



Cardiac-Interventional Radiography

The purpose of continuing qualifications requirements (CQR) is to assist technologists in documenting their continued qualifications in the disciplines of certification and registration held. To accomplish this purpose the continuing qualifications requirements are presented in three parts: the professional profile, the structured self assessment (SSA) and continuing education (CE).

The *Structured Self Assessment Content Specifications for Cardiac-Interventional Radiography* is provided to assist technologists during their CQR compliance period. Its purpose is to prepare technologists for the SSA and to help education providers develop coursework for the technologists who need to address specified areas with targeted continuing education. Targeted CE is assigned only if a standard is not met in a category on the SSA.

The SSA is composed of sets of questions that are designed to evaluate an individual's knowledge in topics related to current practice. Participants are allowed a maximum of one hour and 30 minutes to complete the SSA for Cardiac-Interventional Radiography.

The table below presents the major categories and subcategories covered on the SSA. The number of questions in each category are listed in bold and number of questions in each subcategory in parentheses. The potential number of targeted CE credits that would be prescribed if the standard is not met, are across from each subcategory, with the maximum amount listed at the bottom. Specific topics within each category are addressed in the content outline, which makes up the remaining pages of this document.

Content Category	Number of Questions¹	Potential CE Credits
Patient Care	10	
<i>Patient Interactions and Management (10)</i>		6
Image Production	10	
<i>Image Acquisition and Equipment (10)</i>		6
Procedures	20	
<i>Diagnostic and Conduction System Studies (10)</i>		6
<i>Hemodynamics, Calculations, and Percutaneous Intervention (10)</i>		8
	Total 40	Maximum CE 26

¹: The SSA includes an additional 20 unscored (pilot) questions.



Patient Care

1. Patient Interactions and Management

A. Patient Communication

1. pre-procedure
 - a. explanation of procedure
 - b. informed consent
 - c. explanation of radiation risk
 - d. pre-procedure time-out
2. intra-procedure
3. post-procedure care instructions

B. Patient Assessment and Monitoring (*e.g., normal and abnormal values, implication for imaging, equipment)

1. physiologic monitoring
 - a. temperature
 - b. ECG
 - c. respiration
 - d. non-invasive blood pressure
 - e. intravascular pressure
 - f. pulse oximetry
2. access assessment
 - a. vascular patency
 1. peripheral pulse (e.g., palpation, Doppler)
 2. Allen test
 3. Barbeau test
 - b. anatomical location
 1. femoral
 2. radial
 3. brachial
 4. axillary
 5. jugular
 6. subclavian
 - c. imaging (e.g., ultrasound, fluoroscopy)
3. lab values
 - a. chemistry
 1. glucose
 2. blood urea nitrogen (BUN)
 3. creatinine
 4. electrolytes
 5. enzymes
 - b. hematology
 1. hematocrit
 2. hemoglobin
 3. platelet count
 4. white blood count (WBC)

c. coagulation

1. prothrombin time (PT)
 2. partial thromboplastin time (PTT)
 3. international normalization ratio (INR)
 4. activated clotting time (ACT)
- #### d. arterial blood gas
1. pH
 2. PaCO₂
 3. HCO₂
4. monitor and maintain medical equipment (e.g., IVs, oxygen) used during a procedure
 5. documentation
 - a. radiographic exposure factors
 - b. contrast administration parameters
 - c. fluoroscopy time
 - d. cumulative dose or air kerma (mGy)
 - e. dose area product (DAP) (mGy-cm²)
 - f. physiologic monitoring
 - g. medications
 - h. complications

C. Contrast Administration

1. properties of nonionic contrast agents
2. indications and contraindications

D. Medications

1. types and administration routes
 - a. narcotics
 - b. anticoagulants
 - c. thrombolytics
 - d. vasoactives (constrictors, dilators)
 - e. emergency medications
 - f. platelet inhibitors
 - g. beta blockers
 - h. calcium channel blockers
2. indications and contraindications
3. complications

* The abbreviation "e.g.," is used to indicate that examples are listed in parentheses, but that it is not a complete list of all possibilities.

(Patient Care continues on the following page.)



Patient Care (continued)

- E. Infection Control and Prevention
 - 1. disinfection and cleaning
 - a. medical asepsis
 - b. sterile technique
 - 2. CDC isolation precautions
 - a. transmission of infection
 - 1. contact
 - 2. airborne
 - 3. droplet
 - b. types of precautions
 - 1. CDC Standard Precautions (formerly Universal Precautions)
 - 2. transmission-based precautions (additional precautions)
 - 3. handling and disposal of biohazardous materials
- F. Emergency Care
 - 1. contrast reactions and complications
 - a. allergic-type
 - 1. minor
 - 2. intermediate
 - 3. severe
 - b. adverse
 - 1. hemodynamic responses
 - 2. nephrotoxicity
 - 3. central nervous system (CNS) reactions
 - 2. treatment and medications
 - a. types (e.g., steroids, antihistamines)
 - b. indications and contraindications
 - 3. symptoms and treatment of the following medical emergencies
 - a. cerebral vascular accident (CVA)
 - b. embolism
 - c. thrombosis
 - d. respiratory arrest
 - e. myocardial infarction
 - f. congestive heart failure
 - g. cardiac arrhythmias
 - h. vasovagal response
 - i. anaphylaxis
 - j. hypotensive episodes
 - k. hypertensive episodes
 - l. cardiogenic shock
 - m. cardiac tamponade
 - n. aortic dissection



Image Production

1. Image Acquisition and Equipment

- A. Angiography
 - 1. data acquisition and processing
 - a. modes
 - 1. fluoroscopy
 - a. dose rate
 - b. pulse rate
 - 2. acquisition angiography (cine)
 - a. dose per frame (e.g., low, med, high)
 - b. frame rate
 - 3. roadmapping
 - 4. digital subtraction
 - 5. 3D imaging
 - b. compensating filters (e.g., wedge, soft)
 - c. electronic magnification
 - d. geometric magnification
 - e. collimation
 - 2. projections/positions
- B. Intracardiac Imaging
 - 1. optical coherence tomography (OCT)
 - 2. intravascular ultrasound (IVUS)
 - 3. intracardiac echocardiography (ICE)
- C. Archiving
- D. Quality Control
- E. Automatic Pressure Injectors
 - 1. parts
 - 2. function
 - 3. operation

F. Radiation Protection

- 1. patients
 - a. collimation (e.g., shutters, virtual collimation)
 - b. magnification
 - c. frame rates
 - d. geometry (e.g., SID, OID, tube angle)
 - e. pulsed or continuous
 - f. shielding
 - g. last image hold
 - h. dose rate
- 2. personnel (ALARA)
 - a. shielding
 - b. monitoring devices
 - c. occupational exposure reports
 - d. promote radiation awareness



Procedures

CATEGORY

1. Diagnostic and Conduction System Studies

- A. Diagnostic Studies
 - 1. pulmonary arteriography
 - 2. aortography
 - 3. coronary angiography
 - 4. internal mammary angiography
 - 5. saphenous vein graft angiography
 - 6. femoral angiography
 - 7. carotid angiography
 - 8. renal angiography
 - 9. ventriculography
 - 10. biopsy
- B. Conduction System Studies
 - 1. arrhythmia detection
 - 2. arrhythmia ablation
 - a. atrial fibrillation
 - b. atrial flutter
 - c. ventricular tachycardia
 - 3. cardioversion
 - 4. implants
 - a. pacemaker, permanent insertion
 - b. internal cardiac defibrillator (ICD) insertion
 - c. biventricular pacemaker
 - 5. pacemaker, temporary insertion

FOCUS OF QUESTIONS

Questions about each of the procedures listed on the left may focus on any of the following factors:

- 1. Anatomy and Pathophysiology
- 2. Indications for Procedure
- 3. Contraindications for Procedure
- 4. Image Analysis and Utilization
- 5. Access Methods and Closure Devices
- 6. Equipment and Devices Used
- 7. Complications
 - A. Recognition
 - B. Treatment

(Procedures continues on the following page.)



Procedures (continued)

CATEGORY

2. Hemodynamics, Calculations, and Percutaneous Intervention

A. Hemodynamics and Calculations

1. ventricular volume measurement
2. stenotic valve area (Gorlin Method)
3. shunt detection and calculation
4. cardiac output calculation and measurement
 - a. Fick
 - b. thermodilution
 - c. angiographic
5. right and left heart hemodynamics
6. fractional flow reserve

B. Percutaneous Intervention

1. angioplasty
2. atherectomy
 - a. directional (peripheral)
 - b. rotational
3. stent placement
4. thrombectomy
 - a. mechanical
 - b. pharmacological
5. inferior vena cava (IVC) filter placement/retrieval
6. pericardiocentesis
7. intra-aortic balloon counterpulsation
8. removal of foreign bodies
9. ventricular assist device implantation
10. patent foramen ovale/atrial septal defect closure
11. transcatheter aortic valve implantation (TAVI/TAVR)
12. valvuloplasty

FOCUS OF QUESTIONS

Questions about each of the procedures listed on the left may focus on any of the following factors:

1. Anatomy and Pathophysiology
2. Indications for Procedure
3. Contraindications for Procedure
4. Image Analysis and Utilization
5. Access Methods and Closure Devices
6. Equipment and Devices Used
7. Complications
 - A. Recognition
 - B. Treatment