Does Hands-on Obstetric US Experience Improve Performance on the Radiology Oral Board Examination?\(^1\)

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<td>An electronic survey was sent to all radiology residency programs to assess (a) the time assigned to US rotation, (b) the inclusion of obstetrics in US rotation, and (c) the opportunity for hands-on scanning of obstetric patients. Blinded results from the 2002 Diagnostic Radiology Oral Board Examination were provided by the American Board of Radiology. We recorded the overall examination score, US section score, and individual score for all obstetric cases for each resident from programs that responded to the survey. A Student t test and stratified statistical analyses were performed. This study was determined to be exempt from institutional review board approval. Residency directors who consented to participate were informed of pertinent information.</td>
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<td>Results:</td>
<td>Of the 159 programs, 64 (40.3%) responded and 63 (98%) of these had scores available. US section scores were provided for 280 residents, with 869 obstetric case scores. Fifty (79%) of 63 programs provided the opportunity for hands-on obstetric scanning. After adjusting for covariates, there was no significant difference in individual resident performance between residents with hands-on scanning experience and those without hands-on scanning experience ((P = .61)). When evaluated according to program, there was no significant difference in performance between programs with and those without hands-on training ((P = .39)).</td>
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<td>Conclusion:</td>
<td>Radiology resident performance in obstetric US on the American Board of Radiology Oral Board Examination is similar for programs that provide the opportunity for hands-on obstetric scanning compared with those that do not.</td>
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Residents in both radiology and obstetrics undergo training in ultrasonographic (US) interpretation, and both specialties include US on their respective board examinations. Because of the competition in academic centers between obstetrics and radiology for obstetric US services and the increasing shift of these services to obstetricians, many radiology residents have little exposure to obstetric imaging and even less opportunity for hands-on experience. Some radiology residents are learning obstetric US from lectures, texts, and/or observation only, and some residents may never participate in hands-on scanning.

The 2001 practice guidelines of the American College of Radiology (1) advise involvement with performance, interpretation, and reporting of 300 US examinations within 36 months after residency completion and American Board of Radiology (ABR) certification to ensure competence; without ABR certification, 500 examinations within 36 months after residency are required. A previous study of general US training found that 200 US examinations is insufficient for adequate training (2). There is no minimum requirement for US training during radiology residency. However, gynecologic and obstetric conditions are listed by the ABR as required knowledge on the US section of the oral board examination. It is critical that radiology residency programs continue to emphasize optimal training for all areas of future practice. Thus, the purpose of our study was to investigate whether the inclusion of hands-on obstetric US experience as a formal part of radiology residency affects performance on the US section of the oral board examination.

Materials and Methods

There were two portions of this study: an electronic survey and an evaluation of scores from the 2002 ABR Oral Board Examination. This study was determined to be exempt from institutional review board approval. Residency directors who consented to participate were informed of pertinent information.

Electronic Survey

The survey was sent by e-mail to all radiology residency directors in the United States for the summer of 2002. Before consenting to participate, the residency director was informed of the purpose of the study, of the support provided by the Society of Radiologists in Ultrasound, and that the responses would be confidential and anonymous. The latter was achieved by having the Web master assign each program an identification number. The response process was entirely electronic, and e-mail responses were entered into a database coded by identification number. Questionnaires were automatically resent only to residency directors who had not yet responded. To increase the response rate, each residency director was contacted up to three times. The authors had access to the final database with identification numbers only. Residency directors were asked to discuss the training received by their most recent graduates (i.e., those that were eligible for the 2002 ABR Oral Board Examination).

Questions on the survey included the time spent in US rotation, the time spent in US rotation that included obstetrics, whether the time on obstetrics was separate from the general US rotation, whether hands-on obstetric scanning or in-room observation was included, and information regarding who teaches obstetric US both during the rotation and for didactics. All questions regarding obstetric US were split into (a) first trimester and (b) second and third trimester questions. For the purposes of this report, hands-on scanning was defined as the trainee performing all or part of the US examination, including repeating portions of the study already completed by a technologist. This is distinct from in-room observation, which included observing the sonographer and/or sonologist without scanning the patient.

ABR Performance Data

The second portion of the study involved analysis of data from the 2002 ABR Oral Board Examination. Only first-time examinees were included. A code was assigned to each program by the central office of the ABR, and all results were provided by code. The results were matched to individual program surveys by a single author (M.C.F.) who was in possession of the key.

The US section of the oral board examination was scored as follows. Each examinee was shown approximately 12 US cases, some of which were obstetric cases. All obstetric cases were categorized as first trimester or non-first trimester. Each US case was scored from 68 (worst performance) to 72 (best performance). Scores for all cases in the US section were averaged and then rounded to the nearest whole number. An overall score of 69 or lower indicated that the examinee failed the section, and an overall score of 70 or higher indicated that the examinee passed the section.

Data and Statistical Analysis

Because a low score on an obstetric US case could be related to poor preparation and not to training program opportunities, obstetric scores were adjusted as follows. The overall US section score was subtracted from the average score of the obstetric cases, yielding an adjusted score that ranged from −2 to +2. For example, a resident with an adjusted score of 0 performed the same on the obstetric cases as on the entire US section. Similarly, a score of −2 would indicate a worse score on obstetric cases than on the US section overall.
and a score of +2 would indicate a better score on obstetric cases than on the US section overall. Results are provided as raw score and adjusted score.

The results of the oral board examination and the survey were correlated. The examination scores were compared between residents who had hands-on training and those who did not and between programs that offered hands-on training and those that did not. Examination scores for various types of obstetric cases were also compared between the two groups. Statistical methods included summary statistics, analysis of counts and proportions, two-sample Student t test, and $\chi^2$ test. A $P$ value of less than or equal to .05 was considered to indicate a statistically significant difference. A statistical software program (S-Plus, version 6.2; www.insightful.com) was used for data analysis.

Results

Survey

Electronic surveys were sent to the directors of 159 diagnostic radiology residency programs in the United States. There were 64 responses (40.3%). Of these 64 programs, oral board examination scores were available for 63 (98%). These latter 63 programs comprised the study group and represented 39.6% of residency programs. One program that responded to the survey did not sit any residents for the oral board examination in 2002.

Time required in US rotations during the 4-year residency period ranged from 3 to 24 weeks, with a variable amount of additional time available as an elective. Time required in obstetric US ranged from 0 to 24 weeks. In the single program that reported 0 weeks required for obstetric US, a 2-week elective was offered. In some programs, obstetric US was completely imbedded in the general US rotations. In these institutions, time required for obstetric rotations versus time required in non-obstetric US could not be separated. In most programs, obstetric US is taught predominantly by radiologists (Figure), although the predominance of teaching by radiologists alone is lower for US performed during the second and third trimesters than for US performed during the first trimester (48% vs 68%, respectively).

All programs provided training in obstetric US as part of the residency curriculum. In 29 (46%) of 63 radiology residency programs, obstetric US was included in the general US rotation. In the remaining 34 programs (54%), residents had a separate obstetric US rotation. Fifty programs (79%) indicated that hands-on obstetric US scanning was available to their residents. The remaining programs provided in-room observation only.

ABR Scores

Scores for a total of 280 residents were available from the oral board examination; the total number of obstetric US cases was 869. The mean individual obstetric case score was 70.74 (range, 68.0–72.0; standard deviation, 0.93). The mean individual US section score was 70.80 (range, 69.5–72.0; standard deviation, 0.56). There was no significant difference in individual performance for each type of obstetric US case when compared with overall US cases. When non–first trimester cases were grouped together and compared with first trimester cases, there was no significant difference in resident performance, regardless of hands-on scanning exposure ($P = .39$, two-sided Student t test).

Adjusted obstetric US scores (calculated as the average obstetric US score minus the overall US score) were similar for residents who received hands-on training and for those who did not (Table). Likewise, comparison of examination scores for residency programs, which were calculated by averaging results for all residents in the program, resulted in no significant difference in adjusted obstetric US scores between programs with hands-on training and those without hands-on training (Table).

Discussion

The ABR requires knowledge of gynecologic and obstetric conditions to pass the oral board examination (1). The Radiology Residency Review Committee of the Accreditation Council of Graduate Medical Education requires that residents have rotations in US and that they acquire experience in obstetric US (3). However, there are no minimum requirements in residency for the length of time to be spent learning US or for the number or type of obstetric US examinations to be performed (3). In addition, although US is a hands-on subspecialty, there is no requirement that a radiology resident learn any scanning techniques. Indeed, in current US practice, many radiologists and obstetricians rely on trained sonographers to scan patients and obtain images, and these images are interpreted later.
without the physician ever scanning the patient or being present during any portion of the real-time examination.

In many communities, obstetric US has become increasingly a part of routine obstetric practice; at the same time, many radiology practices have stopped providing obstetric US services. This trend is particularly prevalent in larger academic medical centers, which have both radiology programs and obstetrics and gynecology residency programs. As a result, many radiology residencies can no longer offer broad exposure to obstetric US within their own radiology department. These programs must seek alternative methods for teaching obstetric US to their residents, such as arranging for their residents to be trained by obstetricians or teaching with didactic lectures and conferences.

Adequate training in any subspecialty in radiology requires sufficient exposure to a large number of cases and a wide variety of pathologic conditions. With respect to US training, study results have demonstrated improved skill level with exposure to an increasing number of cases (2,4). With opportunities diminishing for radiology residents in the United States to perform obstetric US, many believe that training in this area of US has become suboptimal (5). If radiology residents do not obtain adequate training in obstetric US during residency, it is unlikely that they will perform obstetric US well in their future practices.

Our study evaluated whether the opportunity for hands-on obstetric training during radiology residency affects individual performance on the oral board examination for obstetric US cases. We found no statistically significant difference in the performance of individual residents who had hands-on obstetric US training and those who did not or between the performance of residency programs that provided hands-on scanning and those that did not.

One possible reason that hands-on training does not affect performance on the oral board examination is because, on the ABR examination, the examinee is asked to interpret images that are technically optimal and of diagnostic quality. In addition, nearly all cases include visible pathologic entities. While the practice of US requires the ability to identify abnormalities with real-time scanning and to record those abnormalities for interpretation, image acquisition is not tested on the oral board examination. Therefore, a resident who learns from images in a textbook could be expected to perform as well as one who learns by scanning the patients himself or herself.

Nearly 80% of the programs that responded to our survey provided the opportunity for hands-on scanning to their residents. This is admirable, and programs that have made alternative arrangements for their residents outside of their own department should be commended. It is apparent that radiology residency programs appreciate the need to have residents scan patients to understand the benefits and limitations of US.

A limitation of this study is that we had no way to assess the quality or quantity of the hands-on experience for each program. Spending a few minutes performing scanning after the sonographer is finished is completely different from being responsible for acquiring all of the images, yet both were considered to be hands-on for the purpose of this study.

In conclusion, there was no statistically significant difference in performance for obstetric US cases in the US section of the oral board examination between training programs that provided hands-on obstetric US scanning opportunities and those that did not. While hands-on training is clearly valued as part of radiology residency training, learning to interpret US images can be done equally as well without hands-on training as with it.

References


