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“What Program Directors Think” III: Results of the 2014/2015 Annual Surveys of the Association of Program Directors in Radiology (APDR)

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Rationale and Objectives: The Association of Program Directors in Radiology regularly surveys its members regarding issues of importance to support radiology residency programs and their directors.

Materials and Methods: This is an observational cross-sectional study using two Web-based surveys posed to the Association of Program Directors in Radiology membership in the fall of 2014 (49 items) and the spring of 2015 (46 items) on the subjects of importance to the members, including the Accreditation Council on Graduate Medical Education Milestones, the Non-Interpretative Skills Curriculum, the American Board of Radiology Core Examination, the effect of the new resident testing and program accreditation paradigms on training outcomes, the 2015 Residency Match, the Interventional Radiology/Diagnostic Radiology (IR/DR) Residency, and Program Director (PD)/Program Coordinator resources.

Results: Responses were collected electronically, results were tallied using SurveyMonkey software, and qualitative responses were tabulated or summarized as comments. Findings were reported during the 63rd annual meeting of the Association of University Radiologists. The maximal response rate was 33% in the fall of 2014 and 36% in the spring of 2015.

Conclusions: PDs believed that the radiology Milestones, now largely implemented, did not affect overall resident evaluation, was not reflective of resident experience, and actually made evaluation of residents more difficult. PDs also felt that although the American Board of Radiology oral examination had been a better test for clinical practice preparedness, their new residents knew at least as much as before. There was little evidence of recall reemergence. The radiology training community saw a drop in residency applicant quality as demonstrated by the United States Medical Licensing Examination scores and clinical rotation grades. Because the new IR/DR Residency positions were to be funded at the expense of the traditional DR positions, the majority of PDs expected a negative effect of the impending IR/DR match on their DR recruitment. PDs were in favor of a unified clinical radiology curriculum similar to the Radiological Society of North America online physics modules.

Key Words: ABR Core Examination; ACGME Milestones; Non-Interpretative Skills Curriculum; radiology resident recruitment; radiology residency training.

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INTRODUCTION

Since 2000, the Association of Program Directors in Radiology (APDR) has conducted an annual survey of its membership on issues affecting training in accredited residency programs in the United States and Canada. The APDR uses the data generated by the survey to promote improvements in resident education through exchange of ideas, to provide benchmarks guiding local resource allocation, to support the radiology residency program director (PD) community, and to facilitate communications with the Accreditation Council for Graduate Medical Education (ACGME) and the

American Board of Radiology (ABR). To make information more generally accessible, the results of the APDR Annual Survey were published in 2012 (1) and in 2015 (2). In this third paper, we analyze the results of the fall 2014 (3) and spring 2015 (4) surveys and discuss recent trends in resident education from the PD's perspective.

For PDs and coordinators, the APDR surveys serve as real-time snapshots of prevailing educational and administrative practices, allowing benchmarking of local procedures and individual training outcomes. This work is not meant to demonstrate best practices, but rather all practices in existence at the time of the survey. The wide variation discussed in the following is the direct result of the accreditation policies. After the introduction of Milestones into residency education (5), the ACGME left the implementation to the professional communities, with the understanding that medical specialties were sufficiently different to make rigid uniformity counterproductive (6). Even within individual specialties, standardizing practices is neither always possible nor even desirable, because training programs vary in size, location, and affiliation, among other attributes. A rigid "menu prix fixe" would be too restrictive for individual educational needs. Inherent program inhomogeneity calls for an "à la carte menu" of solutions, allowing programs and entire specialties to become more innovative and where the best practices can be continuously tested. The APDR survey is meant to record and demonstrate existence of various systems in place at any given time, to facilitate exchange of ideas among the PDs.

The accrediting and certifying communities rely on the residency administration to carry out their mandates. PD buy-in is essential for successful implementation of ACGME and ABR initiatives.

MATERIALS AND METHODS

We performed an observational cross-sectional study using two Web-based surveys conducted in the fall of 2014 and the spring of 2015. Members of the 2014–2015 APDR Annual Survey Committee selected questions from those proposed by committee members and the APDR leadership for inclusion in the surveys. The Committee Chair, with the help from other medical educators, selected and edited the highest quality questions. Before distribution, the questions were reviewed and approved by the current APDR president. The 2014 APDR Fall Survey (October 30–December 15, 2014) had 49 items (3), and the 2015 APDR Spring Survey (February 25–March 30, 2015) had 46 items (4).

Survey methodology was described in detail previously (1). In brief, all active members of the APDR were invited to participate. Participants were allowed to skip questions at will. Responses were collected electronically without personal identifiers, tallied using SurveyMonkey software, and reported in aggregate. The results of the spring 2014 and the fall 2015 surveys were presented to the membership at the 63rd annual meeting of the Association of University Radiologists (April 14–17, 2015, New Orleans, LA). After the meeting, respec-

tive reports were archived on the "members-only" portion of the APDR Web site (3,4).

RESULTS

Demographics

The response rate and demographic data regarding survey respondents are summarized in Table 1.

Fall 2014

The Non-Interpretative Skills Curriculum

Forty-six percent of respondents reported having formal in-house training in critical thinking skills and research design, 23% reported using various online modules, and 31% reported no training in this area. Forty-seven percent reported that the person responsible for teaching this subject was a radiologist staff member, 12% reported bringing in outside experts, and 39% reported not having such instruction in their institution. The responsibility for quality improvement (QI) in the residency program fell largely to the designated faculty QI officers (40%) and the PD (26%), with the rest consisting of individual assignments, such as the associate director (7%), the department chair (7%), and group effort (16%). The QI project was left to the responsibility of the residents in 4% of responses. The average completion time of a QI project ranged from less than a year (31%), 1 year (42%), and more than a year (27%).

Regarding MR safety, 60% respondents reported qualified personnel teaching a formal curriculum on Magnetic Resonance (MR) physics, contrast reaction, implants and devices, and medicolegal issues, whereas 26% reported that the material was covered in the physics course. Half (53%)

TABLE 1. Respondent Demographics

Participation	Fall 2014	Spring 2015
Participants	109	105
Total membership	327	295
Response rate	33%	36%
Affiliation (% respondents)		
University	59%	70%
University affiliated	20%	20%
Community	19%	10%
Military	2%	0%
Program size (% respondents)		
12 or less	10%	8%
13–28	49%	41%
29–40	25%	32%
>40	16%	19%
Location (% respondents)		
Northeast	37%	32%
Southeast	19%	21%
Central/Midwest	22%	28%
Western	22%	19%

of respondents reported that medical economics was taught as a formal curriculum, and 25% reported that the residents were expected to learn on their own using existing online resources. A minority (21%) was satisfied with their way of measuring the Systems-Based Practice subcompetency related to medical economics, and 85% reported that they would use a national online module on the subject if it became available. As to medical imaging informatics and computer technology as applied to radiological imaging, 17% respondents reported teaching a formal curriculum by qualified personnel, 29% reported covering this subject in the physics course, 8% had no formal curriculum, and 45% had no regular teaching on the subject. The American College of Radiology (ACR) Appropriateness Criteria (6) were taught in formal lectures and knowledge was tested by 7% of respondents, 39% reported teaching this topic at the workstation, and 31% reminded residents of their existence and expected them to learn on their own. At the same time, when asked how the residents prepare for the Non-Interpretative Skills section of the ABR Core Examination, 72% of respondents reported independent study using the ABR syllabus (7). As to concrete documentation of residents' proficiency in these subjects during residency, 21% respondents reported some form of testing on specific topics, such as MR safety, whereas 79% respondents reported that attendance record was sufficient. Regarding teaching residents hands-on ultrasound, 63% respondents had formal instruction in their program, whereas 37% had not.

Program Resources

The majority (57%) of respondents reported being given 1 day per week off clinical duties, 22% 2 days per week, and 16% half a day per week. Seventy-six percent of respondents reported needing more time to administer the program, 23% felt they did not need more time, and one respondent reported not needing more because he or she took a pay cut to get enough administrative time. More than half (57%) of respondents reported that their program coordinator had unrelated responsibilities in addition to coordination of the residency program. Regarding additional duties of the PD, 37% reported that the PD was also the vice-chair for education. Regarding assistant PD, 16% of respondents had none in their program, 52% had one, and 32% had more than one. Of the respondents who had at least one assistant PD in their program, 46% reported no administrative time allocation for this function, and 24% reported half a day per week. Regarding valuation of faculty contribution to the program, 11% of respondents had a system of Relative Value Units (RVUs) in education, whereas 89% did not.

Of the 95 respondents whose residents presented at national meetings, 94 (99%) reported funding the residents: 37% fully, 62% partially. Among the latter group, although the travel expense cap ranged from \$800 to \$3000, 44% of respondents reported allocating between \$1000 and \$2000. Regarding resident development programs, respondents reported offering leadership training (41%), research (45%), business of radiology/medicine (32%), and international radiology/medicine

(19%) experience. A minority (38%) did not have a resident development program.

The ACGME Next Accreditation System (NAS) and the ABR Core Examination

Thirty-one percent of respondents considered the NAS an improvement over filling out the Program Information Form (PIF) every 5 years, 28% saw no difference in the administrative burden between the old system and the new, and 42% felt that the time allocation for running the Clinical Competence Committee and the Program Evaluation Committee would far exceed the burden of the PIF in the old residency accreditation paradigm. When asked what changes were made to the resident evaluations to comply with the Milestone achievement system, 64% respondents reported using Milestone terminology, 22% introduced additional questions or checklists, and 14% reported changing nothing. Regarding PD experience with the ACGME Milestones, 35% felt that they enabled a more consistent resident evaluation, and 65% believed that the Milestones either did not affect resident evaluation, were not reflective of resident experience, or in fact made evaluation of residents more difficult.

Based on the two administrations of the ABR Core Examination, 20% of respondents agreed with the statement that the residents would be as rigorously prepared for careers in radiology as they were in the old system (the ABR written and oral examinations), 58% disagreed, and 22% were undecided. The vast majority (98%) supported the establishment of a national radiology residency curriculum designed similar to the Radiological Society of North America (RSNA) physics modules (8) for assisting programs with preparation for the new ABR Core Examination.

Resident Recruitment

All (100%) programs used their own interactive department Web site as a recruitment tool, with a small minority using Facebook (15%) for recruitment and Skype (4%) for applicant interviews. Half (49%) of respondents reported accepting applicants from foreign (other than Caribbean) medical schools, and the same number (49%) reported accepting Caribbean medical school graduates, 72% Doctors of Osteopathy (DO) degrees, 10% US medical schools only, and 3% top-tier US medical schools only. In a large majority (84%) of programs, the PD had the final authority on resident selection, whereas in 10%, this authority rested with the chairman. The majority (75%) of respondents interviewed applicants over the space of several months with 5–10 applicants per day.

Spring 2015

ACGME Milestones

In the spring of 2015, 39% of respondents reported full implementation of the Milestones system in their program, 39% reported 75%–99% implementation of the Milestones, and 22% reported <75% implementation. Regarding the chief

obstacle to the Milestones implementation, 16% reported insufficient interest and understanding on the part of faculty; 16% reported insufficient resources, personnel, and funding; 24% felt that the task was overwhelming even if the resources were sufficient; and 33% has sufficient resources and saw no obstacles. When asked about the overall effects of the Milestones on the respondents' residency programs, 13% were very frustrated by the additional burden without any positive outcome, 12% felt somewhat negative, 23% were overwhelmed by additional work, and 31% felt ambivalent about the Milestones because they did not see significant improvement in the quality of resident education. Another 15% reported some improvement in the quality of residents' education and therefore felt somewhat positive about the Milestones, and 6% saw improvements in every aspect of resident education and therefore felt very positive. As to the requirements for graduation, 95% of respondents reported that achieving level 4 was not an absolute requirement for graduation.

The large minority (47%) explained the Milestones to the residents on an ongoing basis from time to time, and the rest were evenly divided between dedicated lectures (17%), distribution of hard copies or electronic copies of the Milestone project description to the residents (16%), and piecemeal explanations "as needed" (18%). Regarding scholarly activity, the majority accepted publications in peer-reviewed journals (73%), oral presentations of original research at national meetings (74%), and completion of poster presentation/computer exhibit at national meetings (87%). The minority reported accepting oral presentations at grand rounds within the home institution (46%) and in the radiology department (30%).

The ABR Core Examination

Ninety-six percent of respondents reported offering some type structured review course, either in-house (56%) or at an outside institution (40%). The small minority (10%) saw reemergence of the recalls for the Core Examination. When asked to compare the knowledge base and readiness for practice of graduating residents before and after the introduction of the Core Examination, 39% of respondents felt that the performance was similar, 34% felt that the recent graduates knew less, and 12% thought that the recent graduates knew more. At the same time, 91% felt that the ABR Oral Examination was superior to the Core Examination in testing readiness for clinical practice.

Resident Recruitment

Three quarters of the respondents (74%) reported a decrease in quality (United States Medical Licensing Examination [USMLE] scores, clinical grades, etc) of applicants, whereas 25% saw no difference. At the same time, 95% saw a decrease in the number of US medical students among the applicants: 20% reported a small (10% or less), 45% a moderate (11%–20%), and 30% a large (21%–30%) drop. Ninety-five percent also saw an overall decrease in the number of applicants: 44% reporting a small (10%–19%), 39% a moderate (20%–29%), 6% a large (30%–39%) and 5% a very large

(40% or more) drop. The majority (73%) accepted applications from osteopathic medical school seniors (DO) and half (49%) accepted applications from international medical graduates (IMGs). Ten percent of respondents reported interviewing graduates of US medical schools only. A large majority (84%) had final authority over the rank list. Regarding interviews offered before the Match, 35% of respondents reported interviewing 9–10 applicants/position, 32% reported interviewing 11–12 applicants/position, and 23% reported interviewing 13 applicants or more/position. A small minority (15%) endorsed accepting applicants with independent funding from outside the United States.

The Interventional Radiology/Diagnostic Radiology (IR/DR) Residency

Only 6% of respondents reported additional funding outside the existing DR position for the new IR/DR program. The rest expected simple (32%) or hybrid (18%) transfer of positions from the DR to the DR/IR residency, did not know (32%) how the new DR/IR residency would be funded, or did not offer it (14%). The large majority (83%) planned to recruit residents for their IR fellowship through a mix of the integrated and independent pathways as well as transfers, with the expected positive (15%), neutral (30%), and negative (55%) effect on their DR program recruitment. Three quarters of respondents planned to recruit the first applicants to their IR/DR program in the near future, 28% next year (2015–2016), and 43% the year after (2016–2017), with 31% offering one and 39% offering two positions.

Dictated Reports

When asked how their programs maintained and improved the quality of residents' reports, 46% of respondents reported transition to templates in dictation. Others used individual evaluations and feedback (33%), formal lectures (16%), and quality assurance meetings with the residents (5%). Management of contrast reactions was most commonly taught using the ACR Manual on Contrast Media (83%), other online resources (49%), and in-house manuals (50%). A minority (28%) used books and journal articles.

A quarter (28%) of respondents reported developing in-house materials to teach principles of radiation safety, 12% used the "Image Wisely" (8) and "Image Gently" (9) Web sites, 19% relied on various online articles and training modules, 15% held journal clubs for the purpose, and 26% had no dedicated training in dose reduction, expecting the residents to learn the subject during the physics course.

A small minority (21%) of respondents had a formal mechanism, such as a newsletter, to keep in touch with their graduates; 51% reported keeping in touch informally with some trainees depending on their location and interests; and 28% kept in touch with their trainees only if the efforts were made by the individual graduates.

Four fifths (81%) of respondents had a local ACR meeting, and 55% reported active resident participation "at the center of the curriculum and programming." Almost three quarters (72%) of respondents offered mini-fellowships to their fourth-

year residents, 63% of these lasting 12 weeks, 18% lasting 8 weeks, and 17% lasting 24 weeks. RSNA physics modules (7) were part of the physics curriculum in 95% of programs, with 54% of respondents encouraging and 41% requiring completion of at least 10 modules.

Nearly two thirds (63%) of respondents felt that pressures to reduce faculty turnaround time did not result in fewer cases for residents, 68% offered night call responsibilities free from in-house faculty presence; 88% allowed residents to release preliminary reports to the referring physicians: either on call only (35%) or at all times (53%). Of the 99 respondents to the question regarding the timing of the American Institute for Radiologic Pathology (AIRP), three quarters (73%) offered the AIRP course in the third year of training before the ABR Core Examination.

DISCUSSION

The surveys conducted in the fall of 2014 and the spring of 2015 used cross-sectional design observational study to document the state of the community at the time of survey administration. Although the response rates of 33% in the fall and 36% in the spring are in the range of the average response rate for mail surveys (10), this is lower than the 47% response rate in 2011 (1). At least in part this may be due to the introduction of the additional fall survey with resultant survey fatigue, as has been recently demonstrated by Porter et al. (11).

The majority of respondents were either at a university program or affiliated with a university (79% in the fall of 2014 and 90% in the spring of 2015) and represented medium-sized (13–28 residents) and large (29–40 residents) programs (74% in the fall of 2014 and 73% in the spring of 2015). Geographically, more respondents were from the Northeast (37% in the fall 2014 and 32% in the spring 2015) than from any other region of the United States. These demographic characteristics are similar to the recent prior surveys (1,2).

The surveys focused on several issues of importance to the APDR community, namely the increase in PD time and resource utilization resulting from the ACGME's implementation of the NAS, program changes driven by the new ABR testing model, and the state of DR resident recruitment given the shrinking applicant pool and the impact of the new IR/DR programs.

Regarding the Milestones project, our survey suggests that the PDs were hardly enthusiastic. Two thirds (65%) believed that the Milestones did not affect resident evaluation, were not reflective of resident experience, or made evaluation of residents more difficult. At the same time, the PD community is largely in compliance with the ACGME mandates. The majority (78%) of respondents reported full or nearly full implementation of the Milestones. However, when asked about specifics of the implementation, only a quarter of respondents reported introducing new checklists or questions, whereas the rest did not do more than change the terminology of assessment to achieve compliance. Still, three quarters

(76%) of PDs in this survey reported needing more administrative time, even though the majority has assistant/associate directors. This is in line with the prior surveys that did not reveal additional resource allocation to PDs after the introduction of more stringent evaluation guidelines (1,2). Therefore, it is not surprising that the changes introduced as part of the Milestones project are frequently more semantic than substantive.

The overwhelming majority (94%) did not require attainment of level 4 proficiency for graduation, in line with the ACGME program requirements (12) that states "Level 4 is designed as the graduation *target* but does *not* represent a graduation *requirement*. Making decisions about readiness for graduation is the purview of the residency program director."

As to the Non-Interpretative Skills Curriculum, the majority (79%) did not test residents' proficiency in these areas, relying on attendance records instead. It is likely that the PD community does not have necessary skills and resources needed to conduct rigorous internal testing. The methodologies, however, are converging on the instruction materials available through professional societies and the ABR. The majority of respondents reported that their residents used the ABR syllabus for the Non-Interpretative Skills section (72%) and the RSNA educational modules for the physics section (95%) of the ABR Core Examination. A large majority (83%) used the ACR Manual on Contrast Media to learn management of contrast reactions and the same number (85%) responded that they would use a national online stands for Systems-Based Practice (SBP)-Medical Economics learning module if it were available. However, preparation for the ABR Core Examination almost always (96%) includes an in-house or an outside structured review course. The AIRP, not strictly speaking a board review course, is clearly thought to be instrumental in preparation, because three quarters (73%) of responding PDs scheduled it in the third year of training.

In spite of continued reservations on the part of radiology PDs regarding abolition of the ABR Oral Examination, the community does not see current training outcomes in an entirely negative light. Although respondents overwhelmingly felt that the oral examination had been a better test for clinical practice preparedness (91%), two thirds (66%) reported that current residents knew at least as much as before. Going forward, a large majority (98%) supported a national radiology residency curriculum designed similar to the RSNA physics modules. On a positive note, there was little (10%) evidence of recall reemergence.

The majority of PDs reported a shrinking applicant pool (95%), including the number of US medical students. This impression is validated by the published National Resident Matching Service (NRMP) data (13) (Figs 1, 2). At the same time, only three quarters reported accepting students and graduates of osteopathic medical schools and half reported accepting IMG applicants. This in line with the national averages. According to the NRMP 2015 Match report (13), US medical school seniors have a 94% chance of matching, DO seniors have a 79% chance of matching, US-citizen IMGs have a 53%

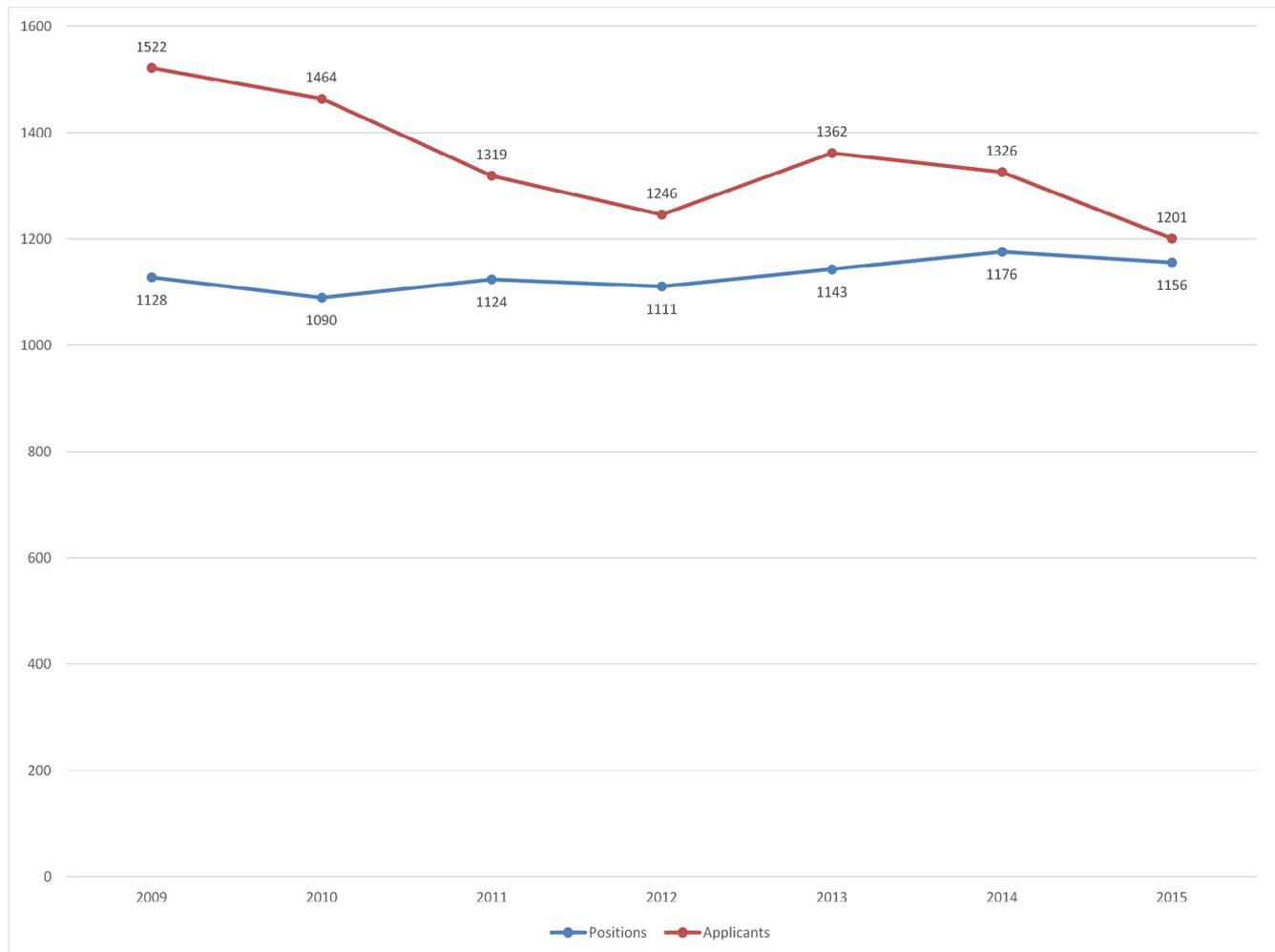


Figure 1. Radiology applicants vs. radiology training positions.

chance of matching, and noncitizen IMGs have a 49% chance of matching. Given the shrinking number of US medical school seniors interested in radiology, it is likely that radiology will continue to rely on independent applicants. Recent data show that although citizen IMGs do not perform as well as noncitizen IMGs and US Medical Doctor (MD) (14–18), noncitizen IMGs have better patient outcomes than both noncitizen IMGs and US MDs (18,19). Another work suggests that IMGs have lower fatigue and higher self-esteem and personal growth scores (20). More research is needed to examine IMG performance in radiology and to determine barriers to their recruitment.

Radiology PDs also reported decreasing applicant quality (75%), as demonstrated by USMLE scores and clinical rotation grades. Although the applicant pool has been shrinking for several years, published NRMP data (13) up to and including 2014 show no change in objective measures of applicant quality (Fig 3). It remains to be seen whether our survey is the bellwether for this unwelcome development.

The majority (84%) of respondents had final authority over the program rank list. As expected with a decrease in appli-

cant number, program recruitment costs were significant, with the majority of the respondents interviewing 9–12 applicants and a quarter (25%) interviewing 13 or more applicants for each position in the match. Given that the IR/DR Residency would further decrease the traditional DR residency applicant pool, more than half (55%) expected a negative effect of the impending IR/DR match on their DR recruitment. At the same time, the vast majority (94%) of respondents did not have additional positions for the new IR/DR Residency, expecting the funds to come out of the existing DR residency allocations.

Our survey results demonstrate four areas of convergence in PD opinions and practices. Given that a large majority of respondents use the RSNA online physics modules (8) in preparation for the Core Examination and are in favor of a national core radiology curriculum similar to the RSNA physics modules, we argue that this would be a worthy investment for consideration by national radiological societies. At the same time, our survey shows that board review courses, either in-house or outside, are here to stay in spite of their related expenses. This is counter to the oft-repeated claim that an

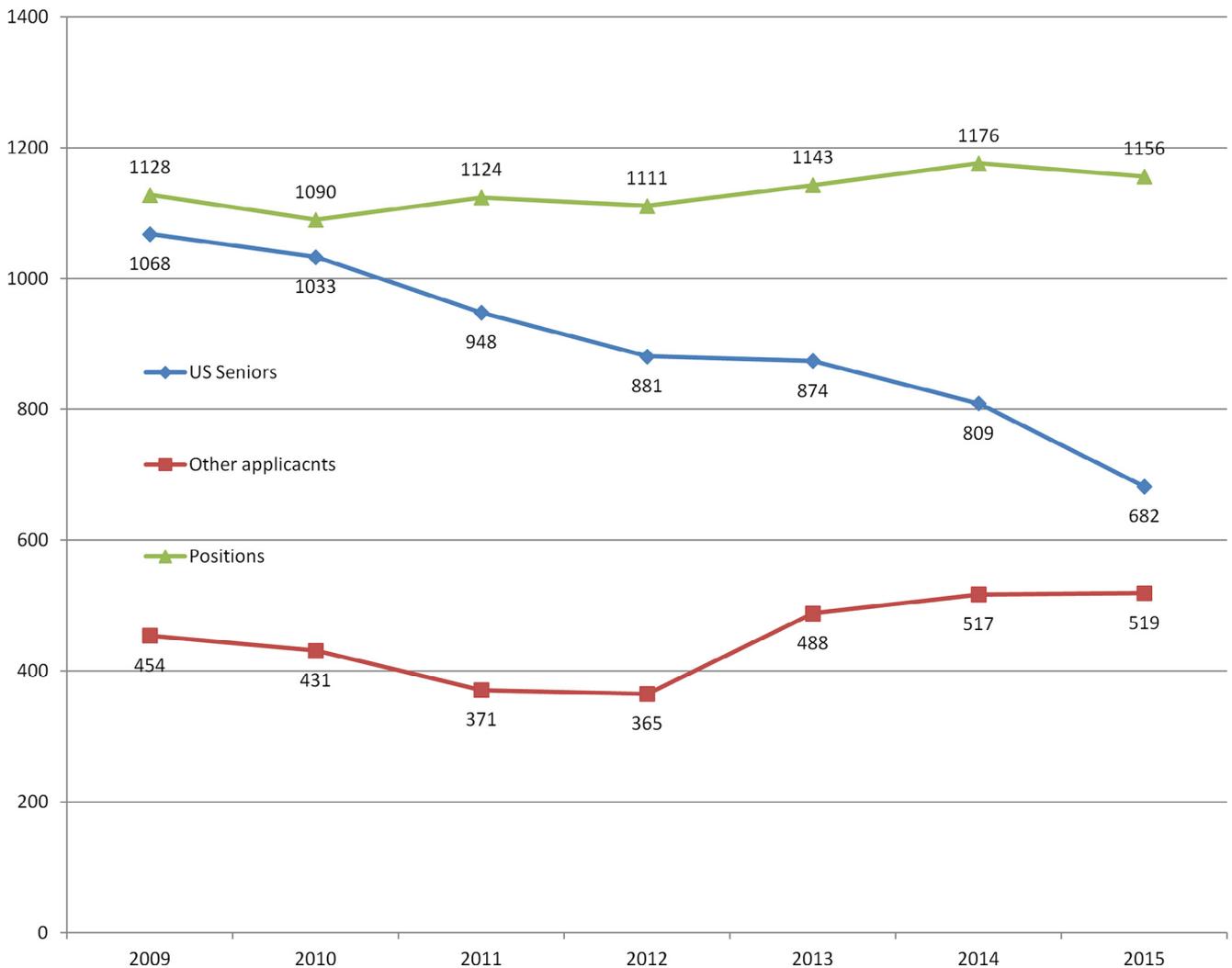


Figure 2. Radiology applicants vs. radiology training positions by applicant type.

effective didactic program coupled with hands-on teaching obviates costly preparation before the ABR Core Examination. Whether this need is real or psychological is uncertain, but the fact remains—persistence of the review courses in the new ABR testing paradigm suggests that they play a role in resident satisfaction and recruitment. The last convergence point deals with achievement of level 4 competence during training, which is desirable but not necessary for graduation in the vast majority of programs.

Our study has several limitations. The survey, designed to address immediate concerns of the membership, is a cross-sectional design observational study with inherent limitations (21). Moreover, the survey was distributed to the APDR members, although not all ACGME-accredited PDs are members of the APDR. At the same time, many APDR members are associate, assistant, and former PDs. This may have introduced a selection bias (22), with some programs possibly overrepresented and others underrepresented. In our question design and data analysis, we took into consideration the inevitable framing bias (23), as well as the

voluntary response bias (24) in a survey that is not mandatory, potentially selecting for respondents with stronger opinions than the average PD. In our analysis, we were mindful of the desirability bias that was shown to affect participant response (25) even in anonymous surveys. In our case, this may have translated into less than maximal response rate to many questions, as participants were allowed to skip items at will, preselecting for respondents with more acceptable views.

CONCLUSIONS

1. Although the implementation of the Milestones in radiology is well under way, the majority of PDs believed that Milestone assessment did not affect overall resident evaluation, was not reflective of resident experience, and actually made evaluation of residents more difficult. The vast majority of radiology programs did not require attainment of level 4 proficiency for graduation.

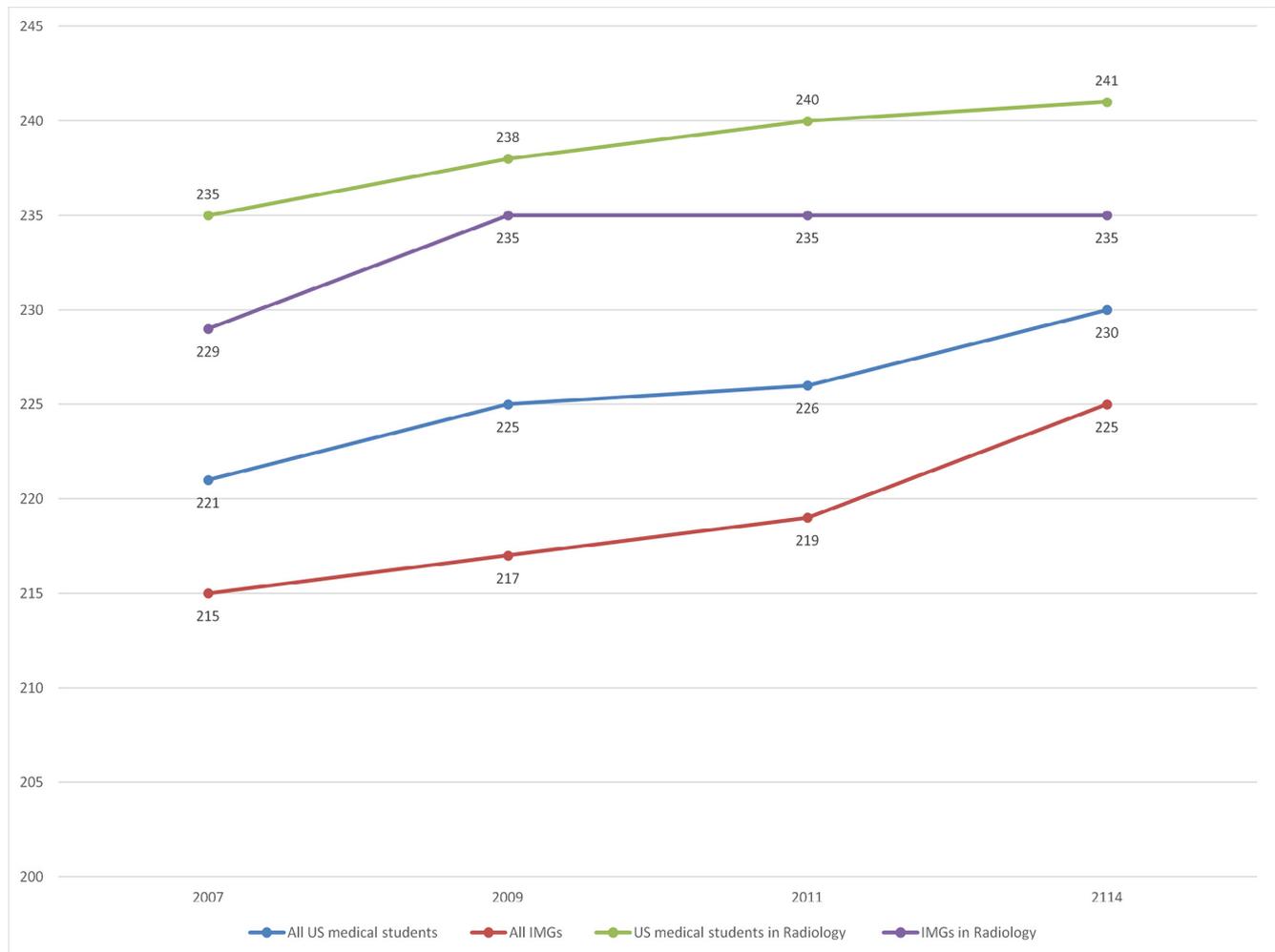


Figure 3. United States Medical Licensing Examination (USMLE) scores by applicant type.

- Even though the overwhelming majority of PDs felt that the oral examination had been a better test for clinical practice preparedness, two thirds reported that their new residents knew at least as much as before. There is little evidence of recall reemergence.
- The online ACR, ABR, and RSNA training modules are in wide use. PDs are overwhelmingly in favor of a unified national radiology clinical curriculum and would use additional non-interpretative curriculum modules (eg healthcare economics) should they become available.
- The radiology training community is experiencing a drop in residency applicant quality as demonstrated by USMLE scores and clinical rotation grades.
- Because most IR/DR Residency positions are to be funded at the expense of traditional DR positions, the majority of PDs expect negative effects of the impending IR/DR match on their DR recruitment.

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