

**Practice Analysis and Content Specifications
for Cardiac-Interventional Radiography**

Final Report

For New Documents Implemented July 2017

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TABLE OF CONTENTS

	<u>Page</u>
CHAPTER 1: PROJECT BACKGROUND AND INTRODUCTION	3
CHAPTER 2: TASK INVENTORY SURVEY	4
Development of Task Inventory Survey	4
Survey Sample	4
Data Analysis	5
CHAPTER 3: CONTENT SPECIFICATIONS AND CLINICAL REQUIREMENTS	6
Revision of Task Inventory	6
Content Specifications and Structured Education Requirements	8
Clinical Experience Requirements	9
CHAPTER 4: EXAM PASSING STANDARD	10
CHAPTER 5: CONCLUSION	11

CHAPTER 1

PROJECT BACKGROUND AND INTRODUCTION

The ARRT establishes the job relatedness of an examination via a practice analysis (also called a job analysis). Practice analyses document the role to be credentialed and the topics to be covered by the examination used in the credentialing decision as well as the degree of emphasis that each topic receives. The rationale for practice analyses is outlined in *The Standards for Educational and Psychological Testing* (American Educational Research Association, American Psychological Association, National Council on Measurement in Education, 2014) and in the National Commission for Certifying Agencies (NCCA) *Standards for the Accreditation of Certification Programs* (NCCA, 2014). Legislative activity and legal precedence also stress the importance of practice analysis in the development and validation of certification exams. The ARRT conducts a practice analysis for each discipline every five years. Such updates are important for professions that continually evolve, due to advances in technology, because they help assure that the content specifications and other certification requirements reflect current practice.

This report describes the practice analysis for Cardiac-Interventional Radiography (CI) conducted between the dates of April 2015 and March 2016. The purpose of the overall project was to identify tasks currently required of the typical technologist and determine the knowledge and cognitive skills required to effectively perform those tasks.

Projects such as this require a coordination of numerous activities. During the project a number of committee meetings were held, a survey was developed and administered, the survey data was analyzed, and decisions were made regarding revisions to the exam content and eligibility requirements. The project was completed when the ARRT Board of Trustees approved the changes to the exam content and eligibility requirements in July 2016. The first exam under the new content and eligibility requirements was administered in July 2017.

CHAPTER 2

TASK INVENTORY SURVEY

Development of Task Inventory Survey

The task inventory survey was developed between March and June 2015 by the Practice Analysis Committee with facilitation from ARRT staff. The Practice Analysis Committee held its first meeting May 2015. Part of the meeting was devoted to the development of a task inventory survey. The survey consisted of tasks thought to define CI. A brief description of the survey is provided below.

The task list that was in effect at the time of the survey (last updated 2014) consisted of 83 tasks, and out of these the committee decided that 22 tasks fit the criteria for the *omitted task list*. The remaining 61 tasks were reviewed, some were modified for clarity, and some were split apart to gain additional detail. Additional tasks that the committee thought reflected recent changes in practice were also added, and the final survey consisted of 99 tasks. This may seem like a large number of additional tasks to add, but many of the new tasks involved radiation safety, a topic that had not previously appeared on this exam. The reason for not including radiation safety content previously was that it was thought to be already tested on an exam that was a prerequisite to the CI exam. However, due to the high profile of radiation safety in the current environment along with the relatively high doses present in the cardiac cath lab, it was thought that adding survey questions, and potentially adding exam content, regarding radiation safety was appropriate at this time.

Demographic questions were also included on the survey so that we could accurately select a target group for analysis, and to provide us with the information to slice our sample to determine if practice patterns differ depending on work setting or years of experience. A few questions concerning trends in practice were also included in the demographic section, in addition to questions about amount of time performing certain categories of exams, and perceptions of levels of procedural knowledge of certain CI specialty areas.

Survey Sample

Evaluation of Original Sample. The original sample was drawn from registered technologists in the ARRT database. The sample was selected to focus on full-time staff technologists with 1 to 10 years of experience. 1,000 R.T.s were randomly selected from a pool that, according to ARRT renewal form information, was full-time employed, with primary discipline of CI, and job title of staff or lead technologist. For this survey we were not concerned whether or not they had taken or passed any particular exam, or if they were certified and registered in CI, CV, or any related discipline.

Once the sample was determined, the task inventory survey was mailed in June 2015. The initial mailing was followed up by a reminder postcard approximately three weeks after the initial survey mailing. A total of 255 surveys were returned by August 2015, for a response rate of 25.5%. Responses from those returning the survey were screened to assure that the surveys were correctly filled out, the responses were realistic, and the responses were from the intended population. After the complete screening process, a total of 234 surveys were retained for an effective response rate of 23.4%.

Data Analysis

When reviewing the data a number to keep in mind is that to include a task on the final task list it should be a part of the responsibilities of at least 40% of the target sample. Tasks may be included if they do not meet this criterion, but a compelling case must be made for this to occur. For example, if we are certain that a task is trending towards becoming more commonly performed and our survey data indicates that 37% are currently performing it, we can write a justification that we believe that the task will soon be performed by a larger percent of the population. Likewise, if a task is deemed to be exceptionally critical, but it falls slightly below 40%, it may be considered for inclusion. The full range of data should be considered when forming a decision on whether or not to include some of these tasks that are close to being included or excluded.

Tasks that between 35% and 45% of the target group indicated responsibility were carefully analyzed to consider whether or not they should be included on the final task list. There were six tasks in this group, and additional detail was reviewed for these tasks. The committee also took into account the Rasch rank of the tasks. This ranking orders tasks by also factoring in how often someone performed a task, and values higher frequencies more.

CHAPTER 3

CONTENT SPECIFICATIONS AND CLINICAL REQUIREMENTS

Revision of the Task Inventory

At the November 2015 meeting the PA committee reviewed the survey data and made the following decisions about tasks to retain on, delete from, or add to the Task List.

The following current task surveyed at less than 40% but was kept on the task list because the committee believes that this task represents critical knowledge for entry-level cardiac-interventional radiographers:

- Prepare or assist in administering (e.g., obtain medication, fill syringe, label syringe) the following types of injectable medications according to physician's orders: Analgesics (37%).

The following twenty-one tasks represent new content that greater than 40% of the target group indicated responsibility for performing, and so the tasks were added to the task list. This is a large number of tasks to add, but a lot of the added tasks focused on patient safety, and others were added to provide additional detail to tasks already on the task list.

- Assess distal pulses pre and post procedure (77%).
- Take appropriate precautions to minimize radiation exposure to the patient (100%).
- Document fluoroscopy time (98%).
- Document fluoroscopy dose (94%).
- Take appropriate precautions to minimize occupational radiation exposure (100%).
- Advocate radiation safety and protection (100%).
- Describe the potential risk of radiation exposure when asked (100%).
- Wear a personnel monitoring device while on duty (100%).
- Evaluate individual occupational exposure reports to determine if values for the reporting period are within established limits (69%).
- Process images: 3D reconstruction (40%).
- Assist with or perform the following procedures: Access Assessment: Brachial angiography (90%).
- Assist with or perform the following procedures: Access Assessment: Axillary angiography (67%).
- Assist with or perform the following procedures: Access Assessment: Subclavian angiography (87%).
- Assist with or perform the following procedures: Access Assessment: Jugular angiography (81%).
- Assist with or perform the following procedures: Access Assessment: Vascular patency (e.g., Allen test, Barbeau test) (88%).
- Assist with or perform the following procedures: Diagnostic: Carotid angiography (80%).
- Assist with or perform the following procedures: Diagnostic: Intracardiac echocardiography (ICE) (52%).
- Assist with or perform the following procedures: Interventional: Directional peripheral atherectomy (70%).
- Assist with or perform the following procedures: Interventional: Rotational peripheral atherectomy (71%).

- Assist with or perform the following procedures: Interventional: Distal protection device placement/retrieval (89%).
- Assist with or perform the following procedures: Interventional: Valvuloplasty (46%).

Three new tasks surveyed at less than 40% but the committee recommended adding them to the task inventory. The individual tasks and rationale for adding them to the task inventory is as follows:

- Prepare or assist in administering (e.g., obtain medication, fill syringe, label syringe) the following types of injectable medications according to physician's orders: Emergency Medications (27%). Rationale: The committee believes this task represents critical lifesaving knowledge for entry-level cardiac-interventional radiographers.
- Assist with or perform the following procedures: Diagnostic: Optical coherence tomography (28%). Rationale: The committee believes this task represents rapidly emerging technology since responsibility for the task increased from 16% to 28% since it was last surveyed in 2011.
- Assist with or perform the following procedures: Interventional: Transcatheter aortic valve implantation (25%). Rationale: The committee believes this task represents rapidly emerging technology since responsibility for the task increased from 17% to 25% since it was last surveyed in 2011.

The following three tasks currently on the task inventory were removed because the tasks have fallen below the 40% threshold:

- In conjunction with physician, select the appropriate contrast agent: Ionic (38%).
- In conjunction with physician, select the appropriate contrast agent: CO₂ (37%).
- Prepare or assist in administering (e.g., obtain medication, fill syringe, label syringe) the following types of injectable medications according to physician's orders: Moderate sedation medications (12%).

The committee deleted one current task that surveyed above the 40% threshold. The task and rationale for deleting it are as follows:

- Assist with or perform the following procedures: Interventional: Directional coronary atherectomy (55%). Rationale: The committee believes that responsibility for this task is rapidly declining, as the equipment is outdated and no longer manufactured.

For clarification, the current task below was divided into three separate tasks.

- Assist with or perform the following procedures: Interventional: Arrhythmia ablation
 1. Assist with or perform the following procedures: Interventional: Arrhythmia ablation–atrial fibrillation (40%)
 2. Assist with or perform the following procedures: Interventional: Arrhythmia ablation–atrial flutter (47%)

3. Assist with or perform the following procedures: Interventional: Arrhythmia ablation–ventricular tachycardia (46%)

Other tasks were reworded to better define the task and reflect current practice. The Board of Trustees approved the final task inventory at the January 2016 board meeting. The final task list can be seen at: [Task Inventories | ARRT - The American Registry of Radiologic Technologists](#)

Content Specifications and Structured Education Requirements

A draft of proposed changes to the content specifications along with a survey asking about the changes was placed on the ARRT website in February 2016 and comments were sought from the professional community. About a dozen individuals replied, and these comments and the survey results were reviewed and discussed by the committee in March 2016; a few changes were made based upon these discussions. The following is a summary of changes made to the content specifications during the entire practice analysis project:

- The content categories were retitled and rearranged into three major sections to make them consistent with the major category titles for all ARRT disciplines.
- Topics regarding access assessment were added in the Patient Care section.
- Topics concerning patient management were moved from the Procedures section to the Patient Care section and retitled as documentation.
- Topics concerning cardiac life support were removed from the Patient Care section.
- The Equipment and Instrumentation section was retitled Image Production.
- Angiography acquisition and processing topics in the Image Production section were expanded.
- Topics regarding optical coherence tomography (OCT) and intracardiac echocardiography (ICE) were added to the Image Production section.
- Radiation protection topics were added to the Image Production section.
- Topics regarding devices and monitoring equipment were moved from the Image Production section to the *focus of questions* list in the Procedures section.
- Topics concerning contrast administration previously in the *focus of questions* list in the Procedures section were moved to the Patient Care section.
- Topics concerning image acquisition, enhancement, and processing previously included in the *focus of questions* list in the Procedures section were moved to the Image Production section.
- Carotid angiography, transcatheter aortic valve implantation (TAVI/TAVR), and valvuloplasty were added to the list of examinations included in the Procedures section.

The Board of Trustees approved the final content specifications and structured education requirements documents implemented July 2017. The final content specifications can be seen at [Content Specifications | ARRT - The American Registry of Radiologic Technologists](#) and the final structured education requirements can be seen at [Structured Education Requirements | ARRT - The American Registry of Radiologic Technologists](#).

Clinical Requirements

The purpose of clinical experience requirements is to verify that candidates have completed a subset of the clinical procedures within a modality. Successful performance of these fundamental procedures, in combination with mastery of the cognitive knowledge and skills covered by the certification examination, provides the basis for the acquisition of the full range of clinical skills required in a variety of settings. Thus, when establishing the clinical experience requirements, the Practice Analysis Committee focused on those procedures in the task inventory typically performed by most entry-level technologists. The committee discussed the professional comments gathered through the survey on the ARRT website and revised the Clinical Experience Requirements. Major changes made during the project include:

- Demonstration of current advanced cardiac life support (ACLS) certification was added as a clinical requirement.
- Mandatory right heart catheterization procedures were reduced from 20 to ten.
- The minimum number of elective procedures was increased from 70 to 80.
- Optical coherence tomography (OCT), intracardiac echocardiography (ICE), transcatheter aortic valve implantation (TAVI/TAVR), distal protection device placement/retrieval, valvuloplasty, carotid angiography, and aortography were added to the list of elective procedures.
- Radial angiography was removed from the list of elective procedures.

The Board of Trustees approved the final clinical requirements document implemented July 2017. The final Clinical Experience Requirements can be seen at [Clinical Experience Requirements | ARRT - The American Registry of Radiologic Technologists](#).

CHAPTER 4

EXAM PASSING STANDARD

Many factors go into deciding when to readdress the passing standard for an exam. When conducting a practice analysis study, the degree to which the content is changed is the primary factor that goes into making the decision. The current standard was set in 2001, but the content has not changed much since then. The committee concluded that the current standard was appropriately passing and failing candidates and so did not see any urgency in conducting a new standard setting study at this time. However, as it has been over ten years a formal process of evaluating the passing standard should be considered in the next few years, or in conjunction with the next practice analysis study.

CHAPTER 5
CONCLUSION

Numerous individuals contributed to this project, as committee members, document reviewers, or as survey respondents. Periodic practice analysis is a necessary step in the life cycle of an exam program to insure that the content of the exam and the eligibility requirements remain relevant with current practice. This study noted a number of significant changes to the field of Cardiac-Interventional Radiography, and thanks to the efforts of all involved it assures that the ARRT CI exam program will continue to be an excellent assessment of technologists wishing to demonstrate their qualifications by seeking certification and registration.