

Original Article

How comprehensive are nuclear medicine residency websites?

ABSTRACT

Our goal for this study was to evaluate the comprehensiveness of nuclear medicine (NM) residency websites from the USA and Canada. The authors searched all the existing NM residency programs as listed in the Fellowship and Residency Electronic Interactive Database and the Canadian Residency Matching Service. We analyzed each website for the presence or absence of 44 elements previously identified as important considerations for medical students applying to residency. We compared criteria prevalence between regions and program size using *t*-tests and analysis of variance. Our results showed that, of 47 NM residencies, 9 did not have a dedicated website, leaving a total of 38 websites available for evaluation. The individual websites in the USA had a mean of 15 of 44 elements sought; in contrast, Canadian programs had 26 of 44 elements sought. The most common elements included contact e-mail, mailing address, and comprehensive faculty listings. Information about resident hometown, academic interests, and extracurricular interests was only included in 3% of the websites. Only 3% of websites included case description and 11% included rotation schedule. Courses attended were included in 5%, educational resources in 8%, and resident education was included in 5% of the websites. In conclusion, about one in five NM residency programs do not have a publicly available website. The websites that do exist are incomprehensive, containing an average of only 32% of elements sought for the USA programs and 41% of elements sought in Canadian programs. Residency program websites are an important tool in recruiting medical students. Addressing the lack of available websites as well as the gap in content of the websites that does exist may improve recruitment of students to NM residency programs.

Keywords: Comprehensive, nuclear medicine, recruitment, residency, website

INTRODUCTION

The search for residency programs often starts with the Internet for prospective applicants. Often, the program website forms the first impression that a prospective applicant will make about a program.^[1] Accordingly, residency program websites have become a valuable source of information for medical students as they decide which programs to apply for.^[2] Prospective applicants are looking not only for the strength or reputation of the program, but also the right “fit.” Unfortunately, numerous studies have revealed an overall lack of comprehensiveness of residency websites spanning multiple specialties in the USA.^[3-7] These findings reveal an area for improvement for programs looking to better recruit medical students to their programs.


Such importance of residency website quality to informing and attracting prospective applicants is of particular relevance

to the field of nuclear medicine (NM). The number of NM residency programs continues to decrease in the USA, while the number of NM residency positions going unfilled in the match increases.^[8-10] Similarly, in Canada, a survey of radiology residents and academic radiology department heads showed that NM is a “less desirable subspecialty,” but the job market is great as the demand for NM physicians increases.^[11] It is more important now than ever to improve the recruitment process for NM. One potential strategy is for each program to maintain a comprehensive and relevant

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residency website. Although prior studies have assessed the comprehensiveness of residency program websites in a number of specialties,^[3-7,12,13] no prior study has evaluated NM residency websites.

Thus, the purpose of this study was to evaluate the comprehensiveness of NM residency program websites in the USA and Canada in order to identify potential areas for improvement in communication with and recruitment of potential residency applicants.

MATERIALS AND METHODS

In December 2016, we searched for all NM residencies listed on the American Medical Association Fellowship and Residency Electronic Interactive Database (FREIDA) (<https://freida.ama-assn.org>) as well as the five NM residency programs in Canada (<https://phx.e-carms.ca/phoenix-web/pd/main?mitid=1367>). For the programs that did not have a direct website link in the FREIDA database, we performed extensive searches through each institution's home page. To evaluate the comprehensiveness of each website, we followed previously established methodology^[3] which included extensive searching for the presence of 44 criteria [Table 1]; these criteria were previously identified as important considerations for medical students applying for residency programs;^[1-7] any information that was addressed in any capacity within the website was categorized as present.

We divided programs in the USA into four regions based on location: midwest, west, south, and northeast. Similarly, programs were divided into quartiles by rank in accordance with their doximity rankings (<http://residency.doximity.com>). We also compared website content between programs in Canada and the USA. Frequencies of the criteria assessed were compared between regions, between rank quartiles, and between program websites from Canada and the USA using Fisher's exact test and analysis of variance, with thresholds for significance set at $P < 0.05$.

Our study did not use or involve any human subjects, making institutional review board approval unnecessary.

RESULTS

Of 42 NM residencies in the USA, 9 (21%) did not have a dedicated website, leaving a total of 33 websites (79%) available for evaluation. The individual websites had a mean (SD) of 14.5 (4.6) of the 44 factors sought (32%). Only two programs had >50% of the factors sought (University of California San Francisco [52%, 23] and University of Alabama [54%, 24]). All five of the NM residencies in Canada

have a website. Only 2 factors of the 44 sought are contained in over half of the program websites (facility description: 60%; rotation schedule: 60%). The programs in Canada altogether lacked 26 of the 44 factors sought (59%).

Specific distributions of website elements are listed in Table 1. The most common elements in the USA included contact e-mail (100%), mailing address (100%), and comprehensive faculty listings (97%, 43). None of the available websites included resident research or residents' message. Information about resident hometown, academic interests, and extracurricular interests was only included in 3% (1) of the websites. Only 3% (1) of the websites included case description or rotation schedule. Courses attended, educational resources, and resident education were included in 6% of the websites. The most common elements in Canada included facility description (60%) and selection criteria (40%). There were 26 out of the 44 components that were not contained in any of the 5 Canadian residency program websites.

Comparisons of programs between Canada and the USA are also listed in Table 1. A significantly higher percentage of USA programs contained the following components: contact e-mail ($P < 0.0001$), mailing address ($P < 0.0001$), chair message ($P = 0.046$), department/program changes and/or news ($P = 0.006$), information about surrounding area ($P = 0.046$), social life ($P = 0.046$), meetings and conferences attended ($P = 0.046$), and comprehensive faculty listings ($P < 0.0001$). A significantly higher percentage of Canadian programs contained the following components: program director message ($P < 0.0001$) and rotation schedule ($P = 0.005$).

When comparing programs by their geographic region within the USA, there were no significant differences in the mean number of items available on each website [$P = 0.23$; Table 2]. Similarly, when comparing the mean number of items between quartiles of doximity ratings, there was no statistically significant difference [$P = 0.65$; Table 2].

DISCUSSION

Recently, NM has experienced a drop in the number of residency programs, and a large number (46%) of residency positions in the USA are going unfilled each year.^[8-10] In Canada, even though the job market is more favorable and the demand for NM physicians is increasing, Canadian residents report that specializing in NM is undesirable due to increased work burden.^[11] Accordingly, the need to maximize recruitment of medical students into the field and prospective applicants to specific programs is greater than ever. To help identify

Table 1: Presence of criteria sought on nuclear medicine program websites

Information found on nuclear medicine program websites	Number of websites (all) (n=38), n (%)	Number of websites (USA) (n=33), n (%)	Number of websites (Canada) (n=5), n (%)	P
Application process				
Link to ERAS (application)	12 (32)	11 (33)	1 (20)	0.66
Contact email	33 (87)	33 (100)	0	<0.0001*
Mailing address	34 (89)	33 (100)	1 (20)	<0.0001*
Selection criteria	5 (13)	3 (9)	2 (40)	0.12
Interview process	5 (13)	4 (12)	1 (20)	1
Interview dates	1 (3)	1 (3)	0	1
Recruitment				
Chair message	19 (50)	19 (58)	0	0.046*
PD message	4 (11)	3 (9)	1 (20)	<0.0001*
Residents' message (chief or otherwise)	0	0	0	1
Department/program changes and/or news	23 (61)	23 (70)	0	0.006*
Incentives				
Salary	9 (24)	9 (27)	0	0.312
Benefits	12 (32)	12 (36)	0	0.16
Vacation	7 (18)	7 (21)	0	0.56
Meal allowance	7 (18)	7 (21)	0	0.56
Moonlighting	6 (16)	6 (18)	0	0.57
Information about surrounding area	19 (50)	19 (58)	0	0.046*
Social life	19 (50)	19 (58)	0	0.046*
Education				
Description of didactics	8 (21)	7 (21)	1 (20)	1
Journal club	13 (34)	12 (36)	1 (20)	0.64
Meetings and conferences attended	19 (50)	19 (58)	0	0.046*
Courses attended	2 (5)	2 (6)	0	1
Educational resources available to residents	3 (8)	2 (6)	1 (20)	0.35
Research				
Research requirements	6 (16)	6 (18)	0	0.57
Active/past research projects in department	15 (39)	14 (42)	1 (20)	0.63
Research resources in the department	11 (29)	10 (30)	1 (20)	1
Support to present research	8 (21)	8 (24)	0	0.34
Clinical training				
Comprehensive faculty listings	32 (84)	32 (97)	0	<0.0001*
Facility description	14 (37)	11 (33)	3 (60)	0.34
Case description	1 (3)	1 (3)	0	1
Imaging equipment description	17 (45)	16 (48)	1 (20)	0.36
Rotation schedule	4 (11)	1 (3)	3 (60)	0.005*
Responsibility progression	8 (21)	6 (18)	2 (40)	0.56
Call requirements	10 (26)	10 (30)	0	0.3
Career placement	5 (13)	5 (15)	0	0.59
Imaging and procedural numbers	5 (13)	4 (12)	1 (20)	1
Imaging and procedural types	6 (16)	5 (15)	1 (20)	1
Current resident information				
Number of residents	13 (34)	12 (36)	1 (20)	0.64
Current resident listings	12 (32)	11 (33)	1 (20)	0.66
Resident photographs	10 (26)	10 (30)	0	0.3
Resident education	2 (5)	2 (6)	0	1
Resident hometown	1 (3)	1 (3)	0	1
Resident research	0	0	0	1
Resident academic interests	1 (3)	1 (3)	0	1
Resident extracurricular activities	1 (3)	1 (3)	0	1

*Statistically significant difference between the USA and Canadian websites, defined as $P < 0.05$. ERAS: Electronic residency application service; PD: President

Table 2: Comprehensiveness of nuclear medicine program websites organized by region and doximity ranking

Variable (n)	Mean number of 44 items addressed (%)	SD
Overall (33)	11.4 (26)	5.5
Region		
Midwest (9)	10.9 (25)	4.0
West (6)	8 (18)	3.3
South (11)	13 (30)	6.0
Northeast (7)	13.2 (30)	7.2
Dximity ranking quartile		
1 st (10)	11.7 (27)	6.2
2 nd (10)	12.9 (29)	6.5
3 rd (8)	9.7 (22)	4.8
4 th (5)	10.6 (24)	2.3

SD: Standard deviation

potential areas for improving potential applicant recruitment, we assessed the comprehensiveness of NM residency websites in the USA and in Canada. We identified three main areas of improvement: (1) approximately one in five residency programs do not have a website in the first place; (2) the websites in both the USA and Canada lack a majority of the factors sought, and are therefore not comprehensive; (3) the information that is contained within the websites did not correspond with factors that previous studies and surveys of residency applicants found most important; and (4) all Canadian programs that exist do have information online, but over half of the 44 factors sought are not present on any of the websites.

Perhaps, the most striking finding of our study is that approximately one in five NM residency programs searched for did not have a program website. This is a disadvantage to NM as a specialty, especially when compared to other surveyed specialties in which 93%–98% of programs in that area do have a publicly accessible website.^[3,4,6] Studies in general surgery and orthopedic surgery have shown a lack of accessible websites, similar to our findings, with 27%–29% of residency program websites missing.^[12,13] At any rate, the current lack of accessible websites may hinder applicant and program communication.

For applicants to better assess the “goodness of fit” of each program, it is important that each program provides a comprehensive website. Of the 33 programs in the USA that did have an accessible website, an average of only 32% of the factors sought were present within each website. Only two programs contained over 50% of the factors. The five Canadian programs lacked 59% of the factors sought. Our data align with the lack of comprehensive websites across a number of different specialties.^[3-7,12,13] Without comprehensive program websites, applicants are obligated to base their application decisions on incomplete information. This incompleteness of NM residency websites is particularly concerning when considering that the

number of NM programs has dropped between the academic years of 2009–2010 and 2015–2016 by 23% and the number of residents has dropped by 48%; furthermore, in the 2015–2016 academic year, 54% of NM residency slots went unfilled.^[8-10] Program websites are thus an area to be improved, especially for programs looking to enhance their recruiting process in a specialty with spots going unfilled in the match.

Websites containing information most pertinent to applicants are crucial to the residency recruitment process. Previous studies have sought to determine the information that applicants place the highest value on during the application process. A survey of highly ranked applicants to residency programs of multiple specialties at two academic medical centers revealed the following features to be the most important features included within a program website: a variety of patients and clinical resources, preparation for next training (fellowship) position or first job, resident morale, and information about depth, breadth, and involvement of faculty.^[14] A survey of medical students applying to a radiology residency program showed that the most important factors affecting how they would eventually rank programs included perceived happiness of current residents, geographic location, and academic reputation.^[15] Furthermore, in the same survey, medical students rated program websites more important in affecting their ranking of programs than written materials that were provided. Our data showed that the most common elements included in program websites were contact e-mail and faculty listings. The least common elements included within NM program websites were those regarding current residents as well as curriculum. Not only are the NM program websites incomprehensive, but also a majority do not contain the information that surveyed applicants find most valuable. A search similar to ours throughout otolaryngology residency program websites revealed that, although still not comprehensive, websites contained factors important to applicants such as information about curriculum and current residents.^[3] It is worth mentioning, however, that opinions regarding the most valuable information to applicants may vary. This reinforces the importance of creating and maintaining comprehensive NM program websites to better recruit all applicants.

When comparing program websites between the USA and Canada, more than half (59%) of the 44 factors sought were nonexistent throughout all Canadian program websites. In a survey of Canadian radiology residents, NM was deemed “undesirable” due to the demand for NM physicians and the increase in stress for the physicians in the field because of that demand. The job market in Canada for many specialties is perceived to be quite favorable by department heads and they predict that the demand for many specialties will continue to

increase.^[11] This same survey reported the most important aspects in making a decision of specialty which included interesting work, work hours/call schedule, job stability, and job availability.^[11] The lack of information regarding case descriptions, call requirements, and career placement is the potential area to address on these websites in order to better recruit applicants to programs.

When comparing program websites based on location and rank, there was no statistically significant difference observed. These findings suggest that regional and academic ranking does not influence the comprehensiveness of a program's website.

It is important to keep in mind the limitations of our study. The first limitation is the difference between structures of each program website. Despite our effort to perform an extensive search of each website, it is possible that we missed the presence of certain elements due to the varying locations of each element from program to program. Nevertheless, we attempted to conduct the most objective and complete search of each website, including manually searching through PDFs and other materials provided on each website; unfortunately, some websites were much more difficult to navigate than others. Another important limitation is the variation in priorities of each applicant. The priorities of each applicant are subjective and our criteria may not be exhaustive in covering each factor that is valuable to each applicant. Finally, we recognized that 9 out of the 42 residency programs did not have accessible websites. It is impossible to determine whether the theoretical presence of the missing websites would change our data or parallel it. We hope that future analysis of NM websites will produce evidence of more comprehensive websites overall.

CONCLUSION

NM has recently experienced a drop in the number of residency programs as well as an inability to fill all spots in the match in the USA. In Canada, NM is perceived as undesirable due to stress from the high demand for NM physicians. Although many studies have been performed to evaluate program websites for residency programs, this is the first for NM residencies. There are great implications, especially now, regarding the findings of our study. Our research showed that the NM residency program websites in the USA that do exist contain an average of about 32% of the factors, and the five Canadian programs lack 59% of the factors that our authors determined as important to include. Furthermore, some programs do not have websites. These findings reveal an area in need of significant improvement in the recruitment

process for NM residency programs. More comprehensive websites, and in turn better recruitment, may allow for an increase in the number of applicants to each program as well as an ability for those applicants to perceive the strength and fit of each program.

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Conflicts of interest

There are no conflicts of interest.

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