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Commentary

Evaluating Dermatology Residency Program Websites

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Abstract

Background: Internet resources play an important role in how medical students access information related to residency programs. Evaluating program websites is necessary in order to provide accurate information for applicants and provide information regarding areas of website improvement for programs. To date, dermatology residency websites (DRWS) have not been evaluated. This paper evaluates dermatology residency websites based on availability of predefined measures.

Methods: Using the FREIDA (Fellowship and Residency Electronic Interactive Database) Online database, authors searched for all accredited dermatology program websites. Eligible programs were identified through the FREIDA Online database and had a functioning website. Two authors independently extracted data with consensus or third researcher resolution of differences. This data was accessed and archived from July 15th to July 17th, 2015.

Primary outcomes measured were presence of content on education, resident and faculty information, program environment, applicant recruitment, schedule, salary, and website quality evaluated using an online tool (WooRank.com).

Results: Out of 117 accredited dermatology residencies, 115 had functioning webpages. Of these, 76.5% (75) had direct links found on the FREIDA Online database. Most programs contained information on education, faculty, program environment, and applicant recruitment. However, website quality and marketing effectiveness were highly variable; most programs were deemed to need improvements in the functioning of their webpages. Also, additional information on current residents and about potential away rotations were lacking from most websites with only 52.2% (60) and 41.7% (48) of programs providing this content, respectively.

Conclusions: A majority of dermatology residency websites contained adequate information on many of the factors we evaluated. However, many were lacking in areas that matter to applicants. We hope this report will encourage dermatology residency programs to improve their websites and provide adequate content to attract the top residents for their respective programs.

Abbreviations and Acronyms:

NRMP – National Residency Matching Program

AMA – American Medical Association

FREIDA –Fellowship and Residency Electronic Interactive Database

DRWS – Dermatology Residency Websites

GME – Graduate Medical Education

SEO –Search Engine Optimization

AAMC – Association of American Medical Colleges

VSAS – Visiting Student Application Service

Introduction

Dermatology programs develop reputations based on faculty achievement, community involvement, and the resident learning environment. To continue attracting qualified applicants, programs must appeal to prospective residents through means of advertisement, a critical step in the application process [1]. This advertising has evolved from print to internet based resources. Since the 1990s numerous studies have evaluated the efficacy of residency websites in attracting applicants. In emergency medicine, 41% of applicants based their decision to apply depending on information presented on the residency website [2, 3]. Among anesthesia applicants, only 2% found that websites provided all the information that they were looking for [4]. Three out of the 99 program websites for otolaryngology had at least three-quarters of the criteria desired, such as faculty listing, rotation schedule, and research [1-3, 5].

Today we continue to see the growing trend in popularity of web-based resources for residency applicants. Students often gather preliminary data with resources such as the National Residency Matching Program (NRMP) and the American Medical Association (AMA) Fellowship and Residency Electronic Interactive Database Online (FREIDA) database to gather preliminary data. However, program specific information is often only found on the institution's website. Faculty information, residency curriculum, and research opportunities are important factors that influence a student's decision to apply and interview at the respective institution [6]. In addition, the visual appearance, utility, and usability of the website contribute to the overall quality of the website [7], which also has the potential to influence the applicant on their decision to apply.

Several reports evaluated residency websites in the fields of general surgery, emergency medicine, and anesthesia. However, dermatology residency website (DRWS) quality remains overlooked [3, 4, 8]. This study assesses both quality and content of each DRWS in hopes to provide dermatology programs information about how to improve the quality of their DRWS and highlighting the strengths of their program to applicants.

Materials and methods

Authors searched for dermatology residencies within the United States using the FREIDA Online database. FREIDA Online is a database maintained by the AMA and the Association of American Medical Colleges via the annual National Graduate Medical

Education (GME) Census that catalogs information and statistics on more than 9600 graduate medical education programs accredited by the Accreditation Council on Graduate Medical Education. Training programs can be identified by specialty, state, keywords, or training institution [8, 9].

Website evaluation criteria

Authors accessed each program’s website through FREIDA Online or Google and evaluated them based on the availability of information regarding the following categories and subcategories: education, resident and faculty information, program environment, and applicant recruitment. Availability of a welcome letter or program description as well as overall website quality and marketing effectiveness were also evaluated. These criteria have been used in previous studies for other residency programs (i.e. general surgery, orthopedic surgery, etc.) and were applied to the current study (Table 1) [8, 9].

The links provided on FREIDA Online for all accredited dermatology program websites were used to access each DRWS. If the link was broken, the program was found by Google search. Content and quality categories were split into three sections. Two authors independently extracted data for each section with consensus or third researcher resolution of differences.

This data was collected over a three-day period from July 15th to July 17th, 2015. Also, each webpage and internal link used to evaluate each program’s website was archived using Internet Archive: Wayback Machine (a digital library), or manually by archiving the website to a folder stored on the author’s computer [5].

Website quality

Authors used an SEO tool (WooRank.com) to evaluate website quality and marketing effectiveness. From the reports generated by the SEO tool, data on the following variables were extracted: Overall quality, site speed, custom 404 page, favicon (a shortcut icon), indexed pages, email privacy, trust or safety, broken links, and mobile friendliness [5, 10, 11]. For website quality, programs received a letter grade (A-E) if it was an internal page to the affiliated hospital’s main website or a number grade 0-100 if the dermatology program website was the main homepage of the website. Explanations of how the remaining variables were reported can be found in Table 1. These variables were chosen based on the authors’ opinions of what was best available for each website and a better indication of website quality.

Using the SEO tool, the authors also recorded data on other variables that were not used to assess website quality. These other variables were program website ranking in the world and in the United States, website traffic, top three accessing countries outside of the United States, and presence of social media or links to social media pages within the website.

Table 1. Categories evaluated for each program website.

Category	Subcategory evaluated
1. Education ^a	Journal club Program Newsletter Grand rounds Didactics Clinical rotations and electives Research opportunities
2. Resident Information ^a	Resident listing Resident photograph Additional resident information
3. Faculty Information ^a	Faculty listing Faculty photograph Additional faculty information Faculty contact information
4. Environment ^a	Hospital statistics or information Any social information (neighborhood, local attractions, social activities)
5. Applicant Recruitment ^a	Applicant information Interview process Away rotation information Program contact information ERAS (Electronic Residency Application Service) link
6. Other ^a	Work hours Mentorship (resident-attending, medical student-

	attending, medical student-resident)
7. Website Quality	Overall quality ^b Site loading time ^c Custom 404 page ^d Favicon ^d Indexed pages ^e Email privacy ^d Trust or Safety ^f Broken links ^g Mobile friendliness ^h

^aThe program must have included sufficient explanation about each of the above categories to receive credit. For website quality subcategories, unless specified, was reported as being either present or absent.

^bFor overall quality, the program webpage was assigned a letter grade or a number 0-100 using a grading scale. The number grading scale is for the main homepage and gives a more detailed and deeper analysis of the complete website. When reviewing one of a website's internal pages the grading scale is in the form of alphabets. These types of reviews are ranked using a letter system, with "A+" being the highest rank and "E" being the lowest.

^cSite loading time was rated as poor ($x \geq 1$ second), to improve ($0.8s \leq x < 1s$), or very good ($x < 0.8s$)

^dVariable reported as "yes" or "no"

^eIndexed pages were rated as none ($x < 1$), poor ($x = 1$), to improve ($1 < x < 300$), or very good ($x \geq 300$)

^fTrust or Safety was reported as "Pass" or "Fail"

^gBroken links are reported as a "yes" if they had 1 or more broken links and "no" if there were 0 broken links

^hMobile friendliness was reported per the SEO tool as poor, fair, good or very good

Results

The FRIEDA Online database reported 119 total accredited dermatology residency programs. Of these programs, there was one duplicate link and two programs merged into one, leaving 117 total accredited dermatology residency programs for analysis. Of these 117 programs, 1.7% (2) did not have DRWS and were not included in our data set. Of the remaining 115 dermatology programs analyzed in our data set, 85.2% (98) had links to a website from FREIDA Online with 76.5% (75) leading directly to the DRWS and 23.5% (23) leading to the affiliated hospital website. The remaining 14.8% (17) of program websites were found through Google search engine.

When analyzing pages for educational-related content (Table 2), 95.7% (110) of DRWS provided a program description; 68.7% (79) presented information about journal clubs, 76.5% (88), grand rounds, 79.1% (91), conference schedules, 78.3% (90) didactics, 87.8% (101) rotation and elective listings or description, and 86.1% (99) research opportunities. In addition, 8.7% (10) had a newsletter either on their website or provided a link to a newsletter developed by their program.

Table 2. Educational Information

Program Description	95.7% (110/115)
Journal Club	68.7% (79/115)
Newsletter	8.7% (10/115)
Grand Rounds	76.5% (88/115)
Conference	79.1% (91/115)
Didactics	78.3% (90/115)
Rotations & Electives	87.8% (101/115)
Research Opportunities	86.1% (99/115)

Regarding resident information, 64.3% (74) of DRWS provided a list of current residents, 54.8% (63) had photographs of some or all of their residents, and 52.2% (60) provided additional information such as hometown, medical school attended, research interest, hobbies, or contact information (Table 3).

Table 3. Resident Information

Current Resident Listing	64.3% (74/115)
Resident Photograph	54.8% (63/115)
Additional Resident Information*	52.2% (60/115)

*Additional resident information consisted of hometown, undergraduate institution, medical school attended, clinical or research interests, and interests.

With respect to faculty information, 89.6% (103) of DRWS listed current faculty; 82.6% (95) provided pictures of some or all of their faculty; and 82.6% (95) provided additional information such as medical school attended, residency program attended, degrees earned, biography, research interest, or publications. Contact information was provided by 62.6% (72) for some or all of their faculty members including telephone number or email address (Table 4).

Table 4. Faculty Information

Current Faculty Listing	89.6% (103/115)
Faculty Photograph	82.6% (95/115)
Additional Faculty Information*	82.6% (95/115)
Faculty Contact Information	62.6% (72/115)

*Additional faculty information consisted of medical school attended, residency program attended, degrees earned, a biography, research interest or publications.

For program environment, 81.7% (94) of DRWS had information about hospitals utilized by the program or patient demographics within the dermatology clinic. Social information, such as neighborhood information, local attractions, or activities was provided by 37.4% (43).

A dedicated section or link for applicant recruitment information (Table 5) was provided by 88.7% (102) of the websites. The interview process was described by 64.3% (74) of DRWS. Information about away rotations was exhibited by 41.7% (48) and 83.5% (96) provided program contact information. A link to the Electronic Residency Application Service (ERAS) was provided by 62.6% (72).

Table 5. Applicant Recruitment

Applicant Information	88.7% (102/115)
Interview Process	64.3% (74/115)
Away Rotation Information	41.7% (48/115)
Program Contact Information	83.5% (96/115)
Link to ERAS	62.6% (72/115)

Information about work hours or examples of weekly, monthly, or yearly work schedules could be found in 36.5% (42) DRWS. In addition, 8.7% (10) had information on resident-faculty mentorship, medical student-resident mentorship, or medical student-faculty mentorship.

For website quality, programs received either a letter grade (A-E) if the DRWS was an internal page to the affiliated hospital's main website or a number grade 0-100 if the DRWS was the main homepage of the website. Based on this, 20% (23) of dermatology residency program websites were the main homepage of the website and 80% (92) were internal pages of the main hospital website. Of those programs that provided information on a main homepage, the average grade was 56.8 out of 100, ranging from 34.9 to 91.7. For the programs with websites that were internal pages, 11% (11) received an A+, 23.9% (22) received an A, 42.4% (39) received a B, 18.5% (17) received a C, and 3.3% (3) received a D (Tables 6 & 7).

Mobile friendliness was also assessed. There was no rating for this parameter in 7.8% (9). Ratings of poor 51.3% (59), fair 5.2% (6), good 7.8% (9), and very good 27.8% (32) were assigned to the programs evaluated. We also looked to see if any of the programs had a presence in social media, either by direct links on their webpage or by Google. We found that 6.1% (7) met this criterion. All other data regarding website quality variables can be found in Table 8.

With respect to countries outside of the U.S. accessing American DRWS, India provided the most website traffic, followed by Canada, North Korea, Philippines, and China.

Discussion

Web-based information continues to shape the educational process of today's growing medical professionals. With this in mind, residency programs across all specialties are attempting to better understand the importance of online advertising for their programs. Although website quality and content has been assessed for other medical specialties, this study is the first to apply website quality metrics to dermatology residency programs.

Many applicants use FREIDA Online to gain initial access to residency program websites [3]. We found 76.5% of DRWS had links in FRIEDA Online that directly lead to their residency websites. In order to enhance accessibility for potential applicants,

dermatology residency programs may consider updating their links with FREIDA on an annual basis. They may also consider changing their links to provide direct access to their dermatology program website instead of the general hospital's website [4].

Website content including rotation schedule, community information, and listing of current residents are of high importance to applicants [12]. We found most websites (95.7%) had a program description, but very few had a newsletter (8.7%). Resident information presented on DRWS was often lacking with 64.3% providing a current resident listing and 54.8% providing resident photographs. Faculty information was provided on 89.6% of websites, but in many cases contact information (phone or email) was absent. Biographies and contact information of residents and faculty are considered invaluable to applicants [2].

With regard to applicant recruitment, we found that a majority of programs had applicant information but lacked away elective rotation information. A possible reason for this trend is that many programs post this information on the separate AAMC's (Association of American Medical Colleges) Visiting Student Application Service (VSAS) website.

Although many surveys have tried to understand the content presented in residency websites, the overall quality is also an important factor that may influence an applicant. This study found that most DRWS had poor website speed correlating with a site loading time of more than one second. Website speed is an important aspect of website quality and plays an enormous role in the user experience. Usability, another important factor in website quality, was also evaluated in our report. According to our data, most of these factors, excluding website trust and safety, were lacking in more than half of DRWS. These are factors that have been noted by WooRank.com as easy to solve and should be considered by programs trying to improve their websites.

With the popularity of smart phones among the general public and especially amongst medical students, it was important to evaluate mobile friendliness of a DRWS. We found more than half websites were considered "poor" in this category.

In terms of marketability, the program utilized also looked at which countries provided the most website traffic. Interestingly, we found that internet users in India most frequently visited dermatology residency websites, followed by Canada, North Korea, Philippines, and China. Even though the percentage of international medical students being accepted into American dermatology residencies is traditionally only 3-4%, this could be useful information for targeted recruitment [13].

Our study was not without limitations. Although we had two authors extracting each data point, some of the content may have been overlooked and not accounted for. This can be attributed to the fact that some of the websites were complicated in terms of navigation and organization. Also, WooRank.com, the tool we used to evaluate website quality, is not comprehensive. This tool also did not evaluate the visual appearance of a website, which is an important aspect in website design [14]. Lastly, our data was collected over a three-day period in July of 2015. This is important because web content may be updated on a daily basis, meaning residency programs might have changed their content and overall design during this study.

In our study we looked at both the content and quality of DRWS across the nation and found there are several factors, such as more content about residents, away elective rotations, and website quality improvements, that dermatology programs can improve when redesigning or updating their websites. Although some of this information may be considered confidential, such as contact information for residents, it is something that medical students actively seek when navigating program websites. Table 9 provides examples of areas to improve for programs receiving a poor grade in overall website quality (less than a 70 or a B). Upcoming studies can measure the response by comparing results collected today with those in the future.

Table 6. Grades (0-100) of Dermatology Residency Websites listed from best to worst on July 16, 2015 (Homepage only)

Institution	Grade ^a
Stanford University School of Medicine	91.7
Yale School of Medicine	65.3
Medical College of Wisconsin	65.1
Jackson Memorial Medical Center	63.8
Kaiser Permanente Southern California	63.1
Wayne State University School of Medicine	62.6
Saint Louis University School of Medicine	61.9
University of Florida College of Medicine	61.7
Duke University School of Medicine	59.6
University of Wisconsin School of Medicine and Public Health	57.5

Washington University School of Medicine	56.9
University of Arkansas for Medical Sciences	56.3
David Geffen School of Medicine at UCLA	55.4
Columbia University Medical Center	54.7
University of Pittsburgh Medical Center	53.6
University of California, San Francisco School of Medicine	53.3
Emory University School of Medicine	52.3
Case Western Reserve University School of Medicine	51.5
Ohio State University College of Medicine	50.8
University of California, Irvine School of Medicine	47.1
Weill Cornell Medical College	46.6
University of Minnesota Medical School	41.7
Harbor-UCLA Medical Center	34.9

^aA score of >70 means that your website is well optimized. A rank <40 means there are a lot of areas to improve on your website.

Table 7. Grades (A-E) of Dermatology Residency Websites listed from best to worst on July 16, 2015 (Internal page only)

Institution	Grade
Eastern Virginia Medical School	A+
Icahn School of Medicine at Mount Sinai	A+
John Hopkins School of Medicine	A+
Mayo Medical School, Arizona	A+
Mayo Medical School, Jacksonville	A+
Mayo Medical School, Rochester	A+
North Shore-LIJ Health System	A+
Tufts Medical Center	A+
University of Texas at Austin – Dell Medical School	A+
University of Texas Southwestern Medical Center	A+
Wake Forest School of Medicine	A+
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Baylor College of Medicine	A
Boston University School of Medicine	A
Case School of Medicine at Metro Health Medical Center	A
Cook County Health and Hospitals System	A
Drexel University College of Medicine	A
Henry Ford Health System	A
Massachusetts General Hospital	A
Northwestern University Feinberg School of Medicine	A
Oregon Health & Sciences University	A
San Antonio Uniformed Services Health Education Consortium	A
SUNY Downstate Medical Center	A
Thomas Jefferson University Sidney Kimmel Medical College	A
University of Alabama School of Medicine	A
University of Colorado Denver School of Medicine	A
University of Iowa Carver College of Medicine	A
University of Kansas Medical Center	A
University of Maryland Medical Center	A
University of Massachusetts Medical School	A
University of Mississippi School of Medicine	A
University of Oklahoma College of Medicine	A
University of Virginia School of Medicine	A
Virginia Tech Carilion School of Medicine	A

Albert Einstein College of Medicine of Yeshiva University	B
Baylor University Medical Center at Dallas	B
Brown University's Warren Alpert Medical School	B
Cleveland Clinic Lerner College of Medicine	B
Cooper Medical School of Rowan University	B
East Carolina University/Vidant Medical Center	B
George Washington University School of Medicine and Health Sciences	B
Indiana University School of Medicine	B
Louisiana State University Health Science Center School of Medicine	B
Marshfield Clinic - St. Josephs Hospital	B
Medical College of Georgia – Georgia Regents University	B
MedStar Washington Hospital Center	B
Naval Medical Center, San Diego	B
New York University School of Medicine	B
Roger Williams Medical Center	B
Southern Illinois University School of Medicine	B
Texas A&M Health Science Center College of Medicine	B
Texas Tech Health Sciences Center School of Medicine	B
University of Arizona College of Medicine	B
University of California Davis School of Medicine	B
University of Chicago, Pritzker School of Medicine	B
University of Cincinnati College of Medicine	B
University of Illinois College of Medicine at Chicago	B
University of Louisville School of Medicine	B
University of Michigan Medical School	B
University of Missouri School of Medicine	B
University of North Carolina School of Medicine	B
University of Pennsylvania	B
University of Puerto Rico School of Medicine	B
University of Rochester Medical Center	B
University of South Carolina	B
University of Southern Florida Morsani College of Medicine	B
University of Texas Medical Branch	B
University of Texas Medical School at Houston	B
University of Utah School of Medicine	B
University of Washington School of Medicine	B
Vanderbilt University School of Medicine	B
West Virginia School of Medicine	B
Wright State University Boonshoft School of Medicine	B

Dartmouth-Hitchcock Medical Center	C
Geisinger Health System	C
Howard University Hospital	C
LAC/USC Medical Center	C
Loma Linda University Medical Center	C
Loyola University Chicago Stritch School of Medicine	C
Rush University Medical Center	C
Rutgers New Jersey Medical School	C
Rutgers Robert Wood Johnson Medical School	C
Stony Brook School of Medicine	C
Tulane University School of Medicine	C
University of California, San Diego School of Medicine	C
University of Connecticut School of Medicine	C
University of New Mexico School of Medicine	C
University of Tennessee Health Science Center	C
University of Texas Health Science Center at San Antonio	C
University of Vermont College of Medicine	C

National Capital Consortium: Walter Reed National Military Medical Center	D
New York Medical College	D

Table 8. Website Quality

Website Speed	“Very Good”	70.4% (81/115)
	“To Improve”	7.0% (8/115)
	“Poor”	22.6% (26/115)
Custom 404 Page		66.1% (76/115)
Favicon		66.1% (76/115)
Indexed Pages	“Very Good”	7.0% (8/115)
	“To Improve”	11.3% (13/115)
	“Poor”	33.9% (39/115)
	None	47.8% (55/115)
Email Privacy		54.8% (63/115)
Website Trust and Safety		100% (115/115)
Broken Links ^a		18.3% (21/115)
Mobile Friendliness	“Very Good”	27.8% (32/115)
	“Good”	7.8% (9/115)
	“Fair”	5.2% (6/115)
	“Poor”	51.3% (59/115)
	None	7.8% (9/115)
Social Media		6.1% (7/115)

^aOf 21 websites with broken links, 33.3% (7) had more than one broken link.

Table 9. Website Improvement Recommendations

Area of Improvement	Recommendation ^a
1. Resident Information	Provide the following for each resident: <ul style="list-style-type: none"> • Resident Listing • Photograph • Hometown • Undergraduate Institution • Medical School Institution • Research or Clinical Interests • Contact Information (email)
2. Faculty Information	Provide the following for each faculty member: <ul style="list-style-type: none"> • Photograph • Medical School Institution • Residency Program Attended • Research Interests and Publications • Area of clinical expertise • Contact Information (email or office number)
3. Applicant Information	Provide the following for prospective applicants: <ul style="list-style-type: none"> • Updated statistics about current residents (i.e. honors, Step 1 and 2 scores, number of publications or research presentations) • Number of recommendation letters from dermatology or other specialties (specify) • A schedule for away rotation electives (i.e. locations of hospitals, required presentations or tests, expectancies of rotators, number of rotator positions) • Interview dates • Do you offer a categorical PGY-1 position for matching applicants
4. Hospital Statistics	Provide information on the following: <ul style="list-style-type: none"> • Name and location of hospitals that the residents and students rotate in • Patient demographics for the program

	<ul style="list-style-type: none"> • Are there any specialty clinics within the program
5. Website Quality	<ul style="list-style-type: none"> • Update information on a monthly basis to ensure accurate information • Update DRWS link in FRIEDA Online • Provide link with direct access to dermatology homepage • Improve website speed, mobile access, social media presence, number of broken links (this can be done by someone at your institution with website development knowledge or an outside business)

^aWhile much of this information may be considered confidential, each dermatology program must use their own judgment with regards to information they are willing to provide.

Conflicts of interest: RP Dellavalle is an employee of the U.S. Department of Veterans Affairs. The US Department of Veterans Affairs had no role in the writing of this manuscript. Any opinions expressed herein do not necessarily reflect the opinions of the US Department of Veterans Affairs. All other authors report no relevant disclosures.

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