



Vascular Interventional Radiography

The purpose of continuing qualifications requirements (CQR) is to assist registered technologists in documenting their continued qualifications in the categories 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 purpose of the CQR SSA is to assist registered technologists to identify gaps in the knowledge and cognitive skills underlying the intelligent performance of the tasks typically required for practice within the disciplines of certification and registration held and help direct their professional development efforts.

The *Structured Self Assessment Content Specifications for Vascular Interventional Radiography* is provided to assist vascular interventional radiographers during their CQR compliance period. Its purpose is to prepare vascular interventional radiographers for the SSA and to help education providers develop coursework for the vascular interventional radiographers 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 have a maximum of 50 minutes to complete the SSA. Please allow an additional eight minutes for the tutorial, two minutes for the nondisclosure agreement (NDA), and 10 minutes for a follow-up survey.

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 Questions	Potential CE Credits
Patient Care	10	
<i>Patient Interactions and Management (10)</i>		4
Image Production	10	
<i>Image Acquisition and Equipment (10)</i>		5
Procedures	30	
<i>Vascular Diagnostic Procedures (10)</i>		7
<i>Vascular Interventional Procedures (10)</i>		7
<i>Nonvascular Procedures (10)</i>		6
	Total 50	Maximum CE 29



Patient Care

1. Patient Interactions and Management

A. Patient Communication

1. preprocedure
 - a. explanation of procedure
 - b. explanation of radiation risk
 - c. preprocedure time-out
2. intraprocedure
3. postprocedure care instructions (*e.g., discharge instructions)

B. Patient Assessment and Preparation

1. patient history
 - a. clinical notes
 1. medications
 2. allergies
 - b. prior imaging
2. interpersonal communication (e.g., patient care team, physician)
3. scheduling and screening
 - a. sequencing of imaging
 - b. pre/post procedure (e.g., contrast administration, NPO status)
4. patient education (e.g., preparation, diet, medications)
5. consent
 - a. informed (e.g., written, verbal)
 - b. emergent (e.g., implied)
6. patient positioning (e.g., Velcro® straps, padding, wedges, arm boards)
7. access assessment
 - a. vascular patency (e.g., ultrasound, Allen test, Barbeau test)
 - b. peripheral pulses (e.g., palpation, Doppler)
 - c. anatomical location (e.g., femoral artery/vein, radial artery, jugular vein)
8. lab values (normal and abnormal values)
 - a. chemistry (e.g., BUN, creatinine, eGFR, liver function tests [LFT], potassium)

b. blood coagulation

1. prothrombin time (PT)
 2. partial thromboplastin time (PTT)
 3. international normalized ratio (INR)
 4. activated clotting time (ACT)
- #### c. hematology (e.g., Hgb, WBC, platelet)

C. Patient Monitoring

1. physiologic monitoring
 - a. temperature
 - b. ECG
 1. equipment and patient preparation
 2. interpretation (e.g., sinus rhythm, common arrhythmias)
 - c. respiration
 - d. blood pressure
 - e. intravascular pressure
 - f. pulse oximetry
 - g. capnography
2. monitor and maintain medical equipment
 - a. oxygen delivery systems
 - b. chest tubes
 - c. indwelling catheters
 - d. drainage bags
 - e. IVs
 - f. suction
3. documentation
 - a. radiographic exposure factors
 - b. contrast administration parameters
 - c. fluoroscopy time
 - d. cumulative dose or air kerma (e.g., mGy)
 - e. dose area product (DAP) (e.g., mGy-cm²)
 - f. physiologic monitoring
 - g. medications
 - h. complications
 - i. implantable devices

* 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)

D. Contrast Administration

1. types and properties of contrast agents
 - a. ionic
 - b. nonionic low osmolar
 - c. nonionic iso-osmolar
 - d. CO₂
 - e. gadolinium
2. indications and contraindications

E. Medications

1. types
 - a. anticoagulants
 - b. thrombolytics
 - c. vasoactives
(e.g., constrictors, dilators)
 - d. analgesics/anxiolytics including reversal agents (e.g., fentanyl, versed, naloxone, flumazenil)
2. indications and contraindications
3. preparation
4. complications and reactions
5. administration routes
6. controlled substance wasting

F. Asepsis and Sterile Technique

1. disinfection and cleaning
 - a. medical asepsis
 - b. sterile technique
 1. patient preparation
 2. procedural tray
(e.g., sterile supplies)
 3. maintenance of sterile fields
 4. scrubbing

G. Handling and Disposal of Hazardous Materials

1. biohazardous (e.g., sharps, blood)
2. tissue samples
3. chemotherapeutic agents
4. radioactive material (e.g., Y-90)

H. Emergency Care

1. contrast reactions and complications
 - a. allergy type
 1. mild
 2. moderate
 3. severe
 - b. adverse
 1. nephrotoxicity
 2. physiological responses
(e.g., airway, hemodynamic, CNS)
 - c. treatment and medications
 1. types (e.g., steroids, antihistamines, epinephrine)
 2. indications and contraindications
2. symptoms and treatment of the following medical emergencies
 - a. cerebral vascular accident (CVA)/transient ischemic attack (TIA)
 - b. embolism
 1. air
 2. thrombotic
 - c. thrombosis
 - d. respiratory arrest
 - e. cardiac events
(e.g., arrhythmias, congestive heart failure, hypotensive/hypertensive episodes, myocardial infarction)
 - f. vasovagal response
 - g. anaphylaxis
 - h. shock
 - i. sepsis
 - j. dissection/perforation
 - k. bleeding
(e.g., hemothorax, hematoma)
 - l. pneumothorax



Image Production

1. Image Acquisition and Equipment

A. Data Acquisition and Processing

1. fluoroscopy
 - a. high/low dose rate
 - b. pulse rate
 - c. roadmapping
 - d. field of view
(e.g., magnification, collimation)
 - e. compensating filters
(e.g., wedge, soft)
2. digital acquisition
 - a. exposure technique
 - b. frame rate
 - c. digital subtraction
 - d. field of view
(e.g., magnification, collimation)
 - e. compensating filters
(e.g., wedge, soft)
 - f. 3D imaging
3. projections/positions
4. post processing
(e.g., reconstruction, pixel shift)
5. PACS

B. Automatic Pressure Injectors

1. parts
2. function and safety
3. operation
4. cleaning

C. Procedural Equipment**

1. ultrasound unit
2. intravascular ultrasound (IVUS)
3. ablation (e.g., cryo, microwave)
4. thrombectomy
5. thrombolysis
6. atherectomy
7. laser
8. lithotripsy (balloon or catheter)
9. pressure transducers

D. 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. last image hold
 - g. dose rate
2. personnel (ALARA)
 - a. shielding
 - b. monitoring devices
 - c. occupational exposure reports
 - d. promote radiation awareness
3. quality control
 - a. aprons
 - b. role of dose calibration
4. mandatory radiation reporting
 - a. Substantial Radiation Dose Level (e.g., National Council on Radiation Protection and Measurements [NCRP 168])
 - b. cumulative air kerma
(e.g., 5 Gy)

**The vascular interventional radiographer is expected to have the basic knowledge of this equipment and its operation.



Procedures

1. Vascular Diagnostic Procedures

- A. Neurologic Angiography
 - 1. intracranial arteriography
 - 2. carotid/vertebral arteriography
 - 3. spinal arteriography
- B. Thoracic Angiography
 - 1. thoracic aortography
 - 2. pulmonary arteriography
 - 3. bronchial arteriography
- C. Abdominal Angiography
 - 1. abdominal aortography
 - 2. pelvic arteriography
 - 3. renal arteriography
 - 4. adrenal arteriography
 - 5. celiac arteriography
 - 6. superior mesenteric artery (SMA) arteriography
 - 7. inferior mesenteric artery (IMA) arteriography
- D. Peripheral Angiography
 - 1. upper extremity arteriography
 - 2. lower extremity arteriography
- E. Venography
 - 1. pelvic venography
 - 2. superior vena cavagram
 - 3. inferior vena cavagram
 - 4. renal venography
 - 5. adrenal venography
 - 6. gonadal venography
 - 7. hepatic venography
 - 8. portal venography
 - 9. upper extremity venography
 - 10. lower extremity venography
 - 11. venous sampling
- F. Miscellaneous Studies
 - 1. hemodialysis graft/fistula study
 - 2. lymphangiography (general mapping)
 - 3. physiologic pressure measurements
 - 4. central venous device check (e.g., port, PICC, hemodialysis catheter)

FOCUS OF QUESTIONS

Questions for each section of the exam may address any of the following factors, as appropriate:

- 1. Anatomy and Pathophysiology
- 2. Indications for Procedure
- 3. Contraindications for Procedure
- 4. Image Analysis and Utilization
- 5. Access Methods
 - A. Arterial
 - B. Venous
- 6. Ultrasound Guidance
- 7. Equipment and Devices Used
 - A. Types (e.g., sheaths, catheters, guidewires, needles, IVUS)
 - B. Indications for Use
- 8. Complications
 - A. Recognition
 - B. Treatment
- 9. Closure Devices, Puncture Site Pressure, and Dressing (e.g., manual, external, permanent, nonpermanent, surgical glue)

(Procedures continues on the following page.)



Procedures (continued)

2. Vascular Interventional Procedures

- A. Angioplasty
 - 1. neurologic
 - 2. body
- B. Stent Placement
 - 1. neurologic
 - 2. body
- C. Embolization
 - 1. neurologic
 - 2. body
- D. Thrombolysis
 - 1. neurologic
 - 2. body
- E. Thrombectomy
 - 1. neurologic
 - 2. body
- F. Atherectomy
- G. Percutaneous Thrombin Injection
- H. Distal Protection Device Placement
- I. Foreign Body Retrieval (e.g., broken catheter, bullet, guidewire, filter piece)
- J. Endograft Placement
- K. Caval Filter Placement/Removal
- L. Transjugular Intrahepatic Portosystemic Shunt (TIPS) Placement or Revision
- M. Transvenous Biopsy
- N. Chemoembolization
- O. Radioembolization
- P. Venous Access
 - 1. tunneled catheter
 - 2. nontunneled catheter
 - 3. port placement
 - 4. port removal
 - 5. PICC line placement
 - 6. peripheral IV

FOCUS OF QUESTIONS

Questions for each section of the exam may address any of the following factors, as appropriate:

1. Anatomy and Pathophysiology
2. Indications for Procedure
3. Contraindications for Procedure
4. Image Analysis and Utilization
5. Access Methods
 - A. Arterial
 - B. Venous
6. Ultrasound Guidance
7. Equipment and Devices Used
 - A. Types (e.g., catheters, balloons, stents, snares, embolics, filters, IVUS)
 - B. Indications for Use
8. Complications
 - A. Recognition
 - B. Treatment
9. Closure Devices, Puncture Site Pressure and Dressing (e.g., manual, external, permanent, nonpermanent, surgical glue)
10. Interventional Suite versus Hybrid OR

(Procedures continues on the following page.)



Procedures (continued)

3. Nonvascular Procedures

- A. Nephrostomy
- B. Ureteral Dilatation/Stents
- C. Antegrade Urography Through an Existing Catheter
- D. Suprapubic Catheter Placement
- E. Percutaneous Ablation (e.g., radiofrequency [RFA], microwave, cryo)
- F. Percutaneous Transhepatic Cholangiogram
- G. Biliary Internal/External Drainage
- H. Cholecystostomy
- I. Gastrostomy/Gastrojejunostomy Placement
- J. Percutaneous Enteric Tube Evaluation (verification with contrast)
- K. Vertebroplasty/Kyphoplasty
- L. Epidural Steroid Injection
- M. Lumbar Puncture
- N. Myelogram
- O. Chest Tube/Drain Placement
- P. Thoracentesis
- Q. Percutaneous Biopsy
- R. Paracentesis
- S. Abscess, Fistula, or Sinus Tract Study
- T. Tunneled Drainage Catheter Placement
 - 1. thoracic
 - 2. abdominal
- U. Percutaneous Drainage With or Without Placement of Catheter (excluding thoracentesis or paracentesis)
- V. Removal of Percutaneous Drainage Catheter (e.g., tunneled, nontunneled)
- W. Change of Percutaneous Tube or Drainage Catheter

FOCUS OF QUESTIONS

Questions for each section of the exam may address any of the following factors, as appropriate:

- 1. Anatomy and Pathophysiology
- 2. Indications for Procedure
- 3. Contraindications for Procedure
- 4. Image Analysis and Utilization
- 5. Ultrasound Guidance
- 6. Equipment and Devices Used
 - A. Types (e.g., sheaths, drainage catheters, guidewires, needles)
 - B. Indications for Use
- 7. Complications
 - A. Recognition
 - B. Treatment