

**Practice Analysis and Content Specifications
for Bone Densitometry**

Final Report

For New Documents Implemented July 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 Bone Densitometry (BD) conducted between the dates of July 2015 and July 2017. 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 January 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 October 2015 and July 2016 by the Practice Analysis Committee with facilitation from ARRT staff. The Practice Analysis Committee held its first meeting November 2015. Part of the meeting was devoted to the development of a task inventory survey. The survey consisted of tasks thought to define BD. A brief description of the survey is provided below.

Format of Survey. The survey consisted of a one page cover letter, a page with directions on how to use the frequency scale to rate job tasks, the job tasks that needed to be rated, and a section with demographic and work experience questions.

Section 1. The first major section of the survey consisted of 61 job tasks that were to be rated using the frequency scale. The first 49 job tasks focused on non-procedure related tasks and the remaining 12 job tasks focused on imaging procedures. The frequency scale had six scale points (never perform, yearly, quarterly, monthly, weekly, and daily) and respondents were instructed to use this scale to rate each task.

Section 2. The second major section of the survey consisted of 16 demographic and work experience questions. These included questions on the respondents' work place, experience, job duties, and demographic characteristics as well as how long it took them to complete the survey.

Survey Sample

Evaluation of Original Sample. The original sample was drawn from registered technologists in the ARRT database. The criteria used to construct a population of individuals from which to sample included working in BD as their primary or secondary discipline of employment, having a job title classified as a staff position, and not being surveyed in the most recent practice analysis survey. Ultimately, 8,235 technologists were identified by ARRT staff that satisfied the above criteria. From the population of technologists a stratified random sample of 1,500 was drawn such that 89 people were certified in BD and worked in full-time with BD as their primary discipline, 50 people were certified in BD and worked part-time with BD as their primary discipline, 436 people were certified in BD and worked full-time with BD as their secondary discipline, 175 people were certified in BD and worked part-time with BD as their secondary discipline, and 89 people were not certified in BD and worked in full-time with BD as their primary discipline, 50 people were not certified in BD and worked part-time with BD as their primary discipline, 436 people were not certified in BD and worked full-time with BD as their secondary discipline, and 175 people were not certified in BD and worked part-time with BD as their secondary discipline. The survey sample was stratified based on whether or not they were certified in BD, worked full or part-time, and worked in BD as their primary and secondary discipline because the BD examination is an entry-level exam and these factors represent the population of people typically working at entry level.

Once the sample was determined, the task inventory survey was mailed in February 2016. The initial mailing was followed up by a reminder postcard that was sent in March 2016. A total of 838 surveys were returned by March 2016 (allowing 6 weeks for completion), for a response rate of 55.9%. 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 731 surveys were retained for an effective response rate of 48.7%.

Data Analysis

Data were analyzed using a few different strategies. First, the percentage of people performing (e.g., provided a response of yearly, quarterly, monthly, daily, or weekly) each task was determined. ARRT's typical guideline for a task to be included in the task inventory is that at least 40% of people performed the task. Results suggested that out of the 61 job tasks that were surveyed, 49 of the tasks were above the 40% threshold. Next, the percentage of people reporting daily or weekly performance of each of the job tasks was examined. Results suggested that 49 out of the 61 job tasks had over 20% of people reporting daily or weekly performance. It is important to examine daily or weekly performance in conjunction with percentage performance because tasks with a high daily or weekly performance and low percentage of people performing or tasks with high percentage of people performing and low daily or weekly performance may require special consideration. Of the 49 tasks above the 40% threshold only one had less than 20% daily or weekly performance. Of the 12 tasks that were below the 40% threshold there was one task with greater than 20% daily or weekly performance. These tasks were the focus of discussion when making final decisions on whether to include the tasks in the final task inventory.

Additional analyses were performed to examine whether there may be important differences in task performance based on years of experience, whether some had BD certification or not, whether a person was working full or part-time, and whether BD was their primary or secondary discipline of employment. Results suggested that there were not significant differences based on years of experience. There was only one task that was significant based on whether some had BD certification or not. This task dealt with performing scans using a fan beam system and was performed more often by those with BD certification. This task was well above the 40% threshold and was kept on the task inventory. There was also one task that differed based on working full versus part-time and this task dealt with performing scans on pediatric patients. This task was done more frequently by those working full-time. This task was well above the 40% threshold and was kept on the task inventory. There were seven tasks that showed significant differences based on working in BD as a primary versus a secondary discipline. The tasks with significant differences included three QC/QA tasks on BD equipment, one task on developing or updating instructional materials for BD, and three special BD imaging scans. All of these tasks were done more frequently by those working in BD as their primary discipline of employment. These results were discussed with the Practice Analysis Committee. Six of the seven tasks were below the 40% threshold. The committee recommended that the task above the 40% threshold be kept as well as the two of the QC/QA tasks on BD equipment. The committee felt that these two tasks were critical to scanner accuracy.

CHAPTER 3

CONTENT SPECIFICATIONS AND CLINICAL REQUIREMENTS

Revision of the Task Inventory

The Practice Analysis Committee met in May 2016 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.

The following tasks surveyed at less than 40% responsible, but were kept on the task inventory because the committee believes these tasks represent entry-level knowledge that is critical to scanner accuracy:

- Perform an in vivo precision study.
- Ensure that cross-calibration between new/existing machines is performed as needed.

The following tasks represent content currently on the BD content specifications and were added to better describe that content:

- Prevent unnecessary persons from remaining in the area during x-ray exposure.
- Take appropriate precautions to minimize occupational x-ray exposure.
- Take appropriate precautions to minimize x-ray exposure to patient.

The following task represents new content and was added to the BD task inventory because it surveyed at greater than 40% responsible:

- Determine if patient has recently ingested contraindicated medications or supplements (e.g., calcium).

The following tasks were deleted because the tasks are similar to another BD task:

- Perform QC testing on imaging equipment before and after service.
This task is similar to: Perform routine QC tests on scanning equipment according to manufacturer guidelines.
- Educate patients about the effect of nutrition, exercise, and lifestyle choices on bone health, and educate patients about fall prevention. These tasks are similar to the new task: Answer basic questions put forth by patient or family member (or refer them to appropriate resources) concerning bone health, fall prevention, exercise, and nutrition.

The following task that was previously on the task inventory was removed because it surveyed below 40% responsible:

- Perform bone densitometry scans using a pencil beam system.

The Board of Trustees approved the final task inventory at the July 2016 board meeting

Content Specifications and Structured Education Requirements

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 content was restructured into three of the four major content sections following the universal content outlines. The three content sections are: Patient Care, Image Production, and Procedures
- Pencil beam DXA scanner was removed.
- Peak height was added to the example list of patient history in the patient care section.

The restructuring of the major content categories impacted the structured education requirements as the content categories of the structured education requirements were also retitled to follow the naming conventions in the universal content outlines. The structured education requirements document was also updated to include the new version of the content specifications.

The Board of Trustees approved the final content specifications document implemented July 2017. The final content specifications can be found at: [Examination Content Specifications | ARRT - The American Registry of Radiologic Technologists](#). The final structured education requirements can be found 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 most notable changes from the previous version of the clinical experience requirements are:

- The activity, utilize FRAX[®] tool to assess 10 year fracture risk, was added to the elective procedures list.
- The activity, install manufacturer software upgrades, was removed from the elective procedures list.
- The activity, develop or update instructional materials related to bone health and bone densitometry (e.g., brochure, video), was removed from the elective procedures list.

The Board of Trustees approved the final clinical requirements document implemented July 2017. The final clinical experience requirements can be found 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 Practice Analysis Committee participated in a Hofstee and Beuk exercise to evaluate the passing standard. The committee reviewed the results from this exercise and considered the changes in content to the BD exam and when the last standard setting was done in BD. It was noted that the last standard setting for BD was in 2000, but there have been only some small changes in content since the last standard setting. Based on these factors, it was recommended that there was not an immediate need for a standard setting, but that one should be considered at some point in the future. The ARRT Board of Trustees reviewed and approved this recommendation.

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