

**Practice Analysis and Content Specifications
for Mammography**

**Final Report
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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 Mammography (MAM) conducted between the dates of July 2017 and July 2020. The purpose of the overall project was to identify tasks currently required of the typical mammographer 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 2019. The first exam under the new content and eligibility requirements was administered in July 2020.

CHAPTER 2

TASK INVENTORY QUESTIONNAIRE

Development of Task Inventory Questionnaire

The task inventory questionnaire was developed between June 2018 and August 2018 by the Practice Analysis Committee with facilitation from ARRT staff. The Practice Analysis Committee held its first meeting July 2018. Part of the meeting was devoted to the development of a task inventory questionnaire. The questionnaire consisted of tasks thought to define the job role of the mammographer. A brief description of the questionnaire is provided below.

Format of Questionnaire. The questionnaire had two main sections: practice activities and demographics and workplace.

Section 1. The practice activities section had participants respond to how frequently they conducted 106 different clinical tasks in the workplace, as well as a space for an additional write-in procedure. The response scale for these items was “Never Perform,” “Yearly,” “Quarterly,” “Monthly,” “Weekly,” and “Daily.”

Section 2. The demographics and workplace section asked participants to answer 16 questions concerning amount of employment, job title, and workplace characteristics as they related to the person’s role as a mammographer.

Survey Sample

Evaluation of Original Sample. The original sample was drawn from mammographers in the ARRT database. The criteria used to construct a sample of individuals to survey included: reported mammography as their primary discipline of employment, reported having five or fewer years of experience in mammography, reported having the job title of staff technologist, supervisor technologist, or chief technologist, were full-time employed, were currently certified and registered in at least one ARRT discipline, had a United States mailing address, and did not have any pending audits or ethics sanctions. Ultimately, 2,315 mammographers were identified by ARRT staff that satisfied the above criteria. ARRT sent a survey to a sample of 1,000 of the above mammographers.

Once the sample was determined, the task inventory questionnaire was mailed in September 2018. The mailed survey also contained the option for people to fill out the same survey online for their own convenience. The initial mailing was followed up by a reminder postcard two weeks later. A total of 364 surveys were returned by October (allowing 4 weeks for completion), for a response rate of 36.4%. Responses from those returning the survey were screened to ensure that the surveys were correctly filled out, the responses were realistic, and the responses were from the intended population (i.e., currently working as a mammographer). After the complete screening process, a total of 335 surveys were retained for an effective response rate of 33.5%.

Data Analysis

Based on the responses to the demographic questions, the 335 usable mammographer surveys tended to come from people that had five or fewer years of experience in the field (over 70%). Respondents worked in a wide variety of settings, with over 20% of respondents reporting working in each of community hospitals, satellite clinics, freestanding clinics, and breast centers. There was relatively good agreement among the mammographers on conducting numerous tasks, as there were 68 tasks where 60% or more respondents reported conducting the task.

Among the tasks with the lower percentages of responses were tasks corresponding to procedures that would be new tasks for the discipline, along with selected interventional procedures.

CHAPTER 3

CONTENT SPECIFICATIONS AND CLINICAL REQUIREMENTS

Revision of the Task Inventory Document

The Practice Analysis Committee met in November 2018 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 document. The clinical tasks that were deleted from or added to the task inventory are listed here. There were a variety of other activity statements that the Committee modified for clarification.

Task Deleted	Rationale
Perform and evaluate the results of the following QC tests: viewboxes	Demographic questions indicated that a low percentage of facilities were still using viewboxes to review mammograms
Perform and evaluate the results of the following digital QC tests: laser imager QC test	Relatively low percentage of mammographers conducting; percentage of mammographers conducting decreased compared to last practice analysis
Position patient and equipment to obtain the following mammographic views: caudocranial (FB)	Relatively low percentage of mammographers conducting; percentage of mammographers conducting greatly decreased compared to last practice analysis
Position patient and equipment to obtain the following mammographic views: lateromedial oblique (LMO)	Relatively low percentage of mammographers conducting; percentage of mammographers conducting greatly decreased compared to last practice analysis
Position patient and equipment to obtain the following mammographic views: superior inferior oblique (SIO)	Relatively low percentage of mammographers conducting; percentage of mammographers conducting greatly decreased compared to last practice analysis
Assist with the following interventional procedures: ductography/galactography	Low percentage of mammographers conducting; percentage of mammographers conducting decreased compared to last practice analysis
Educate (e.g., purpose) patients about the following procedures: sentinel node mapping	Redundant with another task

Task Added	Rationale
Document required information on patient's medical record (e.g., family and surgical history, pathology).	Over 40% of mammographers reported conducting the task
Respond as appropriate to questions from patient or patient's family about: hormone receptor status (e.g., ER+/-, PR+/-, HER2/neu)	Over 40% of mammographers reported conducting the task
Respond as appropriate to questions from patient or patient's family about: sentinel lymph node biopsy and axillary node dissection	Over 40% of mammographers reported conducting the task
Respond as appropriate to questions from patient or patient's family about: timeliness of receiving results	Over 40% of mammographers reported conducting the task
Perform and evaluate the results of the following QC tests: compression thickness indicator	Over 40% of mammographers reported conducting the task
Perform and evaluate the results of the following QC tests: system resolution test-spatial resolution (e.g., line pair pattern)	Over 40% of mammographers reported conducting the task
Follow environmental protection standards for handling and disposing of bio-hazardous materials (e.g., sharps, blood, body fluids)	Over 40% of mammographers reported conducting the task

The Board of Trustees approved the final task inventory at the January 2019 board meeting.

<https://www.arrt.org/arrt-reference-documents/by-document-type/task-inventories>

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:

- In the Patient Care section, the hormone therapy section was expanded.
- In the Image Production section, hard copy devices (e.g., laser printer) was removed.
- In the Image Production section, the topics included in the digital image display were updated.
- In the Image Production section, topics concerning Enhancing Quality Using the Inspection Program (EQUIP) were added.
- In the Image Production section, the 2018 ACR Digital Mammography Manual replaced the 1999 ACR Mammography Control Manual. This manual has no patient positioning information so the 1999 ACR Mammography Control Manual will continue to be used for positioning references.
- In the Procedures section, some of the pathology descriptions were updated to BI-RADS® terminology.
- In the Procedures section, the following views were removed: caudocranial (FB), lateromedial oblique (LMO), and superolateral-to-inferomedial oblique (SIO).

- In the Procedures section, more detail was added to the interventional procedures section.
- Item weighting for the examination content specifications was adjusted. More questions were added to the Patient Care and Procedures sections. The number of questions in the Image Production section decreased. The total number of items on the examination remains the same.

The Board of Trustees approved the final content specifications and structured education requirements documents effective July 2020.

<https://www.arrt.org/arrt-reference-documents/by-document-type/examination-content-specifications>

Clinical Experience and Competence Assessments

The main purpose of clinical experience requirements is to ensure that all mammographers who are eligible for the mammography examination actually practice in their discipline. The intent is not to guarantee that all applicants have achieved a level of excellence in all clinical activities, but rather to assure that applicants have recently demonstrated performance of a certain set of core clinical procedures. 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 mammographers. The most notable changes from the previous version of the clinical experience and competence requirements are:

In the QC Documentation area:

- The number repetitions for phantom image quality increased from five to 10 repetitions.
- Compression thickness indicator was added.
- The description for ‘monitor cleaning’ was changed to ‘acquisition workstation monitor QC’.
- The description for ‘interpretation workstation’ was changed to ‘radiologist’s workstation monitor QC’. The number of repetitions decreased from five to two.
- Facility QC review was added.
- The number of repetitions for ‘repeat analysis’ was decreased from two to one.
- The number of repetitions for ‘mammographic image evaluation’ decreased from 10 to one. The committee wants to clarify that the evaluation must include at least 10 mammographic cases rather than 10 separate evaluations of one case each.

In the elective procedures area:

- Localization imaging was added.
- Surgical specimen imaging and stereotactic specimen imaging were added. The committee believes that these two tasks are different enough to be two separate procedures.
- Ductography/galactography was removed from the list.
- A candidate may only count one elective procedure per patient per day.

- Because most places are no longer using CR for mammography (< 5%), information about receiving a waiver for the artifact evaluation requirement, which cannot be performed with CR equipment, was deleted. A waiver for those that use CR for mammography may be requested by contacting the ARRT Clinical Experience Requirements department.
- All areas of the clinical experience requirements were edited for clarity and to update terminology to reflect current practice.

The Board of Trustees approved the final clinical requirements document effective July 2020.

<https://www.arrt.org/arrt-reference-documents/by-document-type/clinical-experience-requirements>

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 Board had directed ARRT staff to conduct a standard setting study for the mammography exam ahead of the new content being implemented. The Board evaluated the evidence for this study in July of 2019, wherein it elected to maintain the current standard. ARRT staff maintains the standard for the selected response portion using equating with the Rasch item response theory model.

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 ensure that the content of the exam and the eligibility requirements remain relevant with current practice. This study noted a number of changes to the field of mammography, and thanks to the efforts of all involved it assures that the ARRT mammography exam program will continue to be an excellent assessment of mammographers wishing to demonstrate their qualifications by seeking certification and registration.