



Vascular-Interventional Radiography

The purpose of the vascular-interventional radiography examination is to assess the knowledge and cognitive skills underlying the intelligent performance of the tasks typically required of vascular-interventional radiographers at entry into the profession. The tasks typically performed were determined by administering a comprehensive practice analysis survey to a nationwide sample of vascular-interventional radiographers.¹ The *Task Inventory for Vascular-Interventional Radiography* may be found on the ARRT's website (www.arrt.org).

The *Examination Content Specifications for Vascular-Interventional Radiography* identifies the knowledge areas underlying performance of the tasks on the *Task Inventory for Vascular-Interventional Radiography*. Every content category can be linked to one or more activities on the task inventory.

The table below presents the major content categories and subcategories covered on the examination. The number of test questions in each category are listed in bold and number of test questions in each subcategory in parentheses. Specific topics within each category are addressed in the content outline, which makes up the remaining pages of this document.

Content Category	Number of Scored Questions²
Patient Care	30
<i>Patient Interactions and Management (30)</i>	
Image Production	25
<i>Image Acquisition and Equipment (25)</i>	
Procedures	105
<i>Vascular Diagnostic Procedures (50)</i>	
<i>Vascular Interventional Procedures (35)</i>	
<i>Nonvascular Procedures (20)</i>	
Total	160

¹. A special debt of gratitude is due to the hundreds of professionals participating in this project as committee members, survey respondents, and reviewers.

². The exam includes an additional 50 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 (normal and abnormal values; implication for imaging, equipment)
 - 1. physiologic monitoring
 - a. temperature
 - b. ECG
 - 1. equipment and patient preparation
 - 2. interpretation (sinus rhythm, common arrhythmias)
 - c. respiration
 - d. blood pressure
 - e. intravascular pressure
 - f. pulse oximetry
 - 2. 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)
 - 3. lab values
 - a. chemistry (e.g., BUN, creatinine, eGFR, liver function tests (LFT), potassium)
 - b. blood coagulation (e.g., PT, PTT, INR, ACT)
 - c. hematology (e.g., Hgb, WBC, platelet)
 - 4. monitor and maintain medical equipment used during a procedure
 - a. oxygen delivery systems
 - b. chest tubes
 - c. in-dwelling catheters
 - d. drainage bags
 - e. IV's
 - f. suction
- 5. documentation
 - a. radiographic exposure factors
 - b. contrast administration parameters
 - c. fluoroscopy time
 - d. radiation dose
 - e. physiologic monitoring
 - f. medications
 - g. complications
 - h. implantable devices
- C. 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
- D. Medications
 - 1. types and administration routes
 - a. analgesics/antiemetics including reversal agents (e.g., fentanyl, versed, naloxone, flumazenil)
 - b. anticoagulants
 - c. thrombolytics
 - d. vasoconstrictors
 - e. vasodilators
 - 2. indications and contraindications
 - 3. preparation
 - 4. 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. Asepsis and Sterile Technique

1. disinfection and cleaning
 - a. medical asepsis
 - b. sterile technique
 1. patient preparation
 2. procedural tray
 3. maintenance of sterile fields
2. infection control
 - a. CDC Standard Precautions
 - b. transmission precautions
 1. contact
 2. airborne
 3. droplet

F. Handling and Disposal of Hazardous Materials

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

G. Emergency Care

1. contrast reactions and complications
 - a. allergic-type
 1. minor
 2. intermediate
 3. severe
 - b. adverse
 1. hemodynamic responses
 2. nephrotoxicity
 3. 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. air embolism
 - b. anaphylaxis
 - c. bleeding
 - d. cardiac arrhythmias
 - e. congestive heart failure
 - f. hemothorax
 - g. hypertensive episodes
 - h. hypotensive episodes
 - i. myocardial infarction
 - j. pneumothorax
 - k. respiratory arrest
 - l. sepsis
 - m. thrombosis
 - n. thrombotic embolism
 - o. TIA
 - p. vasovagal response



Image Production

1. Image Acquisition and Equipment

- A. Data Acquisition and Processing
 - 1. fluoroscopy
 - a. pulse rate
 - b. high/low dose
 - c. roadmapping
 - d. field of view (e.g., magnification, collimation)
 - e. compensating filters (e.g. wedge, soft)
 - 2. digital angiography
 - 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. archiving
 - 5. quality control
- B. Automatic Pressure Injectors
 - 1. parts
 - 2. function
 - 3. operation

- C. 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. Vascular Diagnostic Procedures

- A. Neurologic Angiography
 - 1. intracranial arteriography
 - 2. extracranial 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. physiologic pressure measurements
 - 3. 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. Equipment and Devices Used
 - A. Types (e.g., sheaths, catheters, guidewires, needles)
 - B. Indications for Use
- 7. Ultrasound Guidance
- 8. Closure Devices, Puncture Site Pressure and Dressing
- 9. Complications
 - A. Recognition
 - B. Treatment

(Procedures continues on the following page.)



Procedures (continued)

CATEGORY

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/Thrombectomy
 - 1. neurologic
 - 2. body
- E. Atherectomy
- F. Distal Protection Device Placement
- G. Foreign Body Retrieval
- H. Endograft Placement
- I. Caval Filter Placement/Removal
- J. Transjugular Intrahepatic Portosystemic Shunt (TIPS) Placement or Revision
- K. Transvenous Biopsy
- L. Chemoembolization
- M. Radioembolization
- N. Venous Access
 - 1. tunneled catheter
 - 2. non-tunneled catheter
 - 3. port
 - 4. 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. Equipment and Devices Used
 - A. Types (e.g., catheters, balloons, stents, snares, embolics, filters)
 - B. Indications for Use
7. Ultrasound Guidance
8. Closure Devices, Puncture Site Pressure and Dressing
9. Complications
 - A. Recognition
 - B. Treatment

(Procedures continues on the following page.)



Procedures (continued)

CATEGORY

3. Nonvascular Procedures

- A. Nephrostomy
- B. Ureteral Dilation/Stents
- C. Percutaneous Stone Extraction (e.g., renal, biliary)
- D. Drainage Procedures
- E. Percutaneous Radiofrequency (RFA) Ablation
- F. Percutaneous Transhepatic Cholangiogram
- G. Biliary Internal/External Drainage
- H. Cholecystostomy
- I. Gastrostomy/Gastrojejunostomy
- J. Vertebroplasty/Kyphoplasty
- K. Discography
- L. Chest Tube/Drain Placement
- M. Thoracentesis
- N. Percutaneous Biopsy
- O. Paracentesis
- P. Tunneled Drainage Catheter Placement
 - 1. thoracic
 - 2. abdominal

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. Equipment and Devices Used
 - A. Types (e.g., sheaths, drainage catheters, guidewires, needles)
 - B. Indications for Use
6. Complications
 - A. Recognition
 - B. Treatment