> • Explains complex variations in anatomy and pathology, including congenital (e.g., contribution of coronary disease to mitral regurgitation, bicuspid aortic valve and ascending aneurysm) • Adapts therapeutic management based on understanding of physiology (e.g., explains when to correct mitral or tricuspid regurgitation in setting of aortic stenosis or coronary artery disease) • Distinguishes the complex clinical manifestations and complications of valvular heart disease (e.g., staging of congestive heart failure) • Interprets and integrates complex abnormalities associated with valvular heart disease (e.g., hypertrophic obstructive cardiomyopathy) • Identifies appropriate treatment for complex patient with valvular heart disease (e.g., combined coronary, aneurysm or root enlargement) • Explains outcomes for all treatment modalities and complications, including databases and clinical trials (e.g., outcome after minimally invasive valves, success of sinus restoration in surgery for atrial fibrillation) 	<ul style="list-style-type: none"> • Presents on outcomes valvular heart disease at local, regional or national meeting

Comments:

Question	Course	Top Milestones correlate	Stem	Choice A	Choice B	Choice C	Choice D	Choice E	Correct	
3080	CV 1	IHD 2-1,2-2	Under normal conditions, left ventricular subendocardial blood flow is determined primarily by	aortic diastolic pressure.	the diastolic perfusion	diastolic regional intramyoc	regional arteriolar resistance	ventricular end-diastolic	D	
3104	CV 1	IHD 1-1,2-1,2-2	All of the following result from ischemic myocardial injury EXCEPT	decreased	ischemic c	mitochond	myocardia	myocardia	A	
3070	CV 1	VD 1-1,6-1	Anatomically, the atrioventricular node is located within the	left atrial free-wall.	memorari	right atrial free-wall.	triangle of Koch.	ventricular septum.	D	
3330	CV 1	VD 1-1,6-1	during procedures involving the tricuspid valve, as well as parts of the atrial septum and interventricular septum. Anatomic	atrioventricular node,	coronary sinus, septal	coronary sinus, ovalis, atrioventricular	leaflet of the	Todaro, fossa	B	
3160	CV 1	CC 1-1	The major physiologic mechanism that augments myocardial oxygen delivery during exercise is	catecholamine release.	coronary vasodilatation.	arteriovenous	increased heart rate.	retrograde shift of the	B	
3408	CV 1	IHD 1-1,1-2,2-1,2-2,3-1	in patients with atherosclerotic coronary disease, myocardial blood flow at	approximately 200 ml/100	dependent upon	reduced by systolic	reduced in patients	reduced in patients	B	
3774	CV 1	IHD 1-1,2-1,2-2,2-3	stunned myocardium is defined as a loss of myocardial contractile force following reperfusion of ischemic myocardium that does not develop necrosis. Which of the following	ions are severely depressed	Calcium ions are severely depressed	Diastolic compliance is decreased	loss of contractile force is decreased	myocardial oxygen utilization decreased	B	
3817	CV 1	IHD 2-1,2-2	The decline in myocardial contractility that follows acute interruption of coronary blood flow is associated with each of the following EXCEPT	conversion of phosphor	ATP levels.	cellular levels of	glycogen synthesis.	rate of glycolysis.	C	
4021	CV 1	IHD 5-1,5-2,6-1,6-2,6-3	The occurrence of postoperative coronary artery spasm following	a grafted	le	a grafted	ri	incomplete	an ungrafted	E
4051	CV 1	CC 3-1,3-2,3-3,4-3	Characteristics of premature atrial contractions (PAC's) include each of the following EXCEPT:	an abnormal P-wave	the early appearance of a P-	myocardial depolariza	a P-R interval after the	a QRS complex after the	D	
3765	CV 1	VD 2-2	A 70 year old man with aortic insufficiency underwent carotid catheterization. Ejection fraction was 50%, regurgitant fraction was 25% and end-diastolic volume was 200 ml. Heart rate was	10.0 L/min	2.5 L/min	4.0 L/min	5.0 L/min	7.5 L/min	E	
3177	CV 1	CC 1-1,1-2,1-3	each of the following may be involved in decreasing cardiac output during mechanical ventilation with positive end-expiratory pressure EXCEPT	altered left ventricular	cardiac preload limitation	increased pulmonary vascular	increased systemic vascular	ventricular interaction	D	
3680	CV 1	IHD 1-1,1-2,1-3,4-1,4-2,4-3	Diagnostic coronary angiography prior to elective aortic valve replacement demonstrates a small right coronary artery with a single posterior descending branch. The left anterior descending	ventricular anomalous origin of the	congenital absence of the	proximal occlusion of the	separate origins of the left	short left main coronary	B	
3681	CV 1	IHD 1-1,1-2,2-2,4-1,4-2,4-3	Each of the following statements regarding atherosclerotic coronary artery disease is true EXCEPT	impairment of the reactive	Progression of coronary	resting blood flow is	the severity of	the severity of	D	
3102	CV 1	VD 1-1,2-1	Each of the following statements regarding mitral valves is/are true EXCEPT	the anterior and	the anterior papillary	the posterior papillary	tertiary chordae arise	the valve leaflets are nearly	C	
3143	CV 1	CC 1-1,1-2	The direct hemodynamic stimulus for left ventricular hypertrophy is thought to be	elevated systolic ventricular	elevated systolic ventricular	total cardiac	elevated ventricular end-	subclinical myocardial	B	
3176	CV 1	CC 1-1,1-2; VD 2-1,2-2	Myocardial hypertrophy in chronic volume overload is causally associated with each of the following EXCEPT	increased wall thickness.	normalized	progressive fall in	reduction in the	relatively normal sarcomer	C	

Question Course Topic	Milestones correlate	Stem	Choice A	Choice B	Choice C	Choice D	Choice E	Correct	
3080	CV 1	IHD 2-1,2-2	Under normal conditions, left ventricular subendocardial blood flow is determined primarily by	aortic diastolic pressure.	the diastolic perfusion	diastolic regional intramyoc	regional arteriolar resistance	ventricular end-diastolic	D
3104	CV 1	IHD 1-1,2-1,2-2	All of the following result from ischemic myocardial injury EXCEPT	decreased	ischemic c	mitochond	myocardia	myocardia	A
3070	CV 1	VD 1-1,6-1	Anatomically, the atrioventricular node is located within the	left atrial free-wall.	memorari	right atrial free-wall.	triangle of Koch.	ventricular septum.	D
3330	CV 1	VD 1-1,6-1	The triangle of Koch is defined by landmarks of importance during procedures involving the tricuspid valve, as well as parts of the atrial septum and interventricular septum. Anatomic	atrioventricular node,	coronary sinus,	ossa	septal	ventricular tendon of	D
3160	CV 1	CC 1-1	The major physiologic mechanism that augments myocardial oxygen delivery during exercise is	catecholamine release.	coronary vasodilata	atrioventr	the increased heart rate.	Todaro, fossa	B
3408	CV 1	IHD 1-1,1-2,2-1,2-2,3-1	In patients with atherosclerotic coronary disease, myocardial blood flow at	approximately 200 ml/100	dependent upon	reduced by systolic	reduced in patients	reduced in patients	B
3774	CV 1	IHD 1-1,2-1,2-2,2-3	Stunned myocardium is defined as a loss of myocardial contractile force following reperfusion of ischemic myocardium that does not develop necrosis. Which of the following	ions are severely	compliance is	contractile force is	al oxygen utilization	of contractil	B
3817	CV 1	IHD 2-1,2-2	The decline in myocardial contractility that follows acute interruption of coronary blood flow is associated with each of the following EXCEPT	conversion of phosphor	ATP levels.	cellular levels of	glycogen synthesis.	rate of glycolysis.	C
4021	CV 1	IHD 5-1,5-2,6-1,6-2,6-3	The occurrence of postoperative coronary artery spasm following	a grafted le	a grafted ri	incomplete	an ungraft	an ungraft	E
4051	CV 1	CC 3-1,3-2,3-3,4-3	Characteristics of premature atrial contractions (PAC's) include each of the following EXCEPT:	an abnormal P-wave	the early appearance of a P-	myocardial depolariza	a P-R interval after the	a QRS complex after the	D
3765	CV 1	VD 2-2	A 70 year old man with aortic insufficiency underwent carotid catheterization. Ejection fraction was 50%, regurgitant fraction was 25% and end-diastolic volume was 200 ml. Heart rate was	10.0 L/min	2.5 L/min	4.0 L/min	5.0 L/min	7.5 L/min	E
3177	CV 1	CC 1-1,1-2,1-3	Each of the following may be involved in decreasing carotid output during mechanical ventilation with positive end-expiratory pressure EXCEPT	altered left ventricular	cardiac preload limitation	increased pulmonary vascular	increased systemic vascular	ventricular interaction	D
3680	CV 1	IHD 1-1,1-2,1-3,4-1,4-2,4-3	Diagnostic coronary angiography prior to elective aortic valve replacement demonstrates a small right coronary artery with a single posterior descending branch. The left anterior descending	ventricular anomalous origin of the	congenital absence of the	proximal occlusion of the	separate origins of the left	short left main coronary	B
3681	CV 1	IHD 1-1,1-2,2-2,4-1,4-2,4-3	Each of the following statements regarding atherosclerotic coronary artery disease is true EXCEPT	impairment of the reactive	Progression of coronary	resting blood flow is	the severity of	the severity of	D
3102	CV 1	VD 1-1,2-1	Each of the following statements regarding mitral valves is/are true EXCEPT	the anterior and	the anterior papillary	the posterior papillary	tertiary chordae arise	the valve leaflets are nearly	C
3143	CV 1	CC 1-1,1-2	The direct hemodynamic stimulus for left ventricular hypertrophy is thought to be	elevated systolic ventricular	elevated systolic ventricular	elevated total cardiac	elevated ventricular end-	subnormal myocardial	B
3176	CV 1	CC 1-1,1-2; VD 2-1,2-2	Myocardial hypertrophy in chronic volume overload is causally associated with each of the following EXCEPT	increased wall thickness.	normalization of systolic	progressive fall in myocardial	reduction in the unstresse	relatively normal sarcomer	C

958	CV 3	CC 3-1,3-2	A 50-year-old man with severe mitral regurgitation and right bundle branch block on ECG is to have a Swan-Ganz catheter placed at the bedside in the ICU. Of the following potential	complete heart block	confusion of the V-wave on the	nemoptysis is due to pulmonary	ventricular fibrillation	ventricular tachycardia	A
4540	CV 3	Professionalism	Each of the following is consistent with the policy on expert Witness of the Society of Thoracic Surgeons EXCEPT:	the physician expert	the physician expert	the physician must have	the physician must have	the physician's specialty	B
3443	CV 3	IHD 6-1,6-2,6-3,6-4	Which of the following variables is the most important predictor of adverse outcome after CABG?	low-volume surgeon	operation in a low-volume	preoperative dialysis-emergic	preoperative ejection fraction	previous cardiac operation	D
3456	CV 3	No match	A robotic left internal mammary artery takedown is underway. The pedicle was almost completely mobilized and the patient has remained stable throughout the procedure. While completing	additional doses of antiarrhythmic	of a second thoracotomy	of the patient's	of the cardiopulmonary	D	
3610	CV 3	'IHD 1-1,2-,2-3; CC 3-1,4-1,4-2; CPB 3-2	A 65-year-old man was found to have 2-vessel coronary artery disease and an ejection fraction of 40%. Three days prior to elective surgery, he suffered an acute myocardial infarction and	balloon counterpulsation is	balloon deflation is	IABP therapy is contraindicated	should occur	inflation timing	E
3762	CV 3	'IHD 2-2,3-2,4-2,6-1,6-2	Three days after three vessel coronary artery bypass operation, a 66 year old woman complains of retrosternal chest discomfort accompanied by nausea and diaphoresis. Hypotension, jugular	aortic dissection	constrictive pericarditis	pericardial tamponade	pulmonary embolism	ventricular arrhythmia	E
4009	CV 3	IHD 1-1,1-2,2-2,2-3,3-1,3-2,3-3,4-1,4-2,4-3	A 70 year old man was admitted to the coronary care unit with a diagnosis of acute anterior myocardial infarction. Immediately following his admission, he had a witnessed ventricular	arrhythmia	electrophysiologic	heparin	transvenous catheter	average electrocardiogram	C
3752	CV 3	VD 4-1,4-2,4-3	Which of the following can be reliably measured or distinguished by intraoperative echocardiography while still on cardiopulmonary bypass?	obstruction of systemic	perfusion of ventricular	regional repair of mitral	success of repair of mitral	in mitral stenosis.	B
4106	CV 3	VD 5-1,5-2,5-3,6-1,6-2,6-3	Compared to conventional repair, a patient who has a minimally invasive mitral valve repair through a right minithoracotomy can expect which of the following?	lower incidence of	lower mortality	of postoperative	of postoperative	infection rate	A
3178	CV 3	CC 3-1,3-2,3-3	All of the following statements regarding use of a Swan-Ganz catheter in the postoperative period following a pneumonectomy are true EXCEPT	concomitant use of positive	it is a reliable means of	it is an accurate guide to	it provides inaccurate	the risk of perforation of the	D
3446	CV 3	CC 4-3	Each of the following nutritional supplements are conditionally essential to improve immune system function and outcomes in critically ill patients EXCEPT:	arginine	amino chain	glutamine	nucleotides	xanthine	E
3449	CV 3	CC 4-3,5-3	Risk factors for development of ventilator associated pneumonia include each of the following EXCEPT:	antibiotics prior to intubation	congestive heart failure	older age	poor oral hygiene	supine position	A
3687	CV 3	No match	Risks of blood transfusion may be reduced for patients undergoing elective coronary artery bypass grafting by each of the following EXCEPT	aprotinin	designated donation	intraoperative blood	preoperative autologous erythropoietin	preoperative erythropoietin	B
3783	CV 3	No match	Each of the following statements regarding blood conservation is true EXCEPT	autologous predonated	designated donation	intraoperative administration	preoperative erythropoietin	postoperative autologous erythropoietin	E
3790	CV 3	No match	Primary adrenal insufficiency is characterized by each of the following EXCEPT	response to ACTH	serum levels of a negative inspiratory force	hypokalemia	hypovolemia	hypotension	C
4019	CV 3	CC 4-1	An 80 year old 55 kg woman is being weaned from ventilatory support following coronary artery bypass grafting. She is on continuous positive airway pressure with an FIO2 of 0.4. Each of	a pCO2 of 40 mmHg	a negative inspiratory force of	a respiratory rate of	a tidal volume of 300 ccs.	a vital capacity of 650	B
4046	CV 3	No match	A 46 year old woman is recovering from emergency coronary artery bypass surgery following complications related to a coronary atherectomy procedure. Shortly after extubation she	administration of blood	contamination of left	clerk error	es involving mitral	ing of blood pulmonary	C
4283	CV 3	VD 4-2,4-3	Intraoperative transesophageal echocardiography can be useful for assessment of each of the following EXCEPT:	aortic atherosclerosis	ventricular regional	intracardiac air	valve repair	venous	E

Thoracic Surgery Milestones

Goals of JCTSE Milestones MK Project

1. Generate “matrix” based on Milestones Project handouts (computer tracking)
2. Populate subcomponents as trainee correctly answers each question; no credit if incorrect
3. Questions overlap on many subcomponents, need to determine how many one has to get right in order to "sign off" on that subcomponent.
4. CCC uses information (i.e., how many subcomponents completed for a given level) in formally assigning a level
5. Future questions directed at subcomponents not adequately covered currently
6. In-Training Examination questions can be included in the matrix
7. Incorporate “matrix” into LMS as a part of dashboard for medical knowledge

ISCHEMIC HEART DISEASE—CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge	1 Basic anatomy and pathology (e.g., angiogram)	2 Common variations anatomy/pathology (e.g., left dominant)	3 Complex integrate anatomy/pathology (e.g., anomalous CA)	4 Complex variations anatomy/pathology (e.g., reoperative)
2. Physiology	0 No knowledge	1 Basic cellular and vascular Physiology	2 Changes with IHD (e.g., ischemia, reperfusion, infarction)	3 Role of treatment on physiology IHD	4 Adapts treatment based on complications (e.g., VSD, MR)
3. Clinical manifestations	0 No knowledge	1 List manifestations (e.g., angina, MI)	2 Differential diagnosis of similar manifestations (e.g., esophageal, aortic)	3 Common variants of IHD (e.g., unstable angina, acute MI)	4 Complex clinical manifestations and complications
4. Diagnostic tools	0 No knowledge	1 List diagnostic tools for IHD	2 Advantages and disadvantages of tools (e.g., EKG, echo, angio)	3 Interprets normal and common abnormalities (e.g., angio, complex EKG)	4 Interprets/integrates complex abnormalities
5. Treatment plan	0 No knowledge	1 List treatment options (e.g., CABG, PCI)	2 Advantages and disadvantages of treatment of treatment options	3 Appropriate treatment for routine IHD	4 Appropriate treatment complex IHD (e.g., hybrid CABG)
6. Complications/outcomes	0 No knowledge	1 Basic complications	2 Risk, benefits, complications	3 ACC/STS/AATS guidelines, basic outcome data (e.g., SYNTAX)	4 Outcomes of all treatment modalities and complications, database (STS)/trials

ISCHEMIC HEART DISEASE—CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge	1 Basic anatomy and pathology (e.g., angiogram)	2 Common variations anatomy/pathology (e.g., left dominant)	3 Complex integrate anatomy/pathology (e.g., anomalous CA)	4 Complex variations anatomy/pathology (e.g., reoperative)
2. Physiology	0 No knowledge	1 Basic cellular and vascular Physiology	2 Changes with IHD (e.g., ischemia, reperfusion, infarction)	3 Role of treatment on physiology IHD	4 Adapts treatment based on complications (e.g., VSD, MR)
3. Clinical manifestations	0 No knowledge	1 List manifestations (e.g., angina, MI)	2 Differential diagnosis of similar manifestations (e.g., esophageal, aortic)	3 Common variants of IHD (e.g., unstable angina, acute MI)	4 Complex clinical manifestations and complications
4. Diagnostic tools	0 No knowledge	1 List diagnostic tools for IHD	2 Advantages and disadvantages of tools (e.g., EKG, echo, angio)	3 Interprets normal and common abnormalities (e.g., angio, complex EKG)	4 Interprets/integrates complex abnormalities
5. Treatment plan	0 No knowledge	1 List treatment options (e.g., CABG, PCI)	2 Advantages and disadvantages of treatment of treatment options	3 Appropriate treatment for routine IHD	4 Appropriate treatment complex IHD (e.g., hybrid CABG)
6. Complications/outcomes	0 No knowledge	1 Basic complications	2 Risk, benefits, complications	3 ACC/STS/AATS guidelines, basic outcome data (e.g., SYNTAX)	4 Outcomes of all treatment modalities and complications, database (STS)/trials

ISCHEMIC HEART DISEASE – CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
<div style="border: 2px solid yellow; padding: 5px;">1. Anatomy</div> <p>Additional Comments:</p>	0 No knowledge	1 Basic anatomy and pathology (e.g., angiogram)	2 Common variations anatomy/pathology (e.g., left dominant)	3 Complex integrate anatomy/pathology (e.g., anomalous CA)	4 Complex variations anatomy/pathology (e.g., reoperative)
2. Physiology <p>Additional Comments:</p>	0 No knowledge	1 Basic cellular and vascular physiology	2 Changes with IHD (e.g., ischemia, reperfusion, infarction)	3 Role of treatment on physiology IHD	4 Adapts treatment based on complications (e.g., VSD, MR)
<div style="border: 2px solid gray; padding: 5px;">3. Clinical manifestations</div> <p>Additional Comments:</p>	0 No knowledge	1 List manifestations (e.g., angina, MI)	2 Differential diagnosis of similar manifestations (e.g., esophageal, aortic)	3 Common variants of IHD (e.g., unstable angina, acute MI)	4 Complex clinical manifestations and complications
<div style="border: 2px solid green; padding: 5px;">4. Diagnostic tools</div> <p>Additional Comments:</p>	0 No knowledge	1 List diagnostic tools for IHD	2 Advantages and disadvantages of tools (e.g., EKG, echo, angio)	3 Interprets normal and common abnormalities (e.g., angio, complex EKG)	4 Interprets/integrates complex abnormalities
<div style="border: 2px solid purple; padding: 5px;">5. Treatment plan</div> <p>Additional Comments:</p>	0 No knowledge	1 List treatment options (e.g., CABG, PCI)	2 Advantages and disadvantages of treatment of treatment options	3 Appropriate treatment for routine IHD	4 Appropriate treatment complex IHD (e.g., hybrid CABG)
<div style="border: 2px solid darkgreen; padding: 5px;">6. Complications/outcomes</div> <p>Additional Comments:</p>	0 No knowledge	1 Basic complications	2 Risk, benefits, complications	3 ACC/STS/AATS guidelines, basic outcome data (e.g., SYNTAX)	4 Outcomes of all treatment modalities and complications, database (STS)/trials

ISCHEMIC HEART DISEASE—CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge	1 Basic anatomy and pathology (e.g., angiogram)	2 Common variations anatomy/pathology (e.g., left dominant)	3 Complex integrate anatomy/pathology (e.g., anomalous CA)	4 Complex variations anatomy/pathology (e.g., reoperative)
2. Physiology	0 No knowledge	1 Basic cellular and vascular Physiology	2 Changes with IHD (e.g., ischemia, reperfusion, infarction)	3 Role of treatment on physiology IHD	4 Adapts treatment based on complications (e.g., VSD, MR)
3. Clinical manifestations	0 No knowledge	1 List manifestations (e.g., angina, MI)	2 Differential diagnosis of similar manifestations (e.g., esophageal, aortic)	3 Common variants of IHD (e.g., unstable angina, acute MI)	4 Complex clinical manifestations and complications
4. Diagnostic tools	0 No knowledge	1 List diagnostic tools for IHD	2 Advantages and disadvantages of tools (e.g., EKG, echo, angio)	3 Interprets normal and common abnormalities (e.g., angio, complex EKG)	4 Interprets/integrates complex abnormalities
5. Treatment plan	0 No knowledge	1 List treatment options (e.g., CABG, PCI)	2 Advantages and disadvantages of treatment of treatment options	3 Appropriate treatment for routine IHD	4 Appropriate treatment complex IHD (e.g., hybrid CABG)
6. Complications/outcomes	0 No knowledge	1 Basic complications	2 Risk, benefits, complications	3 ACC/STS/AATS guidelines, basic outcome data (e.g., SYNTAX)	4 Outcomes of all treatment modalities and complications, database (STS)/trials

A 71-year-old man with a history of coronary artery bypass grafting (left internal thoracic artery to left anterior descending coronary artery, saphenous vein graft to right coronary artery, saphenous vein graft to circumflex coronary artery) presented with severe aortic stenosis. Echocardiographic measurements suggested an aortic valve area of 0.6cm² and peak and mean gradients were 82 and 67mmHg, respectively. Coronary angiography demonstrated that all bypass grafts were patent. The risks of reoperation were accepted. At repeat sternotomy, the internal mammary artery is injured. Of the following sequences, the best strategy is:

- A. Finger pressure on IMA, peripheral CPB, right heart dissection, IMA repair, AVR
- B. Finger pressure on IMA, peripheral CPB, right heart dissection, IMA repair, saphenous vein bypass to LAD, AVR
- C. Finger pressure on IMA, right heart dissection, central CPB, IMA repair, AVR
- D. IMA ligation, right heart dissection, central CPB, saphenous vein bypass to LAD, AVR

Based on question and comments, many subcomponents of Milestones are covered by this question.

Ischemic Heart Disease (IHD): IHD 1-1,1-2,1-4,4-1,5-1,5-2,5-3,6-1,6-2

Anatomy (1)-subcomponents 1,2,4

Diagnostic tool (4)-subcomponents 1

Treatment plan (5)-subcomponents 1,2,3

Complications/outcomes (6)-subcomponents 1,2

ISCHEMIC HEART DISEASE—CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge	1 Basic anatomy and pathology (e.g., angiogram)	2 Anatomical variations (e.g., left dominant)	3 Complex integrate anatomy/pathology (e.g., anomalous CA)	4 Complex variations anatomy/pathology (e.g., reoperative)
2. Physiology	0 No knowledge	1 Basic cellular and vascular Physiology	2 Changes with IHD (e.g., ischemia, reperfusion, infarction)	3 Role of treatment on physiology IHD	4 Adapts treatment based on complications (e.g., VSD, MR)
3. Clinical manifestations	0 No knowledge	1 List manifestations (e.g., angina, MI)	2 Differential diagnosis of similar manifestations (e.g., esophageal, aortic)	3 Common variants of IHD (e.g., unstable angina, acute MI)	4 Complex clinical manifestations and complications
4. Diagnostic tools	0 No knowledge	1 List diagnostic for IHD	2 Advantages and disadvantages of tools (e.g., EKG, echo, angio)	3 Interprets normal and common abnormalities (e.g., angio, complex EKG)	4 Interprets/integrates complex abnormalities
5. Treatment plan	0 No knowledge	1 List treatment options (e.g., CABG, PCI)	2 Indications and advantages of treatment of treatment options	3 Appropriate treatment for acute IHD	4 Appropriate treatment for complex IHD (e.g., hybrid CABG)
6. Complications/outcomes	0 No knowledge	1 Basic complications	2 Risk, benefits, complications	3 ACC/STS/AATS guidelines, basic outcome data (e.g., SYNTAX)	4 Outcomes of all treatment modalities and complications, database (STS)/trials

'A 56-year-old man was referred for surgical evaluation. He has a 2-year history of intermittent chest pain and dyspnea, with worsening of these symptoms over the last month. Cardiac catheterization reveals three vessel disease, with significant stenoses of the left anterior descending, right coronary, and left circumflex arteries. Echocardiography reveals an ejection fraction of 40% and moderate mitral regurgitation with no obvious mitral leaflet pathology. Which of the following statements is true?

- A. If a combined CABG and mitral repair is planned, the mitral valve should be repaired before the distal coronary anastomoses are performed.
- B. In patients with coronary artery disease and mitral regurgitation, the severity of mitral regurgitation is predictive of long-term survival.
- C. Mitral repair is not indicated in this patient, since there is no leaflet or chordal pathology.
- D. Mitral replacement is more likely to be effective than repair, because of the patient's age, chronicity of dyspnea, and low ejection fraction.
- E. Regardless of the procedure performed, this patient has a low expected 5-year survival.

Based on question and comments, many subcomponents of Milestones are covered by this question.

Ischemic Heart Disease (IHD): 1-1,1-2,3-1,3-2,4-1,4-2,4-3,5-1,5-2,5-3,5-4,6-1,6-2,6-3

Valve Disease (VD): 1-2,1-3

ISCHEMIC HEART DISEASE—CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge	1 Basic anatomy and pathology (e.g., angiogram)	2 Changes in variations of anatomy/pathology (e.g., left dominant)	3 Complex integrate anatomy/pathology (e.g., anomalous CA)	4 Complex variations anatomy/pathology (e.g., reoperative)
2. Physiology	0 No knowledge	1 Basic cellular and vascular Physiology	2 Changes with IHD (e.g., ischemia, reperfusion, infarction)	3 Role of treatment on physiology IHD	4 Adapts treatment based on complications (e.g., VSD, MR)
3. Clinical manifestations	0 No knowledge	1 Basic clinical manifestations (e.g., angina, MI)	2 Differential diagnosis of clinical manifestations (e.g., esophageal, aortic)	3 Common variants of IHD (e.g., unstable angina, acute MI)	4 Complex clinical manifestations and complications
4. Diagnostic tools	0 No knowledge	1 Basic diagnostic tools for IHD	2 Advantages and disadvantages of tools (e.g., EKG, echo, angio)	3 Interprets normal and common abnormalities (e.g., angio, complex EKG)	4 Interprets/integrates complex abnormalities
5. Treatment plan	0 No knowledge	1 Basic treatment options (e.g., CABG, PCI)	2 Advantages and disadvantages of treatment options	3 Appropriate treatment for acute IHD	4 Appropriate treatment for chronic IHD (e.g., hybrid CABG)
6. Complications/outcomes	0 No knowledge	1 Basic complications	2 Risk, benefits, and complications	3 Appropriate use of ACC/AHA/STS/AATS guidelines, basic outcome data (e.g., SYNTAX)	4 Outcomes of all treatment modalities and complications, database (STS)/trials

ISCHEMIC HEART DISEASE—CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge				4 Complex variations anatomy/pathology (e.g., reoperative)
2. Physiology	0 No knowledge			3 Role of treatment on physiology IHD	4 Adapts treatment based on complications (e.g., VSD, MR)
3. Clinical manifestations	0 No knowledge				4 Complex clinical manifestations and complications
4. Diagnostic tools	0 No knowledge				
5. Treatment plan	0 No knowledge				
6. Complications/outcomes	0 No knowledge				4 Outcomes of all treatment modalities and complications, database (STS)/trials

ISCHEMIC HEART DISEASE—CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge	1 Basic anatomy and pathology (e.g., angiogram)	2 Common variations anatomy/pathology (e.g., left dominant)	3 Complex integrate anatomy/pathology (e.g., anomalous CA)	4 Complex variations anatomy/pathology (e.g., reoperative)
2. Physiology	0 No knowledge	1 Basic cellular and vascular Physiology	2 Changes with IHD (e.g., ischemia, reperfusion, infarction)	3 Role of treatment on physiology IHD	4 Adapts treatment based on complications (e.g., VSD, MR)
3. Clinical manifestations	0 No knowledge	1 List manifestations (e.g., angina, MI)	2 Differential diagnosis of similar manifestations (e.g., esophageal, aortic)	3 Common variants of IHD (e.g., unstable angina, acute MI)	4 Complex clinical manifestations and complications
4. Diagnostic tools	0 No knowledge	1 List diagnostic tools for IHD	2 Advantages and disadvantages of tools (e.g., EKG, echo, angio)	3 Interprets normal and common abnormalities (e.g., angio, complex EKG)	4 Interprets/integrates complex abnormalities
5. Treatment plan	0 No knowledge	1 List treatment options (e.g., CABG, PCI)	2 Advantages and disadvantages of treatment of treatment options	3 Appropriate treatment for routine IHD	4 Appropriate treatment complex IHD (e.g., hybrid CABG)
6. Complications/outcomes	0 No knowledge	1 Basic complications	2 Risk, benefits, complications	3 ACC/STS/AATS guidelines, basic outcome data (e.g., SYNTAX)	4 Outcomes of all treatment modalities and complications, database (STS)/trials

Medical Knowledge: Ischemic Heart Disease

Level 1	Level 2	Level 3	Level 4
<p> Knows basic anatomy and pathology (identifies coronary anatomy on angiogram)</p>	<p> Understands common variations in anatomy and pathology (e.g., left dominant system)</p>	<p> Understands complex integrations between anatomy and pathology (e.g., anomalous coronary artery)</p>	<p> Understands complex variations in anatomy and pathology, including congenital (e.g., able to identify coronary anatomy in reoperative surgery)</p>
<p> Knows basic cellular and vascular physiology</p>	<p> Understands physiologic changes accompanying ischemic heart disease (e.g., ischemia, ischemia reperfusion injury, infarction, recovering myocardium)</p>	<p> Understands the role of treatment on physiology of ischemic heart disease</p>	<p> Adapts therapeutic management based on understanding of physiology of complications of ischemic heart disease (e.g., post infarct VSD, ischemic mitral regurgitation)</p>
<p> Lists clinical manifestations of ischemic heart disease (e.g., angina, myocardial infarction)</p>	<p> Generates differential diagnosis of disease with similar manifestations (e.g., esophageal and aortic problems, pleurisy)</p>	<p> Identifies the common variants of the clinical manifestations of ischemic heart disease (e.g., unstable angina, acute myocardial infarction, silent ischemia)</p>	<p> Distinguishes the complex clinical manifestations and complications of ischemic heart disease</p>
<p> Lists diagnostic tools available for evaluation of ischemic heart disease</p>	<p> Understands advantages and disadvantages of diagnostic tools in evaluating ischemic heart disease (e.g., EKG vs. echocardiogram vs. angiogram)</p>	<p> Interprets normal and common abnormalities associated with ischemic heart disease (e.g., reads coronary angiogram, complex EKG)</p>	<p> Interprets and integrates complex abnormalities associated with ischemic heart disease</p>
<p> Lists treatment options for ischemic heart disease (e.g., CABG, PCI)</p>	<p> Understands advantages and disadvantages of various treatment options for ischemic heart disease</p>	<p> Identifies appropriate treatment for routine patient with ischemic heart disease.</p>	<p> Identifies appropriate treatment for complex patient with ischemic heart disease (e.g., hybrid CABG)</p>
<p> Knows basic complications for ischemic heart disease</p>	<p> Understands risks, benefits and complications of treatment modalities</p>	<p> Familiar with ACC/STS/AATS guidelines</p>	<p> Knows outcomes for all treatment modalities and complications, including databases and clinical trials (e.g., STS Database)</p>
<p></p>	<p></p>	<p></p>	<p></p>



Medical Knowledge: Ischemic Heart Disease

Level 1	Level 2	Level 3	Level 4
<p> Knows basic anatomy and pathology (identifies coronary anatomy on angiogram)</p>	<p> Understands common variations in anatomy and pathology (e.g., left dominant system)</p>	<p> Understands complex integrations between anatomy and pathology (e.g., anomalous coronary artery)</p>	<p> Understands complex variations in anatomy and pathology, including congenital (e.g., able to identify coronary anatomy in reoperative surgery)</p>
<p> Knows basic cellular and vascular physiology</p>	<p> Understands physiologic changes accompanying ischemic heart disease (e.g., ischemia, ischemia reperfusion injury, infarction, recovering myocardium)</p>	<p> Understands the role of treatment on physiology of ischemic heart disease</p>	<p> Adapts therapeutic management based on understanding of physiology of complications of ischemic heart disease (e.g., post infarct VSD, ischemic mitral regurgitation)</p>
<p> Lists clinical manifestations of ischemic heart disease (e.g., angina, myocardial infarction)</p>	<p> Generates differential diagnosis of disease with similar manifestations (e.g., esophageal and aortic problems, pleurisy)</p>	<p> Identifies the common variants of the clinical manifestations of ischemic heart disease (e.g., unstable angina, acute myocardial infarction, silent ischemia)</p>	<p> Distinguishes the complex clinical manifestations and complications of ischemic heart disease</p>
<p> Lists diagnostic tools available for evaluation of ischemic heart disease</p>	<p> Understands advantages and disadvantages of diagnostic tools in evaluating ischemic heart disease (e.g., EKG vs. echocardiogram vs. angiogram)</p>	<p> Interprets normal and common abnormalities associated with ischemic heart disease (e.g., reads coronary angiogram, complex EKG)</p>	<p> Interprets and integrates complex abnormalities associated with ischemic heart disease</p>
<p> Lists treatment options for ischemic heart disease (e.g., CABG, PCI)</p>	<p> Understands advantages and disadvantages of various treatment options for ischemic heart disease</p>	<p> Identifies appropriate treatment for routine patient with ischemic heart disease.</p>	<p> Identifies appropriate treatment for complex patient with ischemic heart disease (e.g., hybrid CABG)</p>
<p> Knows basic complications for ischemic heart disease</p>	<p> Understands risks, benefits and complications of treatment modalities</p>	<p> Familiar with ACC/STS/AATS guidelines</p> <p> Knows basic outcome literature for ischemic heart disease (e.g., SYNTAX Trial)</p>	<p> Knows outcomes for all treatment modalities and complications, including databases and clinical trials (e.g., STS Database)</p>



Thoracic Surgery Milestones

Goals of JCTSE Milestones MK Project

Limitations

1. Questions are not exhaustive and may not fully represent trainee's knowledge
2. Other assessments (e.g., mock oral exam, conferences, etc.) are critical
3. All components represented by the questions need to be reviewed
4. Some questions not easily categorized (Milestones not intended to be all-inclusive)

<http://anat-content.stanford.edu/fann/>

<http://anat-content.stanford.edu/fann/admin.html>

Surgery (General) Milestones Project—Medical Knowledge

Practice Domain	Competency	Critical Deficiencies	LEVEL 1		LEVEL 2		LEVEL 3		LEVEL 4	
Care For Diseases and Conditions (CDC)	MEDICAL KNOWLEDGE (MK1)	This resident does not have basic knowledge about common surgical conditions to which a medical student would be exposed in clerkship.	This resident has a basic understanding of the symptoms, signs, and treatments of the " <u>broad</u> " <u>diseases</u> in the SCORE curriculum and has basic knowledge about common surgical conditions to which a medical student would be exposed in clerkship.		This resident has basic knowledge about <i>many</i> of the "broad" diseases in the SCORE curriculum and can make a diagnosis and recommend appropriate initial management. This resident can recognize variation in the presentation of common surgical conditions.		This resident has significant knowledge about <i>many</i> "broad" diseases in the SCORE curriculum and a basic knowledge of the "focused" diseases in the SCORE curriculum, and can make a diagnosis and initiate appropriate initial management.		This resident has a comprehensive knowledge of the varying patterns of presentation and alternative and adjuvant treatments for "broad" diseases in the SCORE curriculum and can make the diagnosis and provide initial care for the "focused" diseases in the SCORE curriculum.	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Comments:								
Performance of Operations and Procedures (POP)	MEDICAL KNOWLEDGE (MK2)	This resident does not have basic knowledge about the common "essential" operations to which a medical student would be exposed in clerkship.	This resident has a basic knowledge of the " <u>essential-common</u> " <u>surgical operations</u> in the SCORE curriculum to which a medical student would be exposed in clerkship.		This resident has basic knowledge of the operative steps, peri-operative care, and post-operative complications for <i>many</i> of the "essential" operations in the SCORE curriculum.		This resident has a significant knowledge of the operative steps, peri-operative care, and post-operative complications for <i>most</i> of the "essential" operations in the SCORE curriculum and a basic knowledge of some of the "complex" operations.		This resident has a comprehensive level of knowledge of the operative steps, peri-operative care, and post-operative complications for the "essential" operations in the SCORE curriculum and a basic knowledge of many of the "complex" operations.	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Comments:								

Urology Milestones Project—Medical Knowledge

MK. Demonstrates level-appropriate competency in the following core domains as indicated by performance on the ABS ITE and AUA Resident ISE.

Female pelvic medicine Neurogenic bladder and incontinence BPH and Voiding dysfunction Reconstruction Calculous disease Fistulae Adrenal disease transplantation	Pediatrics Reproductive and sexual dysfunction Uroradiology and Radiation safety Biostatistics and Epidemiology Infectious disease Hypertension and Renovascular disease Renal	Trauma Medical oncology Anatomy Physiology Geriatrics Infections Uropathology
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Has not achieved Level 1	Level 1	Level 2	Level 3	Level 4	Level 5
	Achievement of a percent correct score of 26-35 on the AUA Resident ISE <i>URO-1 only:</i> Achievement of a percent correct score of 26-40 on the the ABSITE	Achievement of a percent correct score of 36-45 on the AUA Resident ISE	Achievement of a percent correct score of 46-55 on the AUA Resident ISE	Achievement of a minimum percent correct score of 56-65 on the AUA Resident ISE	Achievement of a minimum percent correct score of > 65 on the AUA Resident ISE
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:					

Mock Oral Examination Assessment—Cardiothoracic Surgery

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____ EVALUATOR _____
 MILESTONE OR OTHER add lists _____

Milestone Level	No Knowledge	Novice	Advanced Beginner	Intermediate	Competent
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1. Understand general scenario	0 No understanding Generic questions Stalling	1	2 Some understanding Some appropriate questions for clarification Some hesitation	3	4 Full understanding Appropriate questions for clarification No hesitation
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Additional Comments: _____

2. Anatomy/pathophysiology	0 No/basic knowledge	1	2 Integrate anatomy and pathophysiology	3	4 Understand complex variations	NA
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Additional Comments: _____

3. Diagnostic tests	0 Unclear, generic Unable to interpret Incorrect follow-up tests	1	2 Understand advantages and disadvantages Mostly appropriate interpretation Mostly appropriate follow-up	3	4 Interpret and integrate results Avoids unnecessary tests Appropriate follow-up
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Additional Comments: _____

4. Formulate differential dx	0 Unable to formulate Unclear path	1	2 Moderate list of diff dx Somewhat logical path	3	4 Distinguish complex clinical manifestations/complications Logical path
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Additional Comments: _____

5. Diagnosis	0 No diagnosis	1	2 Mostly correct	3	4 Correct diagnosis
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Additional Comments: _____

6. Treatment plan	0 No/inappropriate plan Does not seek assistance	1	2 Understand advantages and disadvantages of options Seeks qualified assistance	3	4 Appropriate plan or approach Account for complex patient
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Additional Comments: _____

7. Management of Complications	0 Fails to recognize complication	1	2 Recognize complication Incomplete understanding of treatment	3	4 Correctly id complication and appropriate treatment
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Additional Comments: _____

8. Overall Level of competence	No Knowledge	Novice	Advanced Beginner	Intermediate	Competent
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Additional Comments: _____

3331	CV 1	VD 1-1,2-1,2-2,3-1,3-2,3-3,3-4	Which of the following physical findings can differentiate severe tricuspid regurgitation from mitral regurgitation? A 55-year-old man has long-standing severe mitral and tricuspid regurgitation. Echo shows that left and right ventricular function are preserved, but all chambers are dilated. Which of the following findings is most likely to be present in this patient?	accentuated JVP	ascites	hepatomegaly	jaundice		D
3338	CV 1	VD 1-1,1-2,1-3,2-1,2-2,2-3,4-1,4-2,4-3,5-1,5-2,5-3	A tapered diagram of the mitral valve annulus is presented in the figure. Injury to which of the structures could cause postoperative atrioventricular block?	Mitral valve partial	Tricuspid annulus is more	Unlike the clear zones of	white mitral valve	white the most common	C
3561	CV 1	VD 1-1,6-1	Which of the following conditions precludes a patient from being an autologous blood donor?	1	2	3	4	5	B
4044	CV 1	No match	Each of the following statements regarding myocardial blood flow and oxygen demand with severe aortic valve stenosis are true EXCEPT	aortic regurgitation	aortic stenosis	ventricular	mitral regurgitation	mitral stenosis	B
3682	CV 1	VD 1-1,1-2,6-1,6-2	A 75-year-old man is in mild respiratory distress in the intensive care unit on POD# 3 following repair of an extent I thoracoabdominal aneurysm (CT and composite shown).	nears with concentric diaphragm dysfunction	right intracavitary left	myocardial oxygen demand	A prolonged pre-aryngeal dysfunction	ventricular fibrillation	B
3980	CV 1	GVD 1-1,5-1	Tissue changes associated with acute heart failure include each of the following EXCEPT	decreased ATP levels.	decreased lactate production	decreased phosphocreatine	increased mitochondrial	increased protein synthesis.	C
3814	CV 1	ESCP 1-2	A 58-year-old woman with heart failure recently underwent a thorough evaluation including cardiac catheterization and an echocardiogram. It was concluded that she has significant	increased end diastolic	increased diastolic pressure	normal diastolic pressure	normal diastolic pressure		A
936	CV 1	CC 1-1,1-2,1-3; ESCP 2-1,2-2,2-3,3-1,3-2,3-3,3-4	Yesterday, a 59-year-old woman underwent left upper lobectomy	lactate level	mixed venous	pH	serum sodium		B
938	CV 1	CC 4-3; LA 6-1	All of the following statements concerning subendocardial blood flow are true EXCEPT	approximates or is	altered by the first	defined as the flow	greater during	vulnerable to	D
3105	CV 1	HD 1-1,1-2,1-3	The majority of ventricular filling occurs in which phase of the cardiac cycle?	Atrial systole.	the first third of diastole.	the first third of diastole.	the middle third of diastole.	ventricular diastasis.	B
3145	CV 1	CC 1-1; VD 2-1	In the normal heart the best index of preload is	left atrial pressure.	ventricular end-diastolic pressure	ventricular end-diastolic pressure	ventricular end-diastolic pressure	pulmonary artery wedge	C
3159	CV 1	CC 1-1,1-2,1-3,3-1	All of the following statements regarding mixed venous oxygen saturation are true EXCEPT	arterial oxygen addition of positive antero-septal branch of the left	cardiac output conversion from sinus to anterior	hemoglobin in myocardial edema.	oxygen consumption removal of a function in posterior descending branch	normal range is 0.68 to 0.82	D
3180	CV 1	CC 1-1,1-2	Assuming no change in myocardial contractility, mean arterial pressure or heart rate, all of the following will increase the pulmonary capillary wedge pressure needed to maintain a normal range of coronary blood	acidosis.	1000 ml/min/m ² .	250 ml/min/m ² .	50 ml/min/m ² .	500 ml/min/m ² .	E
3184	CV 1	CC 1-1,1-2,1-3,3-1	Inadequate systemic oxygen delivery is first manifested by	100 ml/min/m ² .	1000 ml/min/m ² .	250 ml/min/m ² .	50 ml/min/m ² .	500 ml/min/m ² .	D
3407	CV 1	HD 1-1,1-2,3-1	Normal oxygen consumption (VO ₂) is	heart rate.	hemoglobin concentration.	PaO ₂ > 100 torr.	respiratory quotient.	temperature.	C
3768	CV 1	CC 1-2	Oxygen content is most affected by						A
3769	CV 1	CC 1-1							B
3770	CV 1	CC 1-1,1-2							

Pulmonary Hilar Dissection

Assessment

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____

	Poor		Average		Excel
1. Tissue Handling	1	2	3	4	5
	Clumsy, forceful grasping		Careful handling of tissue with occasional mishandling		Consistent gentle handling of tissue with coordinated grasping
2. Time and Motion	1	2	3	4	5
	Many unnecessary moves		Efficient time, but some unnecessary moves		Fluid and efficient economy of motion
3. Instrument Use	1	2	3	4	5
	Awkward and uncoordinated		Occasional awkwardness, relatively competent		Coordinated and competent
4. Knowledge of Anatomy	1	2	3	4	5
	Little to no knowledge		Moderate level of knowledge, no knowledge of variants		Well-versed in anatomy and variants
5. Dissection, separation	1	2	3	4	5
	Unable to accomplish without undue structural damage		Separated structures with occasional injury and excess tissue		Successful structure isolation without injuries
6. Ligation and tying	1	2	3	4	5
	Unable to perform		Slow with hesitation, but successful		Competent tying skills
Final rating (circle one) :	1 (poor)	2	3(fair)	4	5 (competent)

Bronchoscopy

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____
 EVALUATOR _____

Step	Satisfactory		Comments		
Instrument check (rigid bronchoscope)	Y	N			
Check light source	Y	N			
Check side port for ventilation	Y	N			
Lubricate scope, keep optics clear	Y	N			
Position patient, protect teeth throughout procedure	Y	N			
Intubate posterior pharynx	Y	N			
Navigate posterior pharynx, visualize cords	Y	N			
Intubate cords with minimal trauma	Y	N			
Visualize and identify trachea and lobar bronchi	Y	N			
Navigate with minimal airway trauma	Y	N			
Safe withdrawal of bronchoscope	Y	N			
Economy of time and motion	1	2	3	4	5
	1= many unnecessary/ disorganized movements		3=organized time/motion, some unnecessary movement		5=maximum economy of movement and efficiency
Final rating (circle one)	Demonstrates competence		Needs further practice		
Additional comments:					

Assessment--Lobectomy

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ TIME TO COMPLETION _____

	Poor 1	2	3	4	Excellent 5
1. Anatomy	1	2	3	4	5
	Unable to correctly identify structures and their relationships		Completes lobectomy with some missteps		Consistently able to identify structures, correct lobectomy
Additional Comments:					
<hr/>					
2. Retraction	1	2	3	4	5
	Poor exposure, lung injury		Limited exposure, multiple adjustments		Good exposure, adjusts appropriately to maximize angles
Additional Comments:					
<hr/>					
3. Vascular dissection	1	2	3	4	5
	Vascular injury, incorrect identification		Occasional excessive or inadequate force		Correct plane, no tension
Additional Comments:					
<hr/>					
4. Stapler use	1	2	3	4	5
	Unsure how to use, uncontrolled		Appropriate use, maneuvering difficulty		Efficient and correct use
Additional Comments:					
<hr/>					
5. Vascular ligation	1	2	3	4	5
	Vessel injury, inadequate ligation		Excess tension during ligation		Correct knot tying technique
Additional Comments:					
<hr/>					
6. Airway dissection	1	2	3	4	5
	Airway injury, incorrect identification		Occasional excessive or inadequate force		Correct plane, airway identification
Additional Comments:					
<hr/>					
7. Tissue respect	1	2	3	4	5
	Unnecessary force, frequent tissue damage		Occasional damage		Consistent appropriate handling, minimal damage
Additional Comments:					
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8. Instrument handling	1	2	3	4	5
	Tentative or awkward Poor instrument choice		Occasionally stiff or awkward Occasional incorrect instrument		Fluid instrument use Correct instrument for task
Additional Comments:					

9. Use of Both Hands	1	2	3	4	5
	Dominant hand only		Sometimes adjusts tension/retraction with other hand		Continually adjusts both hands appropriately
Additional Comments:					

10. Flow of operation	1	2	3	4	5
	Frequent stopping Deliberation prior to move		Steady progress		Pre-planned Effortless flow
Additional Comments:					

11. Economy of time and motion	1	2	3	4	5
	Many unnecessary moves		Some unnecessary moves		Maximum efficiency
Additional Comments:					

Overall	PASS	FAIL
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Patient Care and technical Skills: Cardiopulmonary Bypass, Myocardial Protection and Temporary Circulatory Support

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Demonstrates basic surgical skills (simulation vs. OR) 	<ul style="list-style-type: none"> • Performs axillary, femoral, arterial or venous cannulation • Performs peripheral vascular access • Performs surgical opening and closing • Assists perfusionist with cardiopulmonary bypass setup and pump run 	<ul style="list-style-type: none"> • Cannulates and institutes cardiopulmonary bypass including myocardial protection in routine cases • Manages cardiopulmonary bypass and myocardial protection in routine cases • Weans and decannulates from cardiopulmonary bypass for routine cases • Recognizes and manage common acute complications (e.g., coagulopathy, pump failure) 	<ul style="list-style-type: none"> • Cannulates and institutes cardiopulmonary bypass including myocardial protection in complex cases • Manages cardiopulmonary bypass and myocardial protection in complex cases • Weans and decannulates from cardiopulmonary bypass for complex cases • Institutes temporary circulatory support for cardiogenic shock (e.g., intraaortic balloon pump, ECMO, short term LV assist) • Recognizes and manages unusual acute complications (e.g., aortic dissection) 	<ul style="list-style-type: none"> • Operates in a hostile chest (e.g., radiation, porcelain aorta, use of epiaortic probe, patent grafts) • Performs left ventricular assist device procedures or transplant
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

Ischemic Heart Disease — Medical Knowledge

Level 1	Level 2	Level 3	Level 4	Level 5
<ul style="list-style-type: none"> • Knows basic anatomy and pathology (identifies coronary anatomy on angiogram) • Knows basic cellular and vascular physiology • Lists clinical manifestations of ischemic heart disease (e.g., angina, myocardial infarction) • Lists diagnostic tools available for evaluation of ischemic heart disease • Lists treatment options for ischemic heart disease (e.g., coronary artery bypass graft [CABG], percutaneous coronary intervention [PCI]) • Knows basic complications for ischemic heart disease 	<ul style="list-style-type: none"> • Understands common variations in anatomy and pathology (e.g., left dominant system) • Understands physiologic changes accompanying ischemic heart disease (e.g., ischemia, ischemia reperfusion injury, infarction, recovering myocardium) • Generates differential diagnosis of disease with similar manifestations (e.g., esophageal and aortic problems, pleurisy) • Understands advantages and disadvantages of diagnostic tools in evaluating ischemic heart disease (e.g., electrocardiogram [EKG] vs. echocardiogram vs. angiogram) • Understands advantages and disadvantages of various treatment options for ischemic heart disease • Understands risks, benefits and complications of treatment modalities 	<ul style="list-style-type: none"> • Understands complex integrations between anatomy and pathology (e.g., anomalous coronary artery) • Understands the role of treatment on physiology of ischemic heart disease • Identifies the common variants of the clinical manifestations of ischemic heart disease (e.g., unstable angina, acute myocardial infarction, silent ischemia) • Interprets normal and common abnormalities associated with ischemic heart disease (e.g., reads coronary angiogram, complex EKG) • Identifies appropriate treatment for routine patient with ischemic heart disease. • Familiar with American College of Cardiology [ACC]/Society for Thoracic Surgery [STS]/Association of American Thoracic Surgeons [AATS] guidelines • Knows basic outcome literature for ischemic heart disease (e.g., SYNTAX Trial) 	<ul style="list-style-type: none"> • Understands complex variations in anatomy and pathology, including congenital (e.g., able to identify coronary anatomy in reoperative surgery) • Adapts therapeutic management based on understanding of physiology of complications of ischemic heart disease (e.g., post infarct ventricular septal defect [VSD], ischemic mitral regurgitation) • Distinguishes the complex clinical manifestations and complications of ischemic heart disease • Interprets and integrates complex abnormalities associated with ischemic heart disease • Identifies appropriate treatment for complex patient with ischemic heart disease (e.g., hybrid CABG) • Knows outcomes for all treatment modalities and complications, including databases and clinical trials (e.g., STS Database) 	<ul style="list-style-type: none"> • Understands implications of SYNTAX score • Presents on outcomes of ischemic heart disease at local, regional, or national meeting

Comments:

Not yet rotated

VALVULAR DISEASE — CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge	1 Basic anatomy and pathology	2 Common variations anatomy/pathology (e.g., type of MR)	3 Complex integrate anatomy/pathology (e.g., bicuspid AS, functional MR)	4 Complex variations anatomy/pathology (e.g., CAD and MR, bicuspid AV and ascending aneurysm)

Additional Comments:

2. Physiology	0 No knowledge	1 Basic valve physiology	2 Changes with valve dis (e.g., pulm HTN)	3 Role of treatment on physiology valve dis (e.g., A fib treatment)	4 Adapts treatment based on physiology (e.g., MR and TR in AS or CAD)
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Additional Comments:

3. Clinical manifestations	0 No knowledge	1 List manifestations (e.g., dyspnea, angina, syncope)	2 Differential diagnosis of similar manifestations (e.g., CAD, emphysema)	3 Common variants of valve disease (e.g., fatigue, exercise intolerance)	4 Complex clinical manifestations and complications (e.g., staging CHF)
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Additional Comments:

4. Diagnostic tools	0 No knowledge	1 List diagnostic tools for valve disease	2 Advantages and disadvantages of tools (e.g., TTE vs. TEE)	3 Interprets normal and common abnormalities (e.g., intraop TEE)	4 Interprets/integrates complex abnormalities (e.g., IHSS)
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Additional Comments:

5. Treatment plan	0 No knowledge	1 List treatment options for valve disease	2 Advantages and disadvantages of treatment options	3 Appropriate treatment for routine valve disease	4 Appropriate treatment for complex valve dis (e.g., combined CABG, aortic aneurysm, root enlargement)
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Additional Comments:

6. Complications/outcomes	0 No knowledge	1 Basic complications (e.g., periop AVR)	2 Risk, benefits, complications (e.g., frequency of common complications)	3 ACC/STS/AATS guidelines, basic outcome data (e.g., valve durability)	4 Outcomes of all treatment modalities and complications, database/trials
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Additional Comments:

ISCHEMIC HEART DISEASE—CLINICAL INTERACTION OR MOCK ORAL EXAMINATION

RESIDENT NAME _____ YR OF TRAINING _____ DATE _____

EVALUATOR _____ initials _____

Level	No knowledge	Novice	Advanced Beginner	Intermediate	Competent
1. Anatomy	0 No knowledge	1 Basic anatomy and pathology (e.g., angiogram)	2 Anatomical variations (e.g., left dominant)	3 Complex integrate anatomy/pathology (e.g., anomalous CA)	4 Complex variations anatomy/pathology (e.g., reoperative)
2. Physiology	0 No knowledge	1 Basic cellular and vascular Physiology	2 Changes with IHD (e.g., ischemia, reperfusion, infarction)	3 Role of treatment on physiology IHD	4 Adapts treatment based on complications (e.g., VSD, MR)
3. Clinical manifestations	0 No knowledge	1 Basic clinical manifestations (e.g., angina, MI)	2 Atypical diagnosis for manifestations (e.g., esophageal, aortic)	3 Common variants of IHD (e.g., unstable angina, acute MI)	4 Complex clinical manifestations and complications
4. Diagnostic tools	0 No knowledge	1 Basic diagnostic tools for IHD	2 Advantages and disadvantages of tools (e.g., EKG, echo, angio)	3 Interprets normal and common abnormalities (e.g., angio, complex EKG)	4 Interprets/integrates complex abnormalities
5. Treatment plan	0 No knowledge	1 Basic treatment options (e.g., CABG, PCI)	2 Advantages and disadvantages of treatment of treatment options	3 Appropriate treatment for routine IHD	4 Appropriate treatment complex IHD (e.g., hybrid CABG)
6. Complications/outcomes	0 No knowledge	1 Basic complications	2 Risk, benefits, complications	3 ACC/STS/AATS guidelines, basic outcome data (e.g., SYNTAX)	4 Outcomes of all treatment modalities and complications, database (STS)/trials

Assessment in CT Surgery Technical Skills

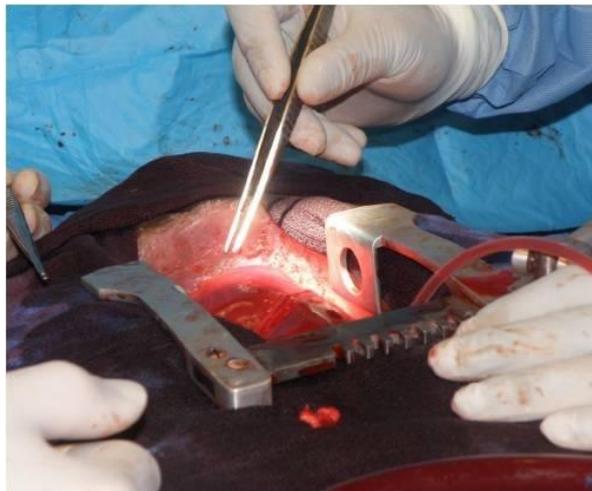
Aortic Cannulation



Orpheus Perfusion Simulator



Ramphal Simulator



Thoracic Surgery Milestones

Assessment

MK:

SESATS (JCTSE website)

ITE

Mock oral exam

Conferences

Case discussions

PC/TS:

Mock oral exam

Case discussions

Direct observation (OR and skills lab)

Case logs

Thoracic Surgery Milestones

Assessment

ICS: 360° (multi-source)

Direct observation

Mock oral exams

Chart review

PBLI: *Case logs*

Chart review

Pt outcomes (M&M)

PRO: 360° (multi-source)

Direct observation

SBP: *Direct observation*

Multi-source evaluation

Chart review

Case discussions