How Well Do We Represent Ourselves? A Student-Centric Analysis of Radiology Residency Website Content

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Introduction

The internet has become a widely utilized source of information for medical students applying to residency. While prominent sources of general residency information exist,[1,2] specific information pertaining to individual programs can often only be found within an institution's residency website. Applicants to a diagnostic radiology (DR) residency often cite program websites as the most useful and influential sources of information when deciding where to apply.[3,4] However, many studies reveal that across a multitude of specialties including internal medicine, otolaryngology, neurosurgery, orthopedic surgery, dermatology, and obstetrics and gynecology, such websites are not comprehensive enough to meet applicants' needs.[5-10] Hence, opportunities for improvement are evident.

To date there is no published study concerning the content of native DR residency program websites, though previous analyses have identified several elements viewed as important by applicants.[3,4,11-13] This includes content related to the application process, interviews, curriculum, benefits and salary, research, faculty, current residents, and clinical resources. Therefore, to provide quality improvement in accordance with applicants' preferences, it may be beneficial emphasize residency website content. The purpose of our study was thus to evaluate the content of existing DR residency websites.

Materials and Methods

All DR residencies listed on the American Medical Association Fellowship and Residency Electronic Interactive Database[1] (FREIDA) were queried for the presence of a dedicated website by authors S.N. and T.V. in December 2016. The majority of program entries in the FREIDA database listed website links directly; for programs that did not include a direct link in the FREIDA database, extensive manual searches for their respective institutions' websites were performed via Google and Bing search engines. Searches incorporated the name of the program along with combinations of the terms "diagnostic radiology," "DR," and "residency." Programs not found within the first 2 pages of Google or Bing results were defined to lack an accessible

dedicated website. Following previously established methodology for assessing comprehensiveness of residency websites,[6] we searched for the presence of 46 criteria (Table 1) based on factors identified to be important for medical students applying to residency[2,3,11-13]; any information addressed or described within the website or its subpages was categorized as present. Information that was not directly described within the website or its subpages were not categorized as present. Information linked out of the residency website was also not categorized as present. Data collection took place between December 2016 and January 2017.

Programs were divided into 4 regions based on location in accordance with U.S. Census designations: Midwest, West, South, and Northeast.[14] Similarly, programs were divided into quartiles by rank in accordance with their Doximity rankings.[15] Prevalence of assessed elements were then compared between regions of the country and Doximity program ranking by author P.Y., using VassarStats (http://vassarstats.net) to perform analysis of variance (ANOVA). Thresholds for significance were set at $P < 0.05$.

This study did not use or involve any human subjects; therefore, institutional review board approval was unnecessary.

Results

Of 189 DR residency programs, 2 small community programs lacked a dedicated website, leaving 187 (99%) available for analysis. Of these 187 programs, 14 (7%) had at least two-thirds of criteria assessed. Websites reported both a mean and median of 23 out of 46 items (50%), with a maximum of 38 items (83%), a minimum of 2 items (4%), and an interquartile range of 8 (19-27 items). Specific distributions of website elements are listed in Figures 1-5. The most frequent information included number of residents (181 of 187 programs; 97%), contact e-mail (162 of 187 programs; 87%), courses attended by residents (155 of 187 programs; 83%), current resident listings (147 of 187 programs; 79%), and facility descriptions (146 of 187 programs; 78%). The least common information included resident academic interests (14 of 187 programs; 7%), Chief Residents' Message (19 of 187 programs; 10%), resident research interests (20 of 187 programs; 11%), and international educational opportunities (22 of 187 programs; 12%).

When compared by region (Fig 6), Midwest and Western programs had significantly more items than those in the Northeast (24 items for Midwest and 23 items for West versus 18.2 for

TABLE 1
Presence of criteria sought on diagnostic radiology program websites

Information found on diagnostic radiology program websites
Application process
Link to ERAS
Contact email
Mailing address
Selection criteria
Interview process
Interview dates
Audition or visiting rotations
Recruitment
Chair message
PD message
Chief residents message
Department/program changes and/or news
Incentives
Salary
Benefits
Vacation
Meal allowance
Moonlighting
Information about surrounding area
Social life
Education
Description of didactics
Journal club
Meetings and conferences attended
Courses attended
4th year mini fellowship
International opportunities
Educational resources available to residents
Research
Research requirements
Active/past research projects in department
Research resources in the department
Support to present research
Clinical training
Comprehensive faculty listings
Facility description
Imaging equipment description
Case description
Rotation schedule
Responsibility progression
Call requirements
Career placement
Imaging and procedural numbers
Comprehensive faculty listings
Current resident information
Number of residents
Current resident listings
Resident photos
Resident education
Resident hometown
Resident research
Resident academic interests
Resident extracurricular activities

ERAS, electronic residency application service.

Northeast) [$P < 0.010$]. Comparing mean number of elements between Doximity ranking quartiles (Fig 7) showed no significant difference ($P = 0.062$).

Discussion

As applicants utilize residency website information in the decision making process,[4,5] ensuring adequate information sharing is important. To our knowledge, this study is the first of such studies in evaluating the specific content of DR residency program websites. Due to the highly individualized nature of applicant decision-making, we selected 46 criteria in an attempt to represent common preferences in the application process. While these criteria may be valued differently between applicants, they provide a framework for initial analysis and comparison of information that is otherwise difficult to

quantify objectively. As such, our results suggest that DR residency websites are often inconsistent and may not adequately address the needs of applicants.

It is important to represent the broad desires of applicants as individual preferences vary. For example, Deloney et al[3] reported that radiology residency applicants are interested in details of the application process, geographic location of the program, living conditions, and schedules. A survey of emergency medicine residency applicants by Gaeta et al[4] uncovered that curriculum information, hospital and patient information, faculty information, and information related to research activities were ranked as highly important. Phitayakorn et al[12] surveyed applicants to multiple specialties and found that preparation for a future position or fellowship, esprit de corps, faculty information, and variety of patients, and clinical resources were among the most desired pieces of information when selecting a residency program. Though applicant desires are variable, this study suggests that they may not be well-represented across websites. Of the 46 elements this study investigated, each website contained half on average (50%). Similar findings have been reported in otolaryngology[6] and neurosurgery.[7] This result offers DR residency programs an opportunity to improve website comprehensiveness.

There is some asymmetry in what is represented within websites. The most common piece of information addressed was the number of residents in the program (97%). However, specific information related to residents such as their research interests (11%), academic interests (7%), and a message from the Chief Residents (10%) were poorly represented and among the least commonly included information. This may be due in part by an underestimation of the importance applicants place on their work relationship with coresidents,[13,16] which can play a significant role in applicant assessment of potential future "fit" into the group. Similar variability can be seen between elements related to the education, research, and training processes. Less than half of assessed websites contained information related to journal club, international opportunities, current research projects and resources, and various aspects of clinical training. Many other curriculum-related elements such as didactic information, meetings/conferences attended, research requirements, courses attended, rotation schedule, and call requirements were represented in over half of websites. Only 1 element (courses attended), however, was represented in at least three-fourths of the websites Though this study does not assign relative importance of assessed criteria, it has been shown by Gaeta et al[4] that information related to the residency curriculum scored as the most important information sought by applicants. Given the importance of curriculum-related information, it therefore can be useful for administrators to include more detail in the description of their program's education and training process.

An interesting finding of this study discerns the regional variation of results. Midwestern and Western programs contained significantly more assessed items than programs in the Northeast. This is a surprising result, given that the Northeastern region has the highest concentration of programs (as confirmed using FREIDA's search tool and separating by state/region) and accordingly more local competition. Because the relative majority of DR residency programs are in the Northeast (62 programs), improvement in the comprehensiveness of the region's websites can strongly refine the results of future analyses. Regarding differences based on rank, no significant variation was found, indicating that academic ranking does not influence website comprehensiveness.

Limitations

There are several limitations to this study. Due to differences in navigability between websites based on individual layouts, it may be possible that some information was overlooked during data collection. This possibility is compounded by the fact that data was collected over a 1-month period of time, potentially allowing us to miss
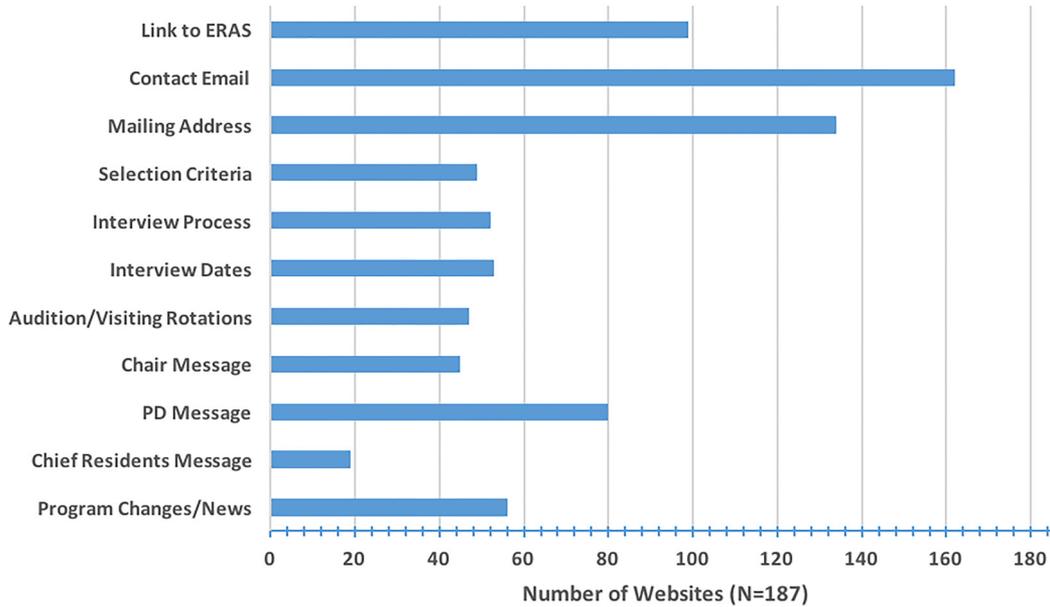
Application Process and Recruitment

FIG 1. The presence of information related to the application process and recruitment.
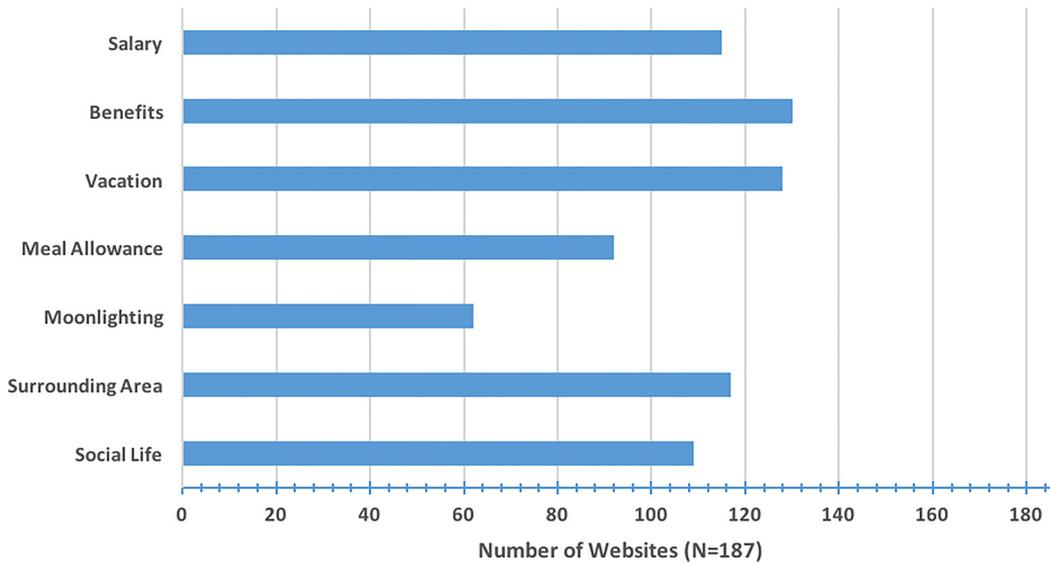
Incentives

FIG 2. The presence of information related to incentives.

updates between data collection and data analysis. Additionally, our study did not track the number of programs that did not have a direct link from FREIDA, which may have been useful in future similar analyses.

Some limitations pertain to this study's metrics and its ability to represent the applicant population. The selection of 46 criteria was based on reviews and surveys that identified common elements residency applicants seek in the decision-making process.[3-5,11-13] However, it is not feasible to create a model that adequately quantifies every applicant's values. As such, defining a comprehensive website, as well as validating the meaningfulness and influence of each criterion, are difficult. A list of 46 criteria may appear demanding, but

the individualized nature of the application process compels a broad list of metrics for assessment. We believe this methodology provides a capable scaffolding to observe the differences in DR website content and to measure the representation of common elements reported as important.[3-5,11-13]

In addition, some limitations pertain to administrative barriers toward implementing a comprehensive website. Such barriers may include a low priority placed on website content, a lack of understanding of comprehensive website importance, and a disconnect from applicant interests. Overcoming these barriers can be an important step toward improving communication with prospective applicants.
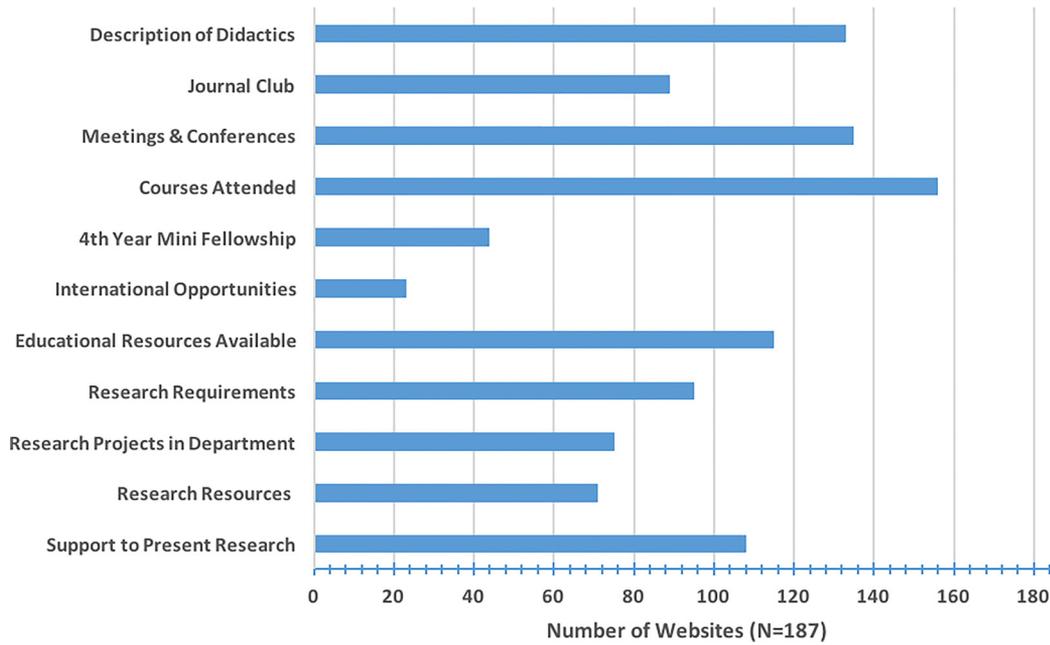
Education and Research

FIG 3. The presence of information related to the educational process and research.
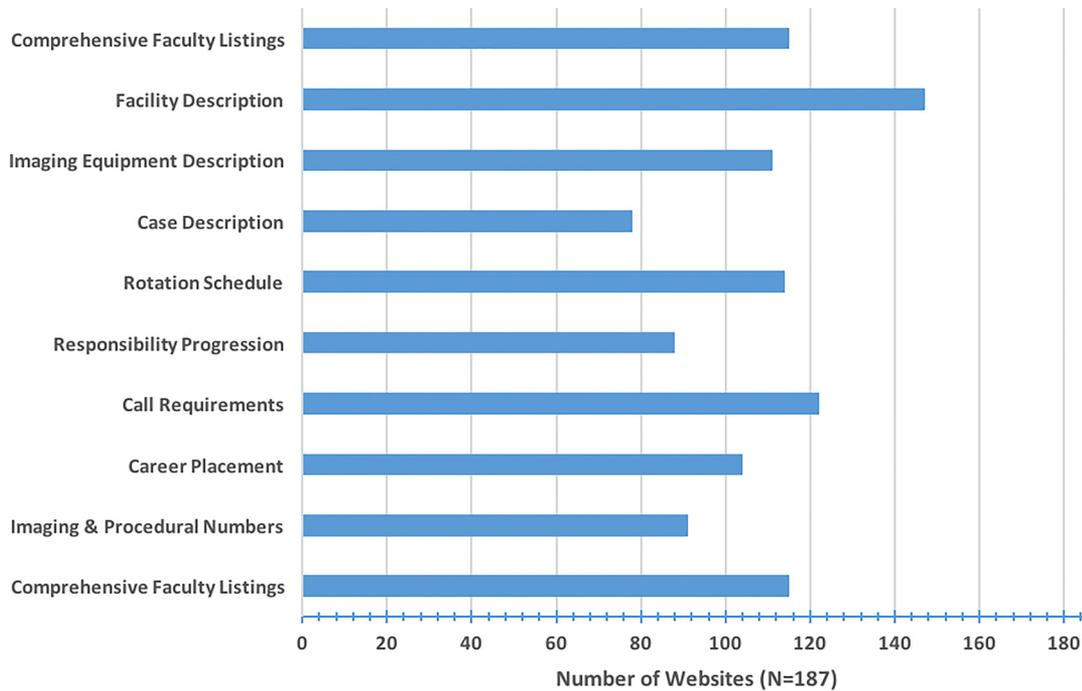
Clinical Training

FIG 4. The presence of information related to clinical training.

Conclusion

Residency websites play an influential role in conferring information to applicants, and they hold recognizable power in affecting application decisions. The results from our analysis show that DR residency websites are inconsistent and may not sufficiently address the values of applicants. Roughly half of the assessed criteria were present on each website. Few websites included a Chief Residents' message, information about resident academic and research interests, and information related to international educational opportunities; all are factors known to be important to medical students applying to DR residency. Information regarding didactics and clinical training,
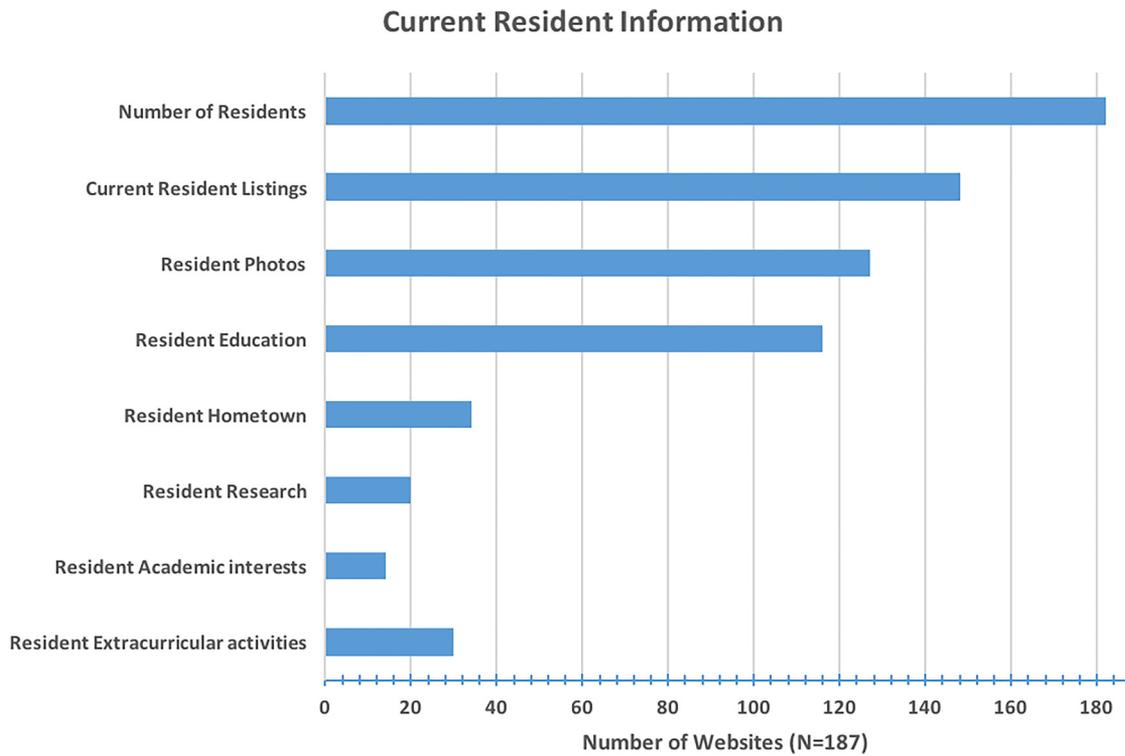
Current Resident Information

FIG 5. The presence of information related to current residents in the program.
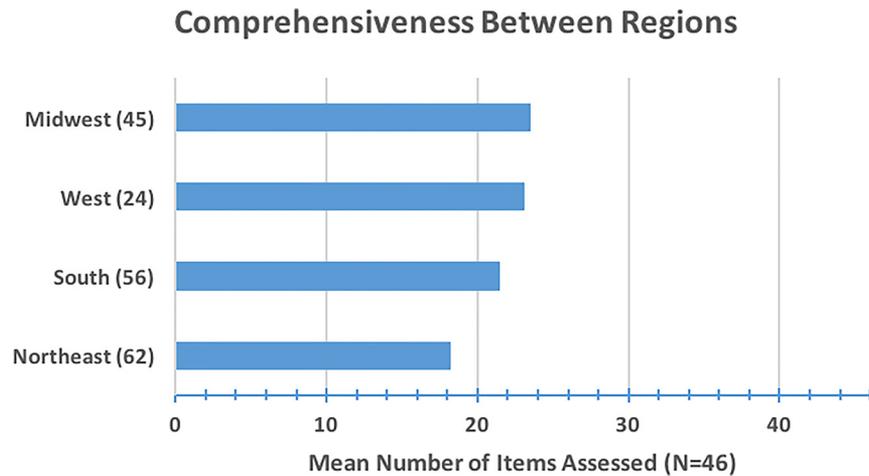
Comprehensiveness Between Regions

FIG 6. The mean number of items between programs separated by region. The Midwest contained 45 programs, the West contained 24 programs, the South contained 56 programs, and the Northeast contained 62 programs.
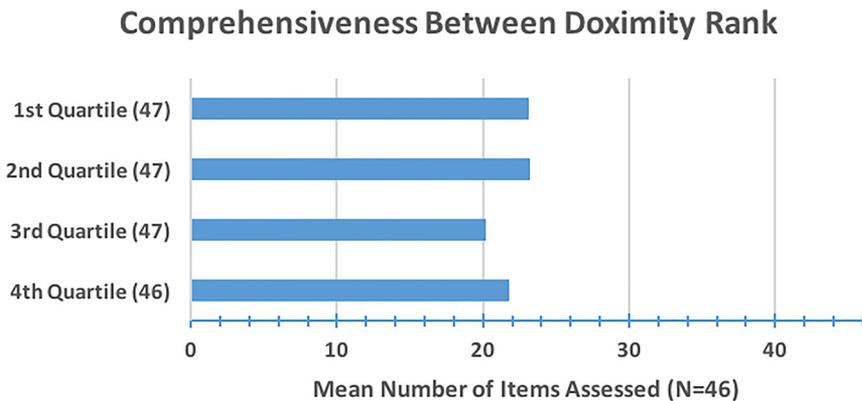
Comprehensiveness Between Doximity Rank

FIG 7. The mean number of items between programs separated by Doximity rank. Programs were grouped into quartiles based on Doximity rankings for Diagnostic Radiology residency. The 1st through 3rd quartiles each contained 47 programs, while the 4th quartile contained 46 programs.

also noted to have a pronounced importance for applicants, was inconsistently expressed between websites. Regional differences in comprehensiveness exist, with more elements expressed in Midwestern and Northeastern websites. Nevertheless, DR residency website content can be improved upon to be more comprehensive. Particularly, highly desired information related to the application process, program curriculum, and department research can be a strong first step towards that goal. Addressing important gaps in website content may help DR residencies better inform and recruit medical students into their programs and to DR as a specialty.

Conflicts of Interest

None.

References

1. Fellowship and Residency Electronic Interactive Database (FREIDA) Online. Available at: https://www.ama-assn.org/life-career/search-ama-residency-fellowship-database. Accessed December 1, 2016.
2. National Resident Matching Program (NRMP). Available at: http://www.nrmp.org/. Accessed November 23, 2017.
3. Deloney LA, Perrot LJ, Lensing SY, et al. Radiology resident recruitment: a study of the impact of web-based information and interview day activities. Acad Radiol 2014;21:931–7.
4. Gaeta TJ, Birkhahn RH, Lamont D, et al. Aspects of residency programs' web sites important to student applicants. Acad Emerg Med 2005;12:89–92.
5. Embi PJ, Desai S, Cooney TG. Use and utility of web-based residency program information: a survey of residency applicants. J Med Internet Res 2003;5:e22.
6. Svider PF, Gupta A, Johnson AP, et al. Evaluation of otolaryngology residency program websites. JAMA Otolaryngol Head Neck Surg 2014;140:956–60.
7. Skovrlj B, Silvestre J, Ibeh C, et al. Neurosurgery residency websites: a critical evaluation. World Neurosurg 2015;84:727–33.
8. Oladeji LO, Yu JC, Oladeji AK, et al. How useful are orthopedic surgery residency web pages. J Surg Educ 2015;72:1185–9.
9. Ashack KA, Burton KA, Soh J, et al. Evaluating dermatology residency program websites. Dermatol Online J 2016;22. Retrieved from https://escholarship.org/uc/item/7rx3j2dn.
10. Foster AM, Jackson CB, Martin SB. Reproductive health and cyber (mis)representations: a content analysis of obstetrics and gynecology residency program websites and applicants. Contraception 2008;78:99–105.
11. Charalel RA, Pua BB, Galla N, et al. Interventional radiology fellowship website content: what is the relevance to potential applicants. Clin Imaging 2016;40:1070–4.
12. Phitayakorn R, Macklin EA, Goldsmith J, et al. Applicants' self-reported priorities in selecting a residency program. J Grad Med Educ 2015;7:21–6.
13. Nuthalapaty FS, Jackson JR, Owen J. The influence of quality-of-life, academic, and workplace factors on residency program selection. Acad Med 2004;79:417–25.
14. United States Census Bureau â€" Regions. Available at: https://www.census.gov/geo/reference/webatlas/regions.html. Accessed December 1, 2016.
15. Doximity Residency Navigator. Available at: http://residency.doximity.com. Accessed December 1, 2016.
16. Ratanawongsa N, Wright SM, Carrese JA. Well-being in residency: effects on relationships with patients, interactions with colleagues, performance, and motivation. Patient Educ Couns 2008;72:194–200.