
CONTENT SPECIFICATIONS FOR THE EXAMINATION IN VASCULAR-INTERVENTIONAL RADIOGRAPHY



Implementation Date: July 2008

The purpose of the ARRT Examination in Vascular-Interventional Radiography is to assess the knowledge and cognitive skills underlying the intelligent performance of the tasks typically required of technologists employed in this specialized area. These content specifications are based on a comprehensive, nationwide job analysis of vascular-interventional technologists employed in various health-care settings.¹

The table below presents the three major content categories and five procedural subcategories covered on the examination, and indicates the number of test questions in each category. The remaining pages list the specific topics addressed within each category, with the approximate number of test questions allocated to each topic appearing in parentheses.

Content Category	Number of Questions²
A. Equipment and Instrumentation	23
B. Patient Care	37
C. Vascular-Interventional Procedures	
1. Neurologic	15
2. Genitourinary	19
3. Gastrointestinal	26
4. Peripheral	28
5. Thoracic	<u>12</u>
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. Each exam includes an additional 20 unscored (pilot) questions. On the pages that follow, the approximate number of test questions allocated to each content category appears in parentheses.

A. EQUIPMENT & INSTRUMENTATION (23)

1. Digital Imaging (7)

- a. Image Characteristics
 - 1. pixel
 - 2. image matrix
 - 3. dynamic range
- b. Image Production
 - 1. data acquisition
 - 2. post processing
 - 3. subtraction technique
 - 4. archiving
 - 5. quality control
 - 6. display
 - 7. 3-D reconstruction

2. Automatic Pressure Injectors (3)

- a. Parts
- b. Function
- c. Operation

3. Catheters, Guidewires, Needles (8)

- a. Types
 - 1. diagnostic
 - 2. interventional (balloon, cutting balloon, atherectomy device, mechanical thrombectomy devices)
- b. Construction
- c. Use

4. Implantable Devices (5)

- a. Caval Filters (permanent and removable)
- b. Central Venous Catheters (with or without subcutaneous reservoir)
- c. Embolic Materials
- d. Stents
 - 1. vascular
 - 2. nonvascular
- e. Stent Grafts
- f. Closure Devices

B. PATIENT CARE (37)

1. Patient Communication (1)

- a. Patient Education
- b. Informed Consent

2. Patient Assessment & Monitoring (11)

(normal and abnormal values; implications)

- a. Vital Signs
 1. temperature
 2. heart rate
 3. respiration
 4. blood pressure
- b. Access Assessment
 1. peripheral pulses
 2. anatomical location
- c. Lab Values
 1. chemistry
 - a. bilirubin
 - b. BUN
 - c. creatinine
 - d. potassium
 2. hematology
 - a. hematocrit
 - b. hemoglobin
 - c. platelet count
 - d. white blood count (WBC)
 3. coagulation
 - a. prothrombin time (PT)
 - b. partial thromboplastin time (PTT)
 - c. international normalization ratio (INR)
 - d. activated clotting time (ACT)
- d. Physiologic Monitoring
 1. ECG
 - a. equipment and patient preparation
 - b. interpretation (sinus rhythm, common dysrhythmias)
 2. pulse oximetry
 3. invasive hemodynamics
 - a. waveform recognition
 - b. normal and abnormal values
- e. Maintaining Accessory Medical Devices
 1. oxygen delivery systems
 2. chest tubes
 3. in-dwelling catheters
 4. drainage bags

3. Contrast Administration (3)

- a. Types & Properties of Contrast Agents
 1. osmolality
 2. chemical structure
 3. CO₂
 4. gadolinium
- b. Indications and Contraindications

4. Medications (8)

- a. Types and Administration Routes
 1. analgesics
 2. antiarrhythmics
 3. antibiotics
 4. anticoagulants
 5. antiemetics
 6. antiplatelet medications
 7. anxiolytics
 8. emergency medications
 9. thrombolytics
 10. vasoconstrictors
 11. vasodilators
- b. Indications and Contraindications
- c. Preparation & Dosage
- d. Complications

5. IV Therapy (2)

- a. Indications and Contraindications
- b. Venipuncture
- c. Solution Preparation
- d. Flow Rate
- e. Complications

B. PATIENT CARE (cont.)

6. Asepsis and Sterile Technique (2)

- a. Sterile Technique
 - 1. types of sterilization (e.g., autoclave)
 - 2. sterile fields
 - a. patient preparation
 - b. procedural tray
 - c. maintenance of sterile fields
 - 3. surgical scrub technique
- b. CDC Isolation Precautions
 - 1. transmission of infection
 - a. contact
 - b. airborne
 - c. droplet
 - 2. types of precautions
 - a. standard precautions (formerly universal precautions)
 - b. transmission-based precautions (additional precautions)

7. Emergency Care (8)

- a. Contrast Reactions and Complications
 - 1. allergic-type
 - a. minor
 - b. intermediate
 - c. severe
 - 2. adverse
 - a. hemodynamic responses
 - b. nephrotoxicity
 - c. CNS reactions
- b. Treatment and Medications
 - 1. types (e.g., steroids, antihistamines)
 - 2. indications and contraindications
- c. Symptoms and Treatment of Medical Emergencies
 - 1. air embolism
 - 2. anaphylaxis
 - 3. cardiac arrhythmias
 - 4. congestive heart failure
 - 5. hemothorax
 - 6. hypertensive episodes
 - 7. hypotensive episodes
 - 8. myocardial infarction
 - 9. pneumothorax
 - 10. respiratory arrest
 - 11. sepsis
 - 12. thrombosis
 - 13. thrombotic embolism
 - 14. TIA
 - 15. vasovagal response

8. Cardiac Life Support (2)

- a. BLS
- b. Defibrillation

C. VASCULAR-INTERVENTIONAL PROCEDURES (100)

CATEGORY	# QUESTIONS	FOCUS OF QUESTIONS
1. Neurologic a. Arteriography (10) 1. intracranial 2. extracranial 3. spinal b. Venography (1) 1. intracranial 2. extracranial c. Interventional Procedures (4) 1. embolization 2. thrombolysis 3. angioplasty 4. stent placement 5. distal protection device placement 6. foreign body retrieval 7. mechanical thrombectomy 8. vertebroplasty	15	<p><i>Questions for each section of the exam may address any of the following factors, as appropriate:</i></p> <ol style="list-style-type: none"> 1. Anatomy & Physiology 2. Pathology 3. Indications for Procedure 4. Contraindications for Procedure 5. Patient Positioning 6. Access Method (e.g., catheter, needle placement, Seldinger technique, guidewires) 7. Patient Management During Procedure 8. Contrast Administration (ionic, nonionic, CO₂, gadolinium) 9. Equipment (e.g., imaging media, automatic injectors) 10. Exposure Technique 11. Image Enhancement 12. Closure Devices 13. Complications 14. Ultrasound Guidance
2. GU a. Arteriography (7) 1. renal 2. adrenal 3. reproductive b. Venography (2) 1. renal 2. adrenal 3. gonadal 4. venous sampling c. Interventional Procedures (10) 1. nephrostomy 2. ureteral dilatation/stents 3. percutaneous stone extraction 4. embolizations 5. angioplasty 6. renal artery stents 7. drainage procedures 8. foreign body retrieval	19	
3. GI a. Arteriography (8) 1. splenic 2. hepatic 3. intestinal 4. pancreatic b. Venography (3) 1. splenic 2. hepatic 3. intestinal/portal	26	

C. VASCULAR–INTERVENTIONAL PROCEDURES (cont.)

<u>CATEGORY</u>	<u># QUESTIONS</u>	<u>FOCUS OF QUESTIONS</u>
<p>3. GI (cont.)</p> <p>c. Interventional Procedures (15)</p> <ol style="list-style-type: none"> 1. pharmacoangiography (e.g., pitressin) 2. embolization 3. angioplasty 4. stone extraction 5. percutaneous transhepatic cholangiogram 6. biliary drainage/stenting 7. cholecystostomy 8. gastrostomy/gastrojejunostomy 9. portal shunts (e.g., TIPS) 10. chemoembolization 11. drainage procedures 12. biopsy (percutaneous or transvascular) 	<p>28</p>	<p><i>Questions for each section of the exam may address any of the following factors, as appropriate:</i></p> <ol style="list-style-type: none"> 1. Anatomy & Physiology 2. Pathology 3. Indications for Procedure 4. Contraindications for Procedure 5. Patient Positioning 6. Access Method (e.g., catheter, needle placement, Seldinger technique, guidewires) 7. Patient Management During Procedure 8. Contrast Administration (ionic, nonionic, CO₂, gadolinium) 9. Equipment (e.g., imaging media, automatic injectors) 10. Exposure Technique 11. Image Enhancement 12. Closure Devices 13. Complications 14. Ultrasound Guidance
<p>4. Peripheral</p> <p>a. Arteriography (13)</p> <ol style="list-style-type: none"> 1. abdominal aortography 2. upper extremity 3. lower extremity 4. pelvic <p>b. Venography (2)</p> <ol style="list-style-type: none"> 1. upper extremity 2. lower extremity 3. pelvic 4. inferior vena cava <p>c. Interventional Procedures (10)</p> <ol style="list-style-type: none"> 1. mechanical: PTA, stents, thrombectomy, atherectomy 2. pharmacologic: r-TPA, urokinase 3. caval filter placement (permanent and removable) 4. embolization 5. central venous access/port placement 6. stent grafts 7. foreign body retrieval <p>d. AV Dialysis (3)</p> <ol style="list-style-type: none"> 1. diagnostic angiography 2. intervention 	<p>28</p>	

C. VASCULAR-INTERVENTIONAL PROCEDURES (cont.)

<u>CATEGORY</u>	<u># QUESTIONS</u>	<u>FOCUS OF QUESTIONS</u>
5. Thoracic	12	<i>Questions for each section of the exam may address any of the following factors, as appropriate:</i>
a. Angiography (7) 1. aortography 2. pulmonary 3. bronchial 4. superior vena cava		
b. Interventional Procedures (5) 1. embolization 2. thrombolysis/thrombectomy 3. angioplasty 4. stents 5. biopsy 6. drainage procedures 7. foreign body retrieval		<ol style="list-style-type: none">1. Anatomy & Physiology2. Pathology3. Indications for Procedure4. Contraindications for Procedure5. Patient Positioning6. Access Method (e.g., catheter, needle placement, Seldinger technique, guidewires)7. Patient Management During Procedure8. Contrast Administration (ionic, nonionic, CO₂, gadolinium)9. Equipment (e.g., imaging media, automatic injectors)10. Exposure Technique11. Image Enhancement12. Closure Devices13. Complications14. Ultrasound Guidance
