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The globally recognized standard of excellence in sonography

2015 ARDMS Sonography Principles & Instrumentation Job Task Analysis Summary Report

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ABOUT THE REPORT

The American Registry for Diagnostic Medical Sonography (ARDMS) is the globally recognized standard of excellence in sonography. It is responsible for the preparation of valid and reliable certification examinations in sonography. The performance of job task analysis (JTA) at the national level assists ARDMS in evaluating the current practice expectations and performance requirements of the specialty. The 2015 Sonography Principles & Instrumentation (SPI) JTA was designed to collect information on the sonography-related work activities sonographer registrants actually perform in practice. The results were used in the development of the test content outline that guides content distribution of the SPI Examination. This report details the methodology, data collection & analysis and survey results. It also includes the test content outline that resulted from the JTA.

METHODOLOGY

Job Task Analysis (JTA) Working Group

A JTA Working Group consisting of twelve subject matter experts (SMEs) led this project. All twelve JTA Working Group members were Exam Development Task Force (EDTF) members and volunteers..

Survey Questionnaire Development

ARDMS facilitated a process whereby the JTA Working Group developed the task list and demographic items for the survey. Tasks and demographic items from previous job task surveys were used as a starting point in this development. The JTA Working Group reached a consensus on a list of 71 tasks to be used in the survey. These tasks were divided into six domains: (1) Clinical Safety, Patient Care, and Quality Assurance; (2) Physical Principles; (3) Ultrasound Transducers; (4) Imaging Principles and Instrumentation; (5) Doppler Imaging Concepts; and (6) Other. All task statements and response options were relevant to RDCS, RDMS, RMSKS, and RVT credentialed sonographers.

The survey questionnaire was pilot-tested with a group of twelve individuals from the SPI EDTF and volunteers.

Survey Administration

The survey was made available to participants as a web-based survey through the survey platform Qualtrics®. An invitation to participate in the study was sent via email to the members.

ARDMS sent the job task analysis survey to 2,659 registrants credentialed since 2010. These registrants were selected randomly using a stratified sampling method so that the sample is representative of all ARDMS sonographer registrants in terms of specialty, gender, and geographic region. The survey was made available to the participants for two weeks between March 19th and April 2nd, 2015. The participants responded anonymously and all responses were kept confidential.

A total of 1,215 (45.7% of those sampled) sonographers responded to the survey. Of these, 1,141 (93.9%) reported that they currently perform and/or teach sonography. The data analysis was based on the responses from the 1,141 sonographers.

Data Analysis

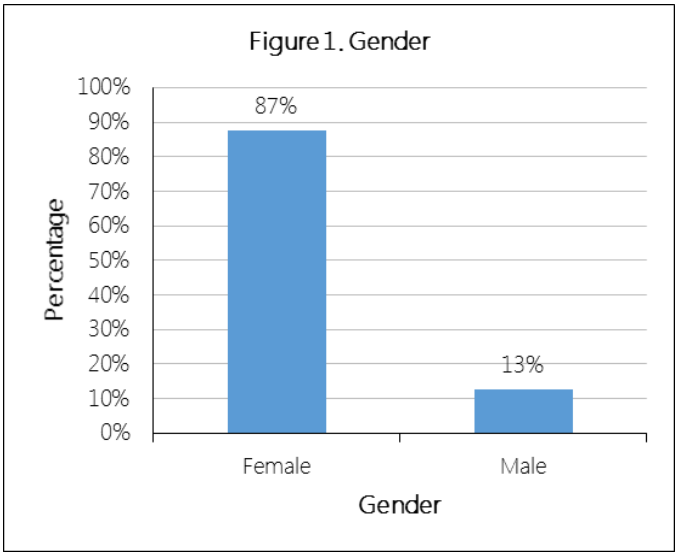
Respondents were asked the following questions for each task: How frequently do you perform the task in your practice, and how important is the task in affecting clinical decisions and patient outcomes? The frequency and importance rating scales were scored 1-5. The response options for the frequency scale were Never, Rarely, Occasionally, Often, and Frequently. The response options for the importance scale were Not Important, Somewhat Important, Moderately Important, Very Important, and Critically Important.

SURVEY RESULTS

Demographics and Backgrounds of Participants

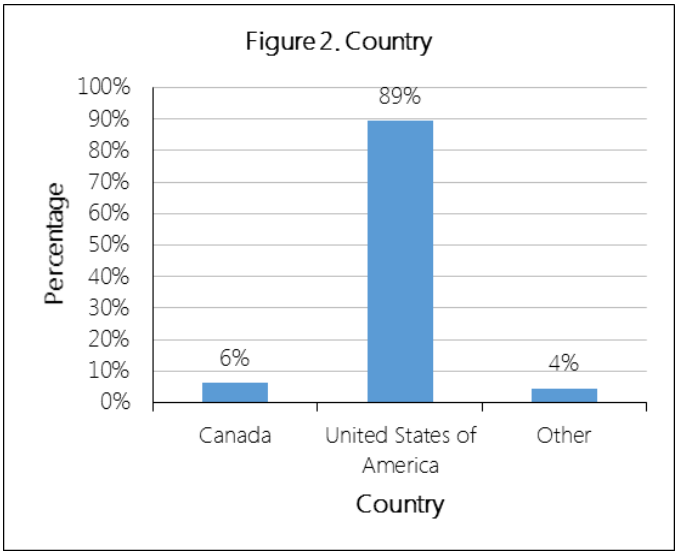
Gender

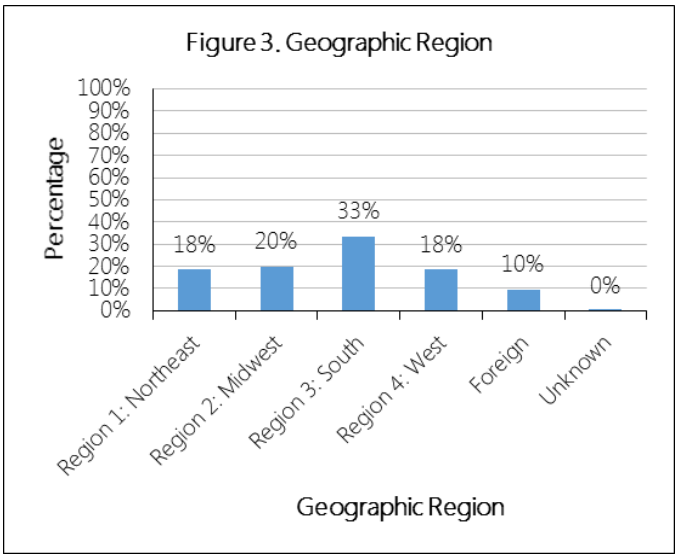
Approximately 87% of the respondents were female and 13% were male (Figure 1).



Location of Practice

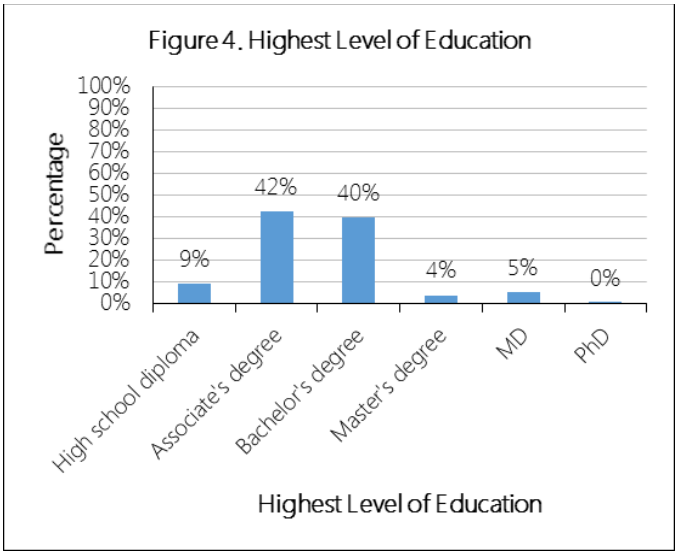
Of the respondents who reported the country in which they practice, 6% reported practicing in Canada and 89% in the United States (Figure 2). About a third of the respondents practice in the southern region of the United States (Figure 3).

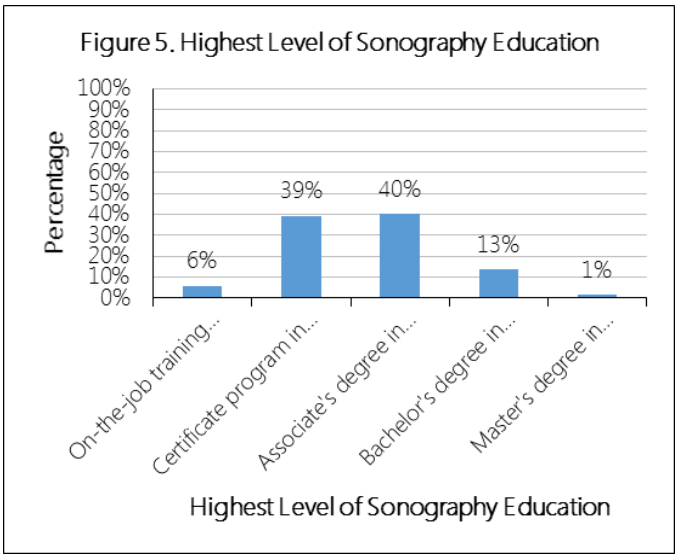




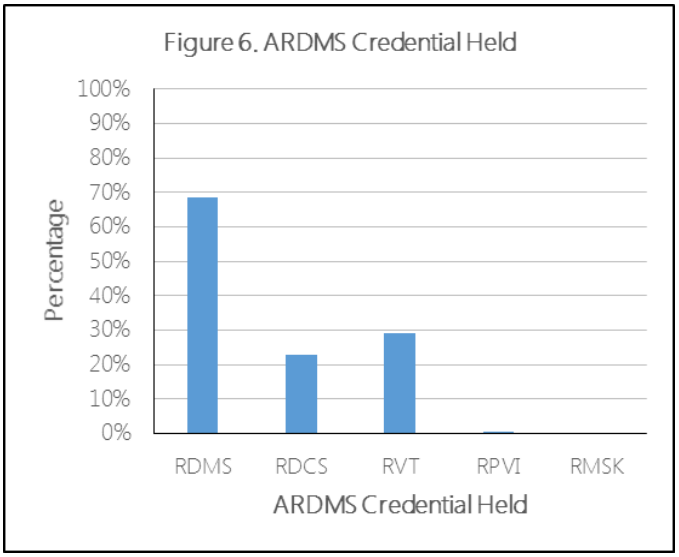
Level of Education

Approximately 49% of respondents have a Bachelor's degree or higher and 42% have an Associate's degree (Figure 4). In sonography education, only 14% had a Bachelor's degree or higher and 40% had an Associate's degree (Figure 5).



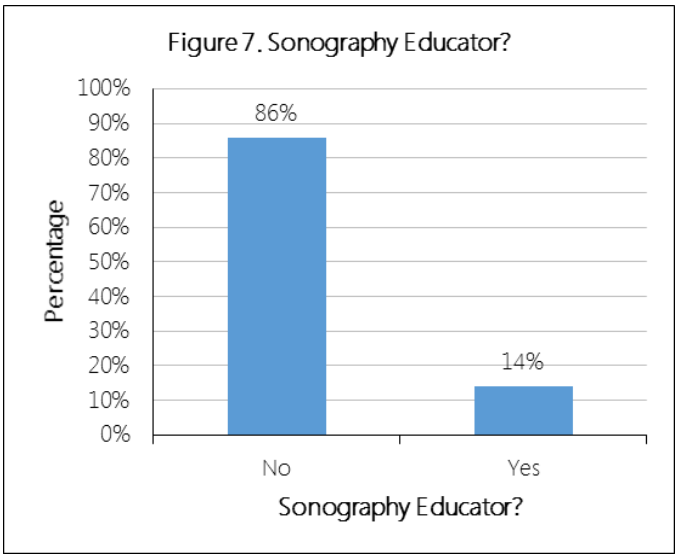


Most respondents (almost 70%) hold the RDMS credential (Figure 6; note that percentages may not add to 100% because respondents may hold multiple credentials).

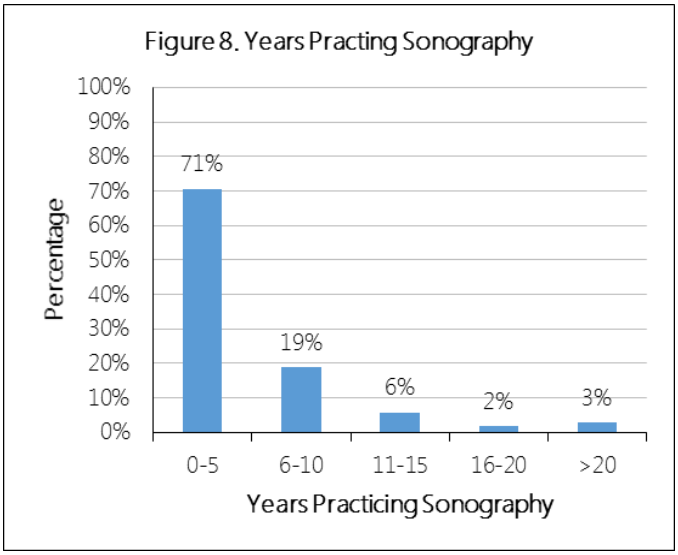


Work Experience

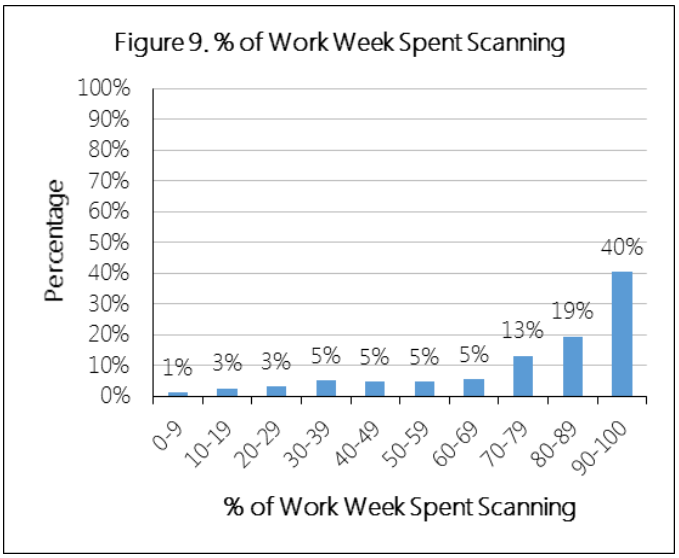
Approximately 14% of respondents are sonography educators (Figure 7).

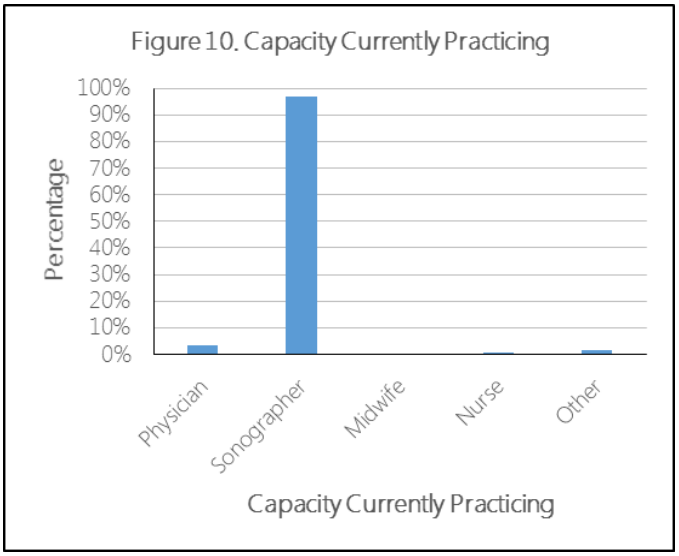


Respondents also reported on the number of years they have been performing sonography. Approximately 29% of the respondents have been performing sonography for at least 6 years (Figure 8).



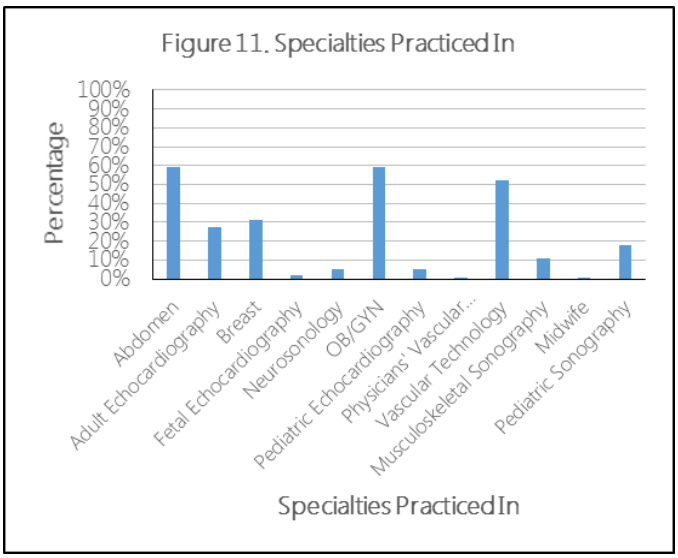
Approximately 59% of the respondents reported conducting at least 80% of their week scanning (Figure 9). Almost all respondents practiced sonography in the capacity of a sonographer (Figure 10).





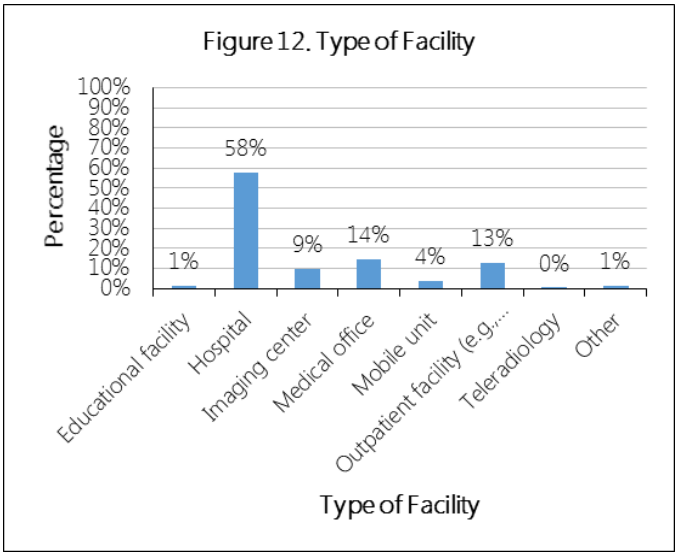
Specialty Area

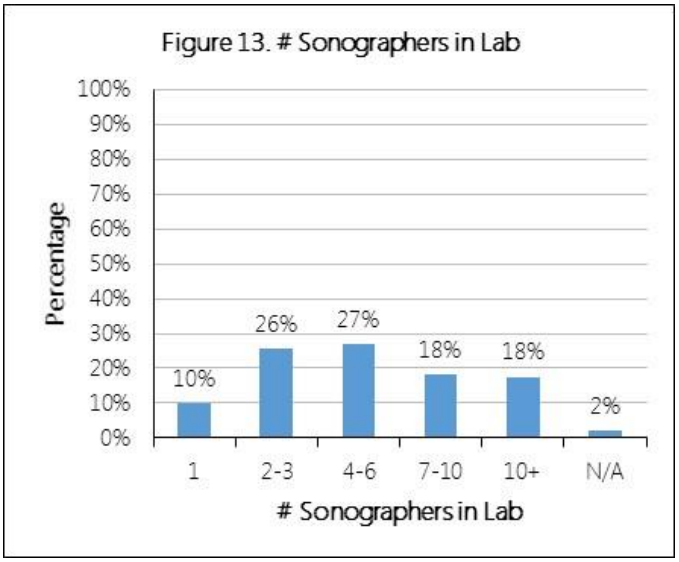
Respondents also reported the specialty area they hold credentials in. The largest specialties are Abdomen, OB/GYN, and Vascular Technology (Figure 11; note that percentages may not add to 100% because respondents may hold credentials in multiple specialties).



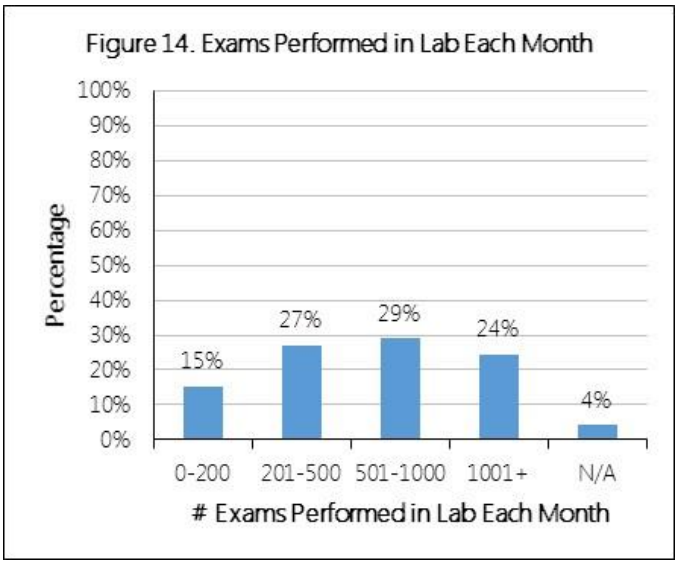
Work Environment

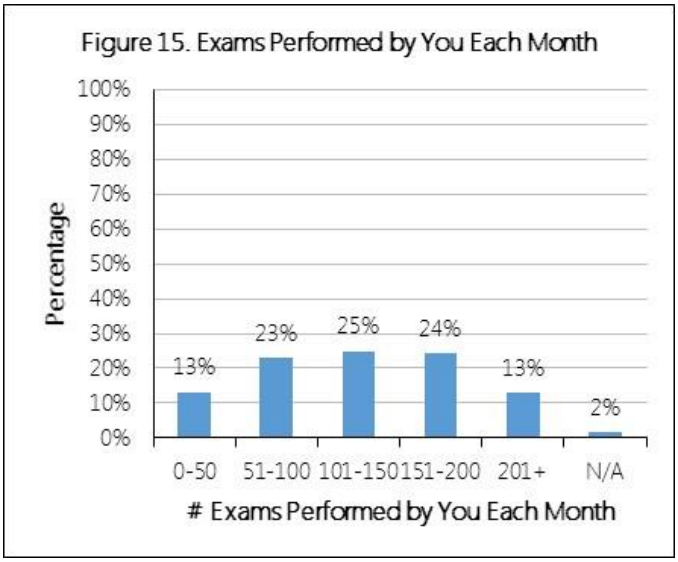
The respondents were asked to indicate the type of environment they perform most of their sonographic examinations. The majority perform their sonographic examinations in hospitals (Figure 12). Approximately 36% of respondents reported having at least 7 sonographers in their lab (Figure 13).



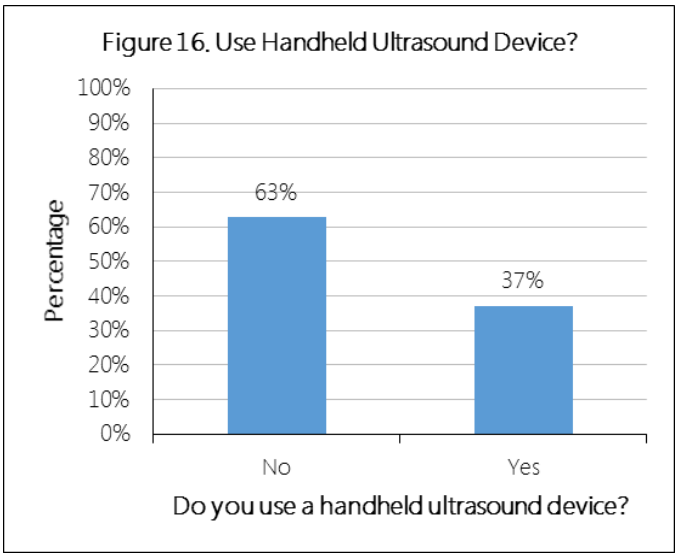


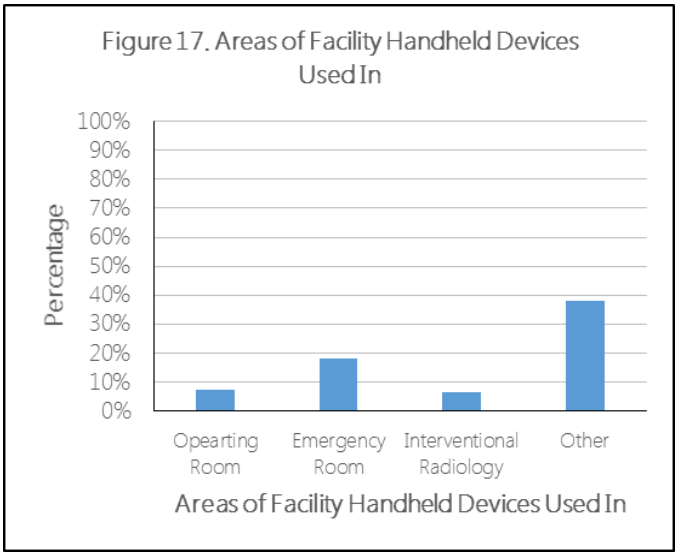
Over half (53%) reported that their labs perform at least 501 examinations each month (Figure 14). About half (49%) of the respondents themselves reported performing at least 101 exams each month (Figure 15).

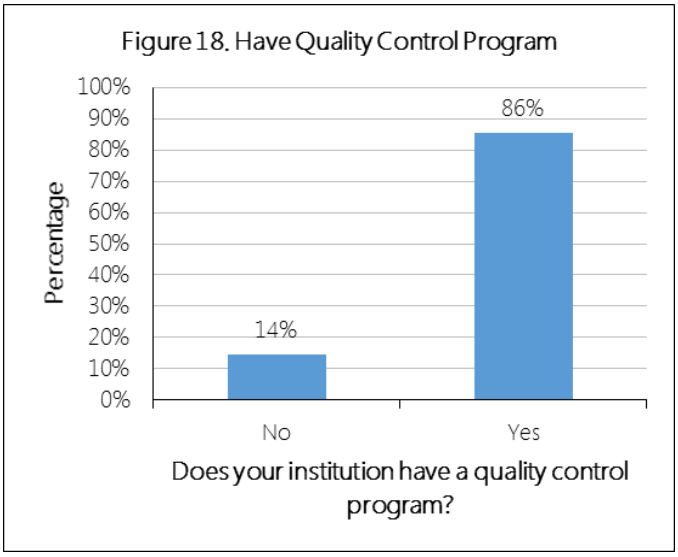




A little over one third (37%) reported using handheld ultrasound devices (Figure 16), mostly in areas of their facility outside of operating rooms, emergency rooms, and interventional radiology (Figure 17).







Approximately 86% of the institutions that respondents work in have a quality control program (Figure 18).

Task Descriptions

Table 3 contains the Task Summary within Domain. Table 4 contains the preliminary and approved domain breakdowns.

Table 3. Task Summary within Domain

Domain, Subdomain, & Task
Clinical Safety, Patient Care, and Quality Assurance 10%
Clinical Safety
Apply generally accepted infection control precautions and disinfectant techniques
Apply ergonomic techniques throughout the workday
Modify output power following ALARA principle
Identify potential bioeffects
Patient Care
Demonstrate appropriate patient care and communication skills
Analyze clinical history and prior imaging studies
Quality Assurance
Apply concepts for conducting performance tests with Doppler flow phantoms and tissue-mimicking phantoms
Apply concepts for evaluation of statistical parameters
New Technologies
Identify tissue Doppler
Evaluate applicable uses of ultrasound contrast agents
Apply concepts related to elastography imaging
Identify ultrasound hybrid imaging, i.e., fusion imaging
Physical Principles 15%
Physical Principles
Modify the exam based on gray-scale artifacts
Differentiate the various interactions of sound and matter
Modify technique based on knowledge of reflectors
Integrate concepts related to optimization of axial resolution
Integrate concepts related to optimization of lateral resolution
Integrate concepts related to optimization of temporal resolution
Integrate concepts related to optimization of elevational resolution
Apply concepts related to duty factor
Ultrasound Transducers 16%
Transducers
Select a specific transducer type based on the area being scanned
Evaluate and adjust transducer frequency based on the area being scanned
Evaluate transducer integrity
Apply concepts related to the use of curvilinear array transducers
Apply concepts related to the use of linear array transducers
Apply concepts related to the use of sector transducers (phased array)
Apply concepts related to the use of endocavity transducers
Apply concepts related to the use of two-dimensional array transducers

- Distinguish components of the transducer
- Apply concepts related to the use of nonimaging transducers
- Apply concepts related to the use of 1.5-dimensional array transducers

Imaging Principles and Instrumentation 28%

Instrumentation

- Demonstrate ability to perform accurate measurements
- Apply concepts related to imaging depth
- Apply concepts related to overall gain
- Apply concepts related to focusing
- Apply concepts related to gray scale
- Apply concepts related to time gain compensation
- Apply concepts related to zoom
- Apply concepts related to M-mode
- Apply concepts related to harmonic imaging
- Apply concepts related to dynamic range, e.g. compression
- Apply concepts related to edge enhancement
- Apply concepts related to persistence
- Apply concepts related to frequency compounding
- Apply concepts related to extended field of view, e.g., panoramic imaging
- Apply concepts related to spatial compounding
- Apply concepts related to coded excitation
- Apply concepts related to the use of three-dimensional/four-dimensional imaging
- Apply concepts related to imaging systems and storage

Doppler Imaging Concepts 31%

Hemodynamics

- Obtain measurements of blood flow velocities
- Apply concepts related to pulse repetition frequency
- Apply concepts related to wall filter
- Apply concepts related to pulsed wave Doppler
- Evaluate spectral Doppler waveforms
- Apply concepts related to continuous wave Doppler
- Apply concepts related to spectral Doppler angle to flow
- Apply concepts related to Doppler scale
- Apply concepts related to spectral Doppler gain
- Modify the exam based on spectral Doppler artifacts
- Adjust sample size (volume)
- Apply concepts related to color gain
- Apply concepts related to color angle to flow
- Apply concepts related to color scale
- Modify the exam based on color artifacts
- Apply concepts related to color maps
- Apply concepts related to color packet size
- Apply concepts related to power Doppler imaging

Table 4. Content Outline Breakdown by Domain

Domain	Approved % of Examination
Clinical Safety, Patient Care, and Quality Assurance	10%
Physical Principles	15%
Ultrasound Transducers	16%
Imaging Principles and Instrumentation	28%
Doppler Imaging Concepts	31%
Total	100%

Note. Forms built to this outline may not match approved percentages exactly.