
CONTENT SPECIFICATIONS FOR FOR THE EXAMINATION IN CARDIAC-INTERVENTIONAL RADIOGRAPHY



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The purpose of the ARRT Examination in Cardiac-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 cardiac-interventional technologists¹ employed in various health-care settings.

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	30
B. Patient Care	35
C. Cardiac-Interventional Procedures	
1. Diagnostic Cardiac Studies	32
2. Percutaneous Coronary Intervention	20
3. Therapy	4
4. Hemodynamics and Calculations	20
5. Conduction System Studies	<u>4</u>
Total	145

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 15 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 (30)

1. Analog Imaging (3)

- a. Cine Cameras
 - 1. basic operation
 - 2. film transport
 - 3. quality control
- b. Film Processing
 - 1. maintenance
 - 2. quality control

2. Digital Imaging (Angiography, Intravascular Ultrasound) (5)

- a. Image Characteristics
 - 1. pixel
 - 2. image matrix
 - 3. dynamic range
- b. Image Production
 - 1. data acquisition
 - 2. post processing
 - 3. archiving
 - 4. quality control

3. Automatic Pressure Injectors (3)

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

4. Percutaneous Equipment (8)

- a. Angiographic Catheters and Guidewires
 - 1. diagnostic
 - 2. interventional
- b. Intravascular Diagnostic Devices
 - 1. intravascular ultrasound (IVUS)
 - 2. pressure wires
- c. Therapeutic Devices
 - 1. balloons
 - 2. stents
 - 3. intra-aortic balloon pump
 - 4. atherectomy
 - 5. laser
 - 6. distal protection devices
 - 7. thrombectomy
 - 8. brachytherapy

5. Patient Assessment Instrumentation (6)

- a. Physiologic Monitoring
 - 1. hemodynamic
 - 2. ECG
 - 3. pulse oximeter
 - 4. pressure transducer
- b. Hemoximeter
- c. Activated Clotting Time (ACT) Unit
- d. Doppler Pulse Unit
- e. Cardiac Output Computer

6. Cardiac Stimulation Equipment (3)

- a. Defibrillator
 - 1. internal
 - 2. external
- b. Temporary Pulse Generator
 - 1. internal
 - 2. external
- c. Electrophysiology Stimulation

7. Implantable Devices (2)

- a. Permanent Pacemakers
- b. Implantable Cardiac Defibrillator

B. PATIENT CARE (35)

1. Patient Communication (2)

- a. Pre-Procedure
 - 1. explanation of procedure
 - 2. informed consent
- b. Intra-Procedure
- c. Post-Procedure Care Instructions

2. Patient Assessment & Monitoring (10)

(normal and abnormal values; implication for imaging)

- 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. glucose
 - b. BUN
 - c. creatinine
 - d. electrolytes
 - e. enzymes
 - 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)
 - 4. arterial blood gas
 - a. pH
 - b. PaCO₂
 - c. HCO₂

d. Physiologic Monitoring

- 1. ECG
 - a. patient preparation
 - b. interpretation
- 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

3. Contrast Administration (2)

- a. Types & Properties of Contrast Agents
 - 1. ionics
 - 2. nonionics
- b. Indications and Contraindications

4. Medications (8)

- a. Types and Administration Routes
 - 1. narcotics
 - 2. antiarrhythmics
 - 3. anticoagulants
 - 4. antibiotics
 - 5. thrombolytics
 - 6. vasodilators
 - 7. vasoconstrictors
 - 8. emergency medications
 - 9. antiemetics
 - 10. platelet inhibitor
 - 11. beta blocker
 - 12. calcium channel blocker
 - 13. sedatives
 - 14. diuretics
- b. Indications and Contraindications
- c. Complications

B. PATIENT CARE (cont.)

5. Infection Control & Prevention (2)

- a. Disinfection and Cleaning
 - 1. medical asepsis
 - 2. sterile 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)
- c. Handling and Disposal of Biohazardous Materials

6. Emergency Care (9)

- 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. CVA
 - 2. embolism
 - 3. thrombosis
 - 4. respiratory arrest
 - 5. myocardial infarction
 - 6. congestive heart failure
 - 7. cardiac arrhythmias
 - 8. vasovagal response
 - 9. anaphylaxis
 - 10. hypotensive episodes
 - 11. hypertensive episodes
 - 12. cardiogenic shock
 - 13. cardiac tamponade
 - 14. aortic dissection

7. Cardiac Life Support (2)

- a. BLS
- b. ACLS

C. CARDIAC INTERVENTIONAL PROCEDURES (80)

<u>Category</u>	<u>Focus of Questions</u>
1. Diagnostic Cardiac Studies (32) a. Pulmonary Angiography b. Aortography c. Coronary Angiography d. Internal Mammary Angiography e. Saphenous Vein Graft Angiography f. Ventriculography g. Biopsy	1. Anatomy & Pathophysiology 2. Indications for Procedure 3. Contraindications for Procedure 4. Cardiac Image Acquisition a. radiographic b. intravascular ultrasound (IVUS) 5. Access Methods and Closure Devices 6. Patient Management During Procedure 7. Contrast Administration
2. Percutaneous Coronary Intervention (20) a. Angioplasty b. Debulking c. Stent Placement d. Thrombolysis 1. mechanical 2. pharmacologic	8. Image Enhancement and Processing 9. Complications a. recognition b. treatment
3. Therapy (4) a. Pericardiocentesis b. Intra-aortic Balloon Counterpulsation c. Removal of Foreign Bodies	

C. CARDIAC INTERVENTIONAL PROCEDURES (cont.)

<u>Category</u>	<u>Focus of Questions</u>
4. Hemodynamics and Calculations (20)	1. Anatomy & Pathophysiology
a. Ventricular Volume Measurement	2. Indications for Procedure
b. Stenotic Valve Area (Gorlin Method)	3. Contraindications for Procedure
c. Shunt Detection and Calculation	4. Cardiac Image Acquisition
d. Cardiac Output Calculation and Measurement	a. radiographic
1. Fick	b. intravascular ultrasound (IVUS)
2. thermodilution	5. Access Methods and Closure Devices
3. angiographic	6. Patient Management During Procedure
e. Right and Left Heart Hemodynamics	7. Contrast Administration
5. Conduction System Studies (4)	8. Image Enhancement and Processing
a. Arrhythmia Detection	9. Complications
b. Arrhythmia Ablation	a. recognition
c. Cardioversion	b. treatment
d. Implants	
1. pacemaker, permanent insertion	
2. internal cardiac defibrillator (ICD) insertion	
3. biventricular pacemaker	
e. Pacemaker, Temporary Insertion	
