

Evaluation of Integrated Interventional Radiology Residency Websites

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ABSTRACT

RATIONALE AND OBJECTIVES: In the transition to the integrated interventional radiology residency model, residency websites are important resources of program information for prospective applicants. The objective of this investigation was to evaluate the availability and comprehensiveness of integrated interventional radiology residency websites.

MATERIALS AND METHODS: A complete list of programs participating in the 2018 integrated interventional radiology match was collected using the online Fellowship and Residency Electronic Interactive Database and Electronic Residency Application Service. Residency program websites were evaluated for the presence of 19 variables related to resident education and recruitment, and the percent comprehensiveness of each website was calculated based on the number of variables present. The effect of program size and geographic region on website availability and comprehensiveness was assessed.

RESULTS: Of the 69 programs participating in the 2018 match, 18 (26%) programs did not have any locatable website. Of the 51 programs with websites, 30 (59%) had stand-alone interventional radiology websites distinct from the associated diagnostic radiology website. Large programs were more likely to have a residency website than small programs (91% versus 54%, $p=0.001$). Across all categories, the mean website comprehensiveness was 33%. Mean website comprehensiveness of programs in the Midwest (43%) and Northeast (37%) was significantly greater than mean website comprehensiveness of programs in the West (19%) ($p=0.005$).

CONCLUSION: Overall, 1 in 4 integrated interventional radiology residency programs did not have locatable websites. Many integrated interventional radiology residency websites lack important content variables. Efforts should be made to improve the residency websites and digital training resources for prospective interventional radiology applicants and to help showcase programs in the best light.

KEYWORDS: Education; Internet; Interventional Radiology; Residency; Website

INTRODUCTION

The first full cycle of the new, integrated interventional radiology (IR) residency match in 2017 marked a milestone in IR's evolution as a medical specialty. With this change, the pool of potential IR trainees has increased to include medical students in addition to diagnostic radiology residents. In 2018, integrated IR was tied for the most competitive specialty to match into in terms of number of spots per applicants.¹ Given the immense interest in IR and the evolving application process for integrated IR programs, residency websites are increasingly important online tools. Websites allow the programs to communicate desired information to potential applicants, and also serve as a key source of information for the applicants.

Prior studies have assessed residency websites for their content and accessibility in various specialties, including diagnostic radiology, dermatology, plastic surgery, orthopedic surgery, neurosurgery, and otolaryngology.²⁻⁷ As IR transitions into the new training system, IR residency websites may benefit from a similar assessment. The objective of the present study was to evaluate the availability and content comprehensiveness of IR residency websites utilizing an approach similar to that in many analogous studies previously conducted in other specialties.

MATERIALS AND METHODS

Website Localization

A list of all programs that registered to participate in the 2018 integrated interventional radiology residency National Residency Matching Program match was collected from the American Association of Medical Colleges Electronic Residency Application Service and confirmed through the American Medical Association Fellowship and Residency Electronic Interactive Database (FREIDA Online). Program websites were identified from their corresponding FREIDA Online profiles. In situations where no website was listed, the program name and the search identifier "interventional radiology residency" was queried using Google (Google LLC, Mountain View, CA), and the first 10 search results were examined to attempt to identify a program website. When no residency website was identified via Google, the program's home institution's general website and corresponding diagnostic radiology website were manually searched to identify a website for the interventional radiology program.

Website Review

Websites were evaluated between October 20 and 25, 2017 for the presence or absence of 19 variables related to education (i.e. residency training) and recruitment of applicants. These variables and this categorization scheme were adapted from multiple similar studies in other fields,³⁻⁷ and reflect many pieces of information a prospective applicant may wish to glean from a residency program website irrespective of the specialty. Pertinent modifications specific to IR were made to this variable list in consultation with IR faculty at our institution in order to better reflect additional variables of specific interest to IR trainees (Table 1). A variable was only considered to be present if available directly on pages linked by the IR website. For example, if social information about the city was listed on the diagnostic radiology website but not the IR website, it was not counted. However, if a link to social information on the diagnostic radiology website was included on the IR website, it was counted.

Table 1. List of residency website content variables.

Educational Content	Recruitment Content
Research Information	Program Director Contact Information
Didactics Schedule	Program Coordinator Contact Information
Rotation Schedule	Social Information
Call Schedule	Alumni (Fellowship) Information
Medical Student Away Rotation Information	Application Requirements
Current Fellows or Residents	Number of Positions
Operative Volume	Early Specialization in IR (ESIR) Information
List of Faculty	Intern Year Preferences
Faculty Profiles	Salary/Benefits
	Affiliated Hospital Information

For each website variable, the percentage of IR residency websites containing that variable was calculated. For each program website evaluated, the total number of variables that website contained was tabulated, and a website comprehensiveness score was calculated as the percentage of total website variables each program's website contained. A total of 19 variables were evaluated, thus a program expressing all 19 variables would be 100% comprehensive.

Additionally, websites were assessed for whether or not they were distinct ("stand-alone") from their associated diagnostic radiology program's website, as this was felt to be important given IR's now distinct application process. A residency website was considered stand-alone if it contained more than one page/link of information related to the interventional radiology program; residency websites that were only a single page on the associated diagnostic radiology

website with no additional links were categorized as not stand-alone websites.

Program Comparison

To assess potential factors that may be related to the presence or comprehensiveness of IR residency websites, IR programs were categorized based on geographic region and program size. Geographic region (Northeast, Midwest, South, West) was designated as classified by the U.S. Census Bureau. The total number of fellows in 2017, as gathered from the Society for Interventional Radiology (SIR) Training Program Directory, was used as a proxy for program size. The median program size was 3; therefore, programs were considered "small" if they had less than 3 fellows and "large" if they had 3 or more fellows. Number of residency positions was not used as a proxy for program size as even large programs rarely have more than three residency positions, and it was felt that the fellowship, present longer than the residency program, would likely be more related to development of the residency program's website.

Statistical Analysis

Analysis was conducted to determine whether geographic region or program size was associated with the presence or absence of a program website. Analysis was also conducted to determine whether geographic region or program size was associated with website comprehensiveness. χ^2 comparisons and Mann-Whitney tests/Kruskal-Wallis tests with post-hoc pairwise analysis were used for categorical and continuous variables, respectively. Threshold for significance was set at $p < 0.05$. SPSS version 24 statistical software (IBM Corporation, Armonk, NY) was used for statistical analysis. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. As all the information used for this study is in the public domain, this investigation was exempt from review by the institutional review board at the affiliated university.

RESULTS

Presence of Websites

A total of 69 programs were registered to participate in the 2018 integrated IR match. Of these, 74% (51/69) had locatable websites and 26% (18/69) did not. Of the 51 websites, 59% (30/51) were stand-alone interventional radiology websites, whereas 41% (21/51) were not. Information on program size (number of fellows) was available via the SIR Training Directory for 87% (60/69) of programs. These 60 programs were categorized into small ($n=28$) and large ($n=32$) as described under *Program Comparison* above. The remaining 13% (9/69) of programs that did not have information on program size were excluded from program size analysis. When grouping programs by size, there was a significant association between program size and the presence of a website

(χ^2 , $p=.001$). Specifically, 91% (29/32) of large programs had websites, whereas only 54% (15/28) of small programs had websites. There was no significant association between geographic region and the presence or absence of a website.

Website Assessment – Recruitment Content

The 51 available websites were assessed for the presence of the 10 recruitment variables as outlined in Table 1. The presence of alumni information (percentage of residency websites containing this content variable = 10%) and intern year preference information (27%) were among the lowest, while application requirements (63%) and hospital information (59%) were the highest (Figure 1).

Website Assessment – Education Content

The 51 available websites were assessed for the presence of the 9 education variables as outlined in Table 1. Information on medical student away rotations (10%) and call schedules (14%) were particularly low, whereas information on resident rotations (51%) was the highest (Figure 2). Additionally, 39% of websites listed IR faculty distinct from diagnostic radiology faculty, and 24% of websites included specific IR-related information on these faculty members (e.g. training institution, research interests).

Figure 1. Recruitment content on IR residency websites.

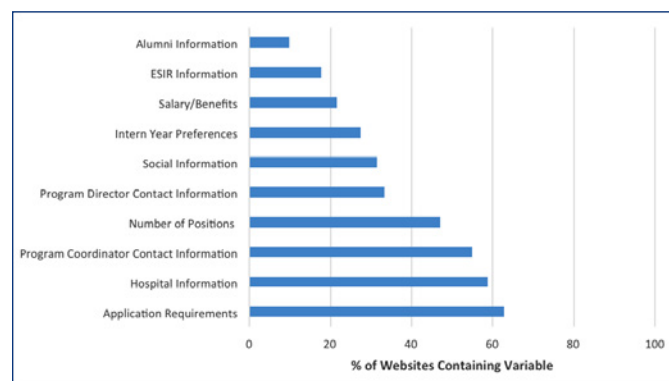
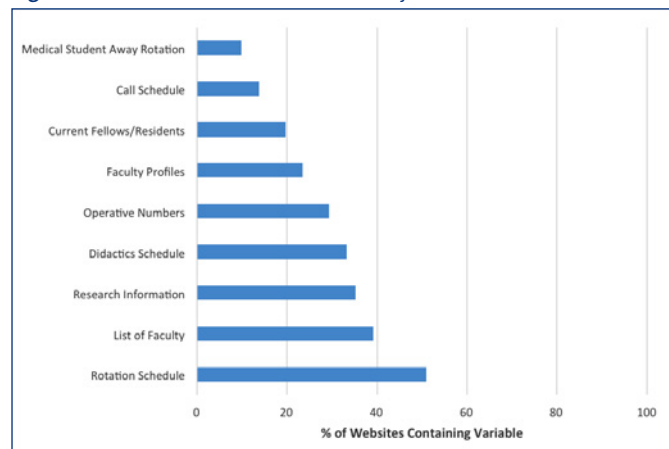


Figure 2. Education content on IR residency websites.



Website Comprehensiveness

The mean (SD) comprehensiveness score across all 51 websites was 33% (17%). When organizing programs by geographic region, there was a significant difference in website content (Kruskal-Wallis, $p=0.005$) (Table 2). Post-hoc pairwise analysis demonstrated that the mean comprehensiveness of Midwest program websites (43%) and Northeast program websites (37%) were each significantly greater than the comprehensiveness of West program websites (19%). When organizing programs by size, there was no significant difference in website comprehensiveness between large and small programs (Mann-Whitney, $p=0.071$). Program size information was not available for 14% (7/51) of websites, and therefore these were excluded from this program size analysis.

Table 2. Comparison of website comprehensiveness by program characteristics.

	N	Comprehensiveness %, Mean (SD)	P-value
Region			.005
Midwest	12	43 (17)*	
Northeast	18	37 (14)*	
South	12	26 (13)	
West	9	19 (16)*	
Program Size			.071
Small (<3 fellows)	15	38 (13)	
Large (>=3 fellows)	29	29 (18)	

* post-hoc pairwise comparison demonstrates $p\text{-value} < 0.05$

DISCUSSION

The present study evaluated the online presence of integrated IR residency programs for website availability and comprehensiveness. Only 74% of programs registered to participate in the 2018 integrated IR match had websites, and only 59% of these websites were stand-alone IR websites. Large programs were significantly more likely to have a website than small programs. Overall, IR program websites have room for improvement in terms of the content they provide.

For medical students, residency program websites are a nearly universally accessed source of information, as evidenced in a survey of anesthesia residency applicants that found that 98% of respondents consulted residency websites during the application process.⁸ Moreover, with the recent development and launch of integrated IR residency programs, it is expected that greater numbers of prospective applicants are utilizing the internet to learn about various programs, rendering IR residency websites increasingly important. Traditionally, IR has been a fellowship after diagnostic radiology residency. Therefore, residents have likely had multiple rotations in IR, established relationships with

mentors in the specialty, and had more time to learn about different programs before applying. Compared to this system, the new integrated residency model requires medical students to learn about programs with less time and exposure than radiology residents applying to IR fellowship traditionally would have had. Given that data suggests that most students become interested in IR relatively late in their medical school training,⁹ the need for publicly available, high quality online information is paramount.

The importance of program websites has been highlighted in radiology as well as other specialties.¹⁰⁻¹⁵ A survey of integrated IR applicants in the 2017 match conducted by DePietro et al. found that applicants ranked program websites as the number one most important resource for learning about programs, even more important than mentoring from attending physicians, away rotations, and residents.¹⁰ In a study of diagnostic radiology residency applicants by Deloney et al., 59% of respondents found residency program websites to be most useful when deciding where to apply and 44% found them useful when preparing for interviews.¹³ Additionally, residency websites have also been shown to have a tangible impact on program selection. This was further supported in a study of emergency medicine residency applicants, in which 78% of surveyed applicants reported that information from residency websites influenced their decision to apply to a program and 41% of applicants chose not to apply to a specific program based on the quality of their residency website.¹² A survey of neurosurgery residency applicants found that residency websites influenced 90% of respondents in choosing where to apply and aided more than half of applicants in ranking programs.¹⁵ These studies highlight the importance of program websites and their influence on prospective applicants.

Assessments of residency program websites conducted in other fields,³⁻⁷ including diagnostic radiology,² have nearly universally concluded that website content and accessibility were less than desirable and had room to improve. However, in comparing the comprehensiveness of website content between these other fields and the present study's findings for IR, IR websites tended to lag behind in many content variables. For example, the study of diagnostic radiology residency websites found that 63% of websites contained faculty information, 62% contained rotation schedules, and 59% contained research description or requirements,² while these values were 24%, 51%, and 35%, respectively, for IR. A similar, and in some instances starker, difference for these variables was noted when comparing IR websites to program websites for otolaryngology, plastic surgery, dermatology, and neurosurgery.^{3,4,6,7} These findings are unsurprising given that the integrated IR residency is only in its second full match, but do highlight an area that offers opportunities for improvement as the field matures.

There are several potential limitations of this study. This analysis only evaluated for presence or absence of specific

website content variables. It did not measure quality, level of detail, accuracy, or importance of the content. Moreover, these content variables were adapted from similar studies in other fields. However, it is possible that the relative importance of these variables for IR is different than it is for other fields. That said, the 19 content variables encompass a variety of domains that are of interest to students applying into IR and residency in general, and examining similar content variables assessed in prior studies allows for comparison with the findings of other specialties. Additionally, the review of each website is a subjective process and is inherently susceptible to observer bias. However, each website was reviewed by a single author (C.H.) using a similar approach in order to make the evaluation process as consistent as possible. Future studies may analyze what resources medical students applying into IR find valuable and how programs can best utilize online resources for resident recruitment.

CONCLUSION

Residency program websites are a valuable source of information and an important opportunity for programs to reach prospective applicants. Our findings suggest that there is room for improvement in IR residency websites. We believe that creating a residency website (for programs without one) and/or improving the content comprehensiveness of program websites would improve the availability of information for prospective applicants. In turn, this could help applicants and programs find the best fit, which is vitally important for the future of the integrated interventional radiology match.

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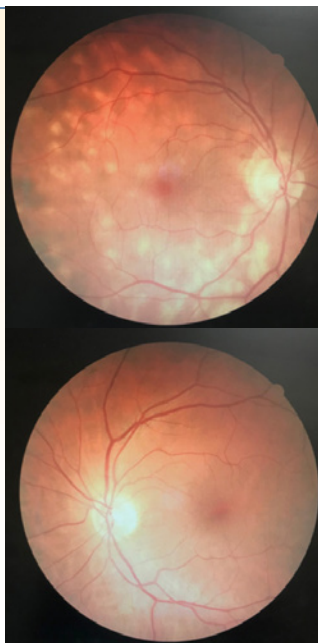
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