

**Practice Analysis and Content Specifications  
for Radiation Therapy**

**Final Report**

**For New Documents Implemented January 2017**

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## 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 Radiation Therapy conducted between the dates of January 2014 and January 2017. The purpose of the overall project was to identify tasks currently required of the typical therapist 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 January 2016. The first exam under the new content and eligibility requirements was administered in January 2017.

## CHAPTER 2

### TASK INVENTORY SURVEY

#### **Development of Task Inventory Survey**

The task inventory survey was developed between November and December of 2014 by the Practice Analysis Committee with facilitation from ARRT staff. The Practice Analysis Committee held its first meeting in December 2014. Part of the meeting was devoted to the development of a task inventory survey. The survey consisted of tasks thought to define Radiation Therapy. A brief description of the survey is provided below.

#### ***Format of Survey.***

*Section 1: Practice Activities.* Respondents indicated how often they personally conducted each of 75 tasks using a scale with the following anchors: Not Responsible, Yearly, Quarterly, Monthly, Weekly, and Daily.

*Section 2: Equipment, Technology, and Special Procedures.* Respondents indicated how often they used or conducted each of 31 pieces of equipment or special procedures respectively. This section also used a scale with the anchors of Not Responsible, Yearly, Quarterly, Monthly, Weekly, and Daily.

*Section 3: Radiation Treatment Procedures.* Respondents indicated how often a patient begins a new course of treatment, if they are personally responsible for the treatment during a typical rotation, for 37 different treatments. This section also used a scale with the anchors of Not Responsible, Yearly, Quarterly, Monthly, Weekly, and Daily.

*Section 4: Demographics and Workplace.* Respondents answered nine questions related to the number of work hours they work, their work experience, and key aspects of their workplace.

#### **Survey Sample**

***Evaluation of Original Sample.*** The original sample was drawn from registered therapists in the ARRT database. The criteria used to construct a population of individuals from which to sample included: people who were Radiation Therapy certified and registered, reported currently working full time in the United States, reported radiation therapy as their primary job role, had a job title relating to regularly conducting radiation therapy (e.g., staff technologist), reported 5 or fewer years of experience in radiation therapy, and were in good standing with the ARRT. Ultimately, 1,979 therapists were identified by ARRT staff that satisfied the above criteria. From the population of 1,979 therapists, a stratified random sample of 1,000 was drawn such that a variety of years of experience would be sampled. This would give the potential opportunity to evaluate differences in years of experience in terms of what percentage of people were responsible for various activities.

Once the sample was determined, the task inventory survey was mailed in January 2015. Participants who were mailed the survey were also given the option to complete the survey online for their potential convenience. The initial mailing was followed up by a reminder/thank you postcard two weeks later. A total of 275 surveys were returned by March 2015 (allowing 8 weeks for completion), for a response rate of 27.5%. 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 257 surveys were retained for an effective response rate of 25.7%.

## **Data Analysis**

***Task Responsibility.*** There was a great deal of agreement in the tasks, equipment, and procedures comprising the job role of radiation therapists. Of the 143 items surveyed in sections 1, 2, and 3, 90 items had over 75% of respondents indicating that they were responsible. While most of the tasks had high levels of responsibility, tasks dealing with newer or emerging technology, such as proton therapy, or infrequent treatments, such as total marrow irradiation, received low percentages responding as responsible.

***Evaluation of Target Sample.*** ARRT certification exams are intended to assess the knowledge and skills required to carry out the major tasks typically required at entry into a specific modality. Entry is generally interpreted by ARRT as meaning three or fewer years of experience for primary examinations. The current returned sample consisted of 166 therapists with three or fewer years of experience, and 90 with more than three years (1 missing response). ARRT staff ran a series of chi-square tests of independence to see whether the entry level group differed significantly from the more experienced group in terms of the percentages responsible for conducting each activity. When using a critical alpha such that the familywise error across all tasks was .05, there were no tasks that were statistically significant in the percentage responsible between the entry level group and the more experienced group that was based on years of experience. There were also no statistically significant differences between the group that self-reported as being considered as entry level versus the self-reported not entry level group. Because the target and non-target group were not significantly different, ARRT staff pooled the entry level and non-entry level groups for the purposes of all other analyses.

## CHAPTER 3

### CONTENT SPECIFICATIONS AND CLINICAL REQUIREMENTS

#### **Revision of the Task Inventory**

The Practice Analysis Committee met in April 2014 to review the practice analysis survey data and determine whether any tasks should be dropped from, added to, or changed in the final task inventory. The clinical tasks that were deleted from or added to the task inventory are listed here. One item of note is that this practice analysis added the listing of treatment set-ups to the task inventory. While these were previously listed in the exam content specifications, they were not explicitly listed in the task inventory.

Deleted Task	Rationale
Image the preliminary field marked by collimator wires or other localizing devices.	Redundant with another task on the task inventory
Record information and measurements necessary to fabricate beam modifying devices.	Redundant with another task on the task inventory
Operate a CT scanner for treatment planning purposes	Redundant with another task on the task inventory

Added Task	Rationale
Practice appropriate precautions to minimize occupational radiation exposure (e.g., ALARA).	Clarification and emphasis concerning personnel versus patient exposure
Verify the patient understands the procedure.	Clarification as an additional step above and beyond simply explaining the procedure
Identify and respond to cultural differences and sensitivities.	High responsibility level
Demonstrate and promote professional and ethical behavior.	High responsibility level; consistency with other primary disciplines
Obtain patient's vital signs, when necessary.	Critical task when necessary
Maintain oxygen administration as prescribed.	Clarification of a previous task now better specifying the therapist level of personal responsibility
Utilize proper technique during patient transfer.	Therapist and patient safety task
Troubleshoot and correct treatment equipment/software malfunctions, if appropriate.	High responsibility level
Set-up patient and treatment unit to personally perform the following radiation therapy treatments:	
Brain: SRS	High responsibility level
Brain: Primary	High responsibility level
Brain: Metastatic (whole brain)	High responsibility level
Brain: Craniospinal	High responsibility level
Head and Neck: Laterals only	High responsibility level
Head and Neck: 3D Conformal	High responsibility level
Head and Neck: IMRT	High responsibility level
Lung: AP/PA	High responsibility level
Lung: 3D Conformal	High responsibility level

Lung: IMRT	High responsibility level
Lung: SBRT	High responsibility level
Breast: Tangents only	High responsibility level
Breast: Tangents with Supraclavicular	High responsibility level
Breast: Tangents with Supraclavicular and Posterior Axilla	High responsibility level
Breast: Tangents with Supraclavicular and Separate Internal Mammary	High responsibility level
Breast: IMRT	High responsibility level
Abdomen: AP/PA	High responsibility level
Abdomen: 3D Conformal	High responsibility level
Abdomen: Para-Aortic	High responsibility level
Abdomen: IMRT	High responsibility level
Abdomen: SBRT	High responsibility level
Pelvis: AP/PA	High responsibility level
Pelvis: 3D Conformal Supine	High responsibility level
Pelvis: 3D Conformal Prone	High responsibility level
Pelvis: Inguinal Lymph Nodes	High responsibility level
Pelvis: IMRT	High responsibility level
Pelvis: SBRT	High responsibility level
Skeletal: Spine	High responsibility level
Skeletal: Extremity	High responsibility level
Electron Fields: Single	High responsibility level
Electron Fields: Abutting Fields	High responsibility level
Heterotopic Treatment	High responsibility level
Participate in the following procedures:	
TBI (Total Body Irradiation)	Critical to practice
TSE/TBE (Total Skin/Body Electrons)	Critical to practice

The Board of Trustees approved the final task inventory at the July 2015 board meeting.

### **Content Specifications**

*Outline of Topics.* Revising the content specifications is based on changes to the final task inventory, comments from the professional community, and judgment of the Practice Analysis Committee. A final draft of the content specifications was completed after the task inventory had been finalized and approved. For every activity in the task inventory, the Practice Analysis Committee was asked to consider the knowledge and skill required to successfully perform that task and verify that the topic was addressed in the content specifications. Similarly, topics

that could not be linked to practice were not included on the final content specifications. The most notable changes from the previous version of the content specifications are:

- The committee restructured the content specifications into three major areas (Patient Care, Safety, and Procedures), whereas the previous content specifications had five major content areas.
- Score reporting on these content specifications will now be based on eight subsections areas instead of the former five major content areas. The subsections are Patient Interactions; Patient and Medical Record Management; Radiation Physics, Equipment, and Quality Assurance; Radiation Protection; Treatment Sites and Tumors; Treatment Volume Localization; Prescription and Dose Calculation; and Treatments.
- A variety of minor clarifications and wording changes throughout the document to bring it in line with current practice and terminology.

The Board of Trustees approved the final content specifications document implemented January 2017.

[Examination Content Specifications | ARRT - The American Registry of Radiologic Technologists](#)

### **Clinical Requirements**

The purpose of the clinical competency requirements is to verify that individuals certified by the ARRT have demonstrated competence performing the clinical activities fundamental to a particular discipline. Competent performance of these fundamental activities, in conjunction with mastery of the cognitive knowledge and skills covered by the certification examination, provides the basis for the acquisition of the full range of procedures typically required in a variety of settings. Demonstration of clinical competence means that the candidate has performed the procedure independently, consistently, and effectively during the course of his or her formal education. Thus, when establishing the clinical competency requirements, the Practice Analysis Committee focused on those procedures in the task inventory typically performed by most entry-level therapists. The most notable changes from the previous version of the clinical competency requirements are:

- A new set of mandatory quality control procedures.
- There is no longer a distinction between mandatory and elective procedures in the Radiation Treatment Procedures section. Candidates must now demonstrate competency in all listed procedures, though three procedures may be demonstrated in a clinical lab environment (i.e., not on a patient).
- The committee added clarification to the procedures list, combining selected Radiation Treatment Procedures, splitting out certain procedures into two requirements, and adding and subtracting selected procedures. The Radiation Treatment Procedures list now contains a total of 18 procedures (down from 21)

The Board of Trustees approved the final clinical requirements document implemented January 2017.

[Clinical Competency 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. Given the changes to the content specifications in the current practice analysis, as well as the cumulative changes since the last standard setting study for Radiation Therapy, the members of the Advisory Committee went through an activity wherein they evaluated the passing standard. Based on the results of the activity and discussion therein, four Advisory Committee members suggested that the cut score comprising the current standard should be higher, while one committee member suggested that the standard stay the same.

ARRT staff went to the Board with these results. Based on these results, the Board recommended that ARRT staff should conduct a more thorough standard setting study to evaluate the standard of the Radiation Therapy exam. This standard setting study will take place sometime before the end of 2018.

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 radiation therapy, and thanks to the efforts of all involved it assures that the ARRT Radiation Therapy exam program will continue to be an excellent assessment of therapists wishing to demonstrate their qualifications by seeking certification and registration.