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Contributor Role	Role Definition	Aut	thors 2	3	4	5	6	7	8.	9
Conceptualization	Ideas; formulation or evolution of overarching research goals and aims.	Χ	X					Χ	X	X
Data Curation	Management activities to annotate (produce metadata), scrub data and maintain research data (including software code, where it is necessary for interpreting the data itself) for initial use and later reuse.	Χ	Х	Χ						
Formal Analysis	Application of statistical, mathematical, computational, or other formal techniques to analyze or synthesize study data.									
Funding Acquisition	Acquisition of the financial support for the project leading to this publication.									
Investigation	Conducting a research and investigation process, specifically performing the experiments, or data/evidence collection.		Χ		Х					
Methodology	Development or design of methodology; creation of models		Χ					Χ	Χ	Χ
Project Administration	Management and coordination responsibility for the research activity planning and execution.									
Resources	Provision of study materials, reagents, materials, patients, laboratory samples, animals, instrumentation, computing resources, or other analysis tools.									
Software	Programming, software development; designing computer programs; implementation of the computer code and supporting algorithms; testing of existing code components.									
Supervision	Oversight and leadership responsibility for the research activity planning and execution, including mentorship external to the core team.							Χ	Х	Χ
Validation	Verification, whether as a part of the activity or separate, of the overall replication/reproducibility of results/experiments and other research outputs.	Х	Χ		Х	Χ	Χ			
Visualization	Preparation, creation and/or presentation of the published work, specifically visualization/data presentation.	Х	Χ		Х	Χ				
Writing - Original Draft Preparation	Creation and/or presentation of the published work, specifically writing the initial draft (including substantive translation).	Χ	Х		Χ	X	Χ			
Writing - Review & Editing	Preparation, creation and/or presentation of the published work by those from the original research group, specifically critical review, commentary or revision – including pre- or post-publication stages.				Х	X	X	Χ	X	X

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Personal, Professional, and Institutional Social Network accounts.

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Discussion Points: Residency program websites are commonly used among applicants during the residency application process. Applicants value wellness, fellowship acquisition, faculty information, resident life, and application contact information.

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ABSTRACT.

Background: Residency program applicants use a variety of resources during the application cycle. Program websites can vary substantially, and it is unclear how the website information is used by applicants.

Objective: We aimed to determine the most popular information source used by applicants. We also sought to identify specific online content that was deemed important in the decision-making process.

Methods: A survey was distributed to fourth-year medical students at an academic institution. Demographic information was collected, and the important of various online resources was gauged using a Likert scale. Subgroup analysis was performed for procedural versus non-procedural specialty applicants.

Results: 91 of the 169 fourth-year medical students (54%) completed the survey. The most utilized sources for the students were residency program websites (41%), the Fellowship and Residency Electronic Interactive Database (FREIDA) website (36%), and the Doximity website (14%). The most valued (Likert scale of 4 and 5) website content for the students included information on resident wellness (86%), resident fellowship acquisition (85%), faculty data (84%), residency location and resident lifestyle (81%), and application point of contact (79%). There were significant differences between what procedural specialty applicants deemed important versus what those applying to non-procedural specialties deemed important.

Conclusion: Residency program websites are commonly used among applicants during the residency match process. Content on resident wellness was highly valued irrespective of specialty choice; however, this information was often not present on residency websites. These findings may help guide website content development initiatives for residency programs to reflect applicant needs more adequately.

Key Words: residency, medical education, residency websites



INTRODUCTION.

 Matching into a residency program is an annual competitive undertaking for fourth-year medical students. The decision to apply to and rank residency programs in the match is a multifactorial process and applicants have various resources that may be utilized to guide them. However, there have been limited studies on how applicants use or value these resources in the application and ranking process.

The residency application and interview process is an expensive and time-consuming venture with an average expenditure between \$4000 to \$6000 for 12 to 17 interviews. This cost can approach \$20,000 when applying to multiple specialties or an even higher number of programs. These costs arise from application fees, flights to interviews, hotel and other travel expenses. While this may evolve as COVID19 has temporarily shifted to virtual interviews, it is likely that programs may continue the virtual model or incorporate a hybrid model of interviews once the pandemic is over. In fact, the COVID19 pandemic increased the role of website content as applicants are unable to visit the program and learn more in depth information. These realities highlight the importance of accurate, easily accessible residency program information that allows medical students to make informed decisions during the application season.

Before the advent of the Internet, medical students largely accessed residency program information through printed brochures and word of mouth via faculty mentors or peers.³ The American Medical Association-Fellowship and Residency Electronic Interactive Database Access (AMA-FREIDA) was first published in an electronic diskette in 1991 and made available on the Internet in 1996, propelling residency information access into the digital age.⁴ Concurrently, residency programs also recognized the importance of maintaining websites for applicants. Studies showed that while only 67% of general surgery residency programs had a viable link to the program's website on the FREIDA page in 2003, 99.2% of the general surgery residency programs had a functioning program website in 2017.^{5,6}

Currently, residency program information can still be obtained through individual sources such as attending mentors or peers, but it is mostly accessed online.^{6,7} Some of the recognized and consistent online sources were individual residency program websites, the FREIDA website, and the Accreditation Council for Graduate Medical Education (ACGME) website.^{8,9} Studies in different specialties showed that the majority of applicants consider residency program websites important in their application decisions, although website content varied significantly and may not present information that applicants deemed valuable.^{3,5-7,10-19} There have also been some studies that examined the roles of online forums such as the student doctor network (SDN) or residency website components in different subspecialties.¹⁰ However, the current literature has little information about what online sources residency applicants across all specialties used the most or what information was considered the most useful in their decision-making process. We sought to identify the most common online sources used by medical students when selecting residency programs and to identify online content that applicants considered important in their decision-making process.



METHODS

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This is a cross-sectional survey study in which a questionnaire was distributed to all fourth-year medical students at a single academic institution who applied to residency programs during the 2019-2020 application cycle. A cross-sectional study was implemented, as it is relatively inexpensive and straightforward to perform. Fourth-year medical students were invited to complete the survey, since they were in the process of learning about and applying to residency programs. These medical students were enrolled in a Doctor of Medicine (MD) program in the United States. The survey was conducted at the beginning of 2020, which was after the interview season and before residency match day in March. The Institutional Review Board (IRB) approval was obtained for this study (George Washington University School of Medicine and Health Sciences, IRB code: NCR191264).

The 30-question survey was designed to evaluate what the residency applicants used as their source of information during the application process and what the applicants considered important on the residency program websites. This survey was designed to include popular resources used during the residency applicant process and aspects of training that we deemed were relevant in ranking different programs. The survey collected information on participant age, gender, race, specialty, number of program applications, the most common information source, and the most useful source of information when researching a program. Applicants were asked to rate the importance of specific residency program website content during the application and ranking process using a 5-point Likert scale (1=not important at all to 5=crucial information that may influence one's decision). The rated residency website content was categorized into four categories of specific content: training structure, resident and faculty data, program logistics, and program environment (Table 1). Specific questions from the survey are included in Table 1.1. Data analysis was descriptive and percentages were used to present categorical variables.

The survey responses were anonymously reviewed to remove bias. Subgroup analyses were performed comparing the preferences of applicants in procedural (surgical and anesthesia subspecialties) versus non-procedural specialties. Table 4 includes the lists of the specialties in each category. The applicants' preferences for the most important (Likert scale 4 and 5) and not important (Likert scale 1 and 2) residency website contents were analyzed separately with Mann-Whitney U test / Wilcoxon Rank Sum test on the R statistical software and the comparison of the important elements are highlighted in Table 2.



RESULTS.

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Ninety-one out of 169 fourth-year medical students completed the survey, a 53.8% response rate. The majority of the respondents were female (70.3%) with an age range between 26 and 30 years old (58.2%). Race distribution consisted of 58.2% Caucasian, 22% Asian, 8.8% African American, and 8.8% Hispanic, Latino, or Spanish origin. Fifty-four percent applied to primary care specialties (family medicine, internal medicine, obstetrics and gynecology, and pediatrics), and 57.1% of applicants planned to subspecialize after residency. Thirty-four percent of applicants applied to more than 50 residency programs, 38% to 31-50 programs, and 21% to 21-30 programs.

The three most used sources of residency program information were individual program websites (40.7%), the FREIDA website (36.3%), and the Doximity website (14.3%) (Figure 1).8,20 The three most commonly used sources were also considered the most useful sources for obtaining residency program information. Other sources were considered useful but they were only minimally cited by the study cohort. These included 21 spreadsheets (2.2%), ACGME website (2.2%), shared Google spreadsheets within the program (1.1%), Residency explorer website by the American Association of Medical Colleges (AAMC) (1.1%), American Academy of Family Physicians (AAFP) website (1.1%), and discussion with advisors (1.1%) (Figure 2).8,9,20-23 Residency program website content, in general, was rated as very important or crucial (60.5% for a combined Likert scale of 4 and 5) for medical students when deciding to apply or to rank a program. Specifically, information on resident wellness (85.8%), fellowship acquisition (84.6%), faculty data (83.5%), residency location and resident lifestyle (81.3%) and application contact information (79.1%) were ranked the most important (Likert scale of 4 and 5) information by applicants (Figure 3). Other information applicants considered important included training site information (76.9%), board pass rates (76.9%), residents' names and photos (73.7%), rotation structure (71.4%), residency policies (62.7%), application details (60.4%), residents' medical schools (58.2%), and current department events (55%). On the other hand, the number of publications by current residents (60.4%), morbidity and mortality conferences and grand rounds information (40.7%), access to question banks (35.2%), and research requirements (29.7%) were the top four topics rated as not important or maybe important (Likert scale 1 and 2) to our cohort.

Subgroup analyses by specialty choice (Table 3) showed that for applicants pursuing procedural specialties, the most important residency website content included fellowship acquisition (94.1%), faculty information (88.2%), and application contact information (82.4%), while non-procedural specialty applicants valued resident wellness (91.2%), location training sites and resident life (84.2%), and description of training sites (80.7%) (Table 2). Of note, resident life (76.5%), resident wellness (76.5%), and skills simulation lab (76.5%) were also highly ranked important factors for procedural specialty applicants (Table 2 and 3). Non-procedural applicants appreciated information on residency policies (p=0.005) significantly more than procedural specialty applicants while procedural specialty applicants appreciated skills simulation lab (p = 0.0001), research requirement (p = 0.014), number of publications by residents (p = 0.042), and fellowship acquisition (p = 0.007) information significantly more than non-procedural applicants (Table 2 and 3).







DISCUSSION.

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Since the early 2000s, studies in different specialties, including emergency medicine, internal medicine, general surgery, radiology, plastic surgery, orthopedic surgery, otolaryngology, and anesthesiology have illustrated that residency websites are widely used by residency applicants. These studies also evaluated the use and content of residency program websites. 3,6,7,10,12,19,24,25 However, no single study has surveyed residency applicants across specialties to determine the most useful online resource and content for applicants overall. While there is an array of resources, our study reveals that the most commonly used and

most useful source for residency applicants is the individual residency program websites (Figure 1, 2). Our study also adds to the existing literature by identifying resident wellness as the most valued program content. A potential reason for this finding could be that burnout and wellness have gained increasing

attention in recent years which has led the ACGME to add "residency wellness", comprised of psychological, emotional, and physical well-being, to its list of residency program requirements in 2017.27 The ACGME's Clinical Learning Environment Review (CLER) program that was designed to improve and monitor resident engagement in safe, high-quality patient care during clinical training also adopted the term "well-being" to encompass areas formerly known as duty hours, fatigue management, and mitigation.²⁸ The Flexibility In duty hour Requirements for Surgical Trainees (FIRST) trial showed considerable variation in training program rates of resident reported burnout.²⁹ After this trial, the SECOND trial (Surgical Education Culture Optimization through targeted interventions based on National comparative Data) was created to examine whether providing programs with their performance data and tools to create wellness initiatives could improve residency program culture and wellness.^{29,30} Given the now required focus on resident wellness and the value of wellness to applicants, an informative website that highlights program wellness and accurately represents the program will likely benefit programs.

Additionally, robust and comprehensive residency website information has become even more relevant not only due to our advances in technology but also in situations when in-person interviews and visits to programs may be limited and even discouraged, as we are currently experiencing with the coronavirus (COVID-19) pandemic. In response to the global pandemic, various organizations, including the AAMC and the Association of Program Directors in Surgery (APDS), have encouraged residency programs to offer online interviews, establish virtual tours, and expand website presence during the pandemic. 31-32 In this setting, digital resources such as FREIDA, ACGME website, Doximity, and residency program website may become even more important. An investment in website expansion or remote interviews is not only advantageous for programs to amplify their program to a larger audience and demonstrate adaptability on a digital platform, but it also prepares for future situations that would limit traveling and in-person interactions.

Our study reinforces the existing literature and suggests that programs need to highlight the needs of the applicants (Table 5). Additionally, our study meaningfully expands the literature by including applicants from different specialties. Our primary study team has an interest in procedural subspecialties, which is why we chose to perform a subgroup analysis looking at differences between procedural and non-procedural specialties. We found that there is a statistically significant difference in the importance of resident policy and

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skills simulation between procedural and non-procedural specialties. Applicants applying to procedural based specialties valued skills labs while non-procedural applicants valued resident policy. Applicants applying into procedural specialties also valued information on research requirements, number of publications by residents, and fellowship acquisition (Table 2). This could be a result of structured research or professional development year(s) integrated into procedural residency programs; however, further studies are required to assess how programs can best structure their website to provide applicants with meaningful research-related information.

Our study also shows that applicants highly valued information on resident wellness or lifestyle, but the existing literature suggests that content on program websites is not always congruent with the information that applicants value most (Table 6).6,7,13,16,25 Gaeta et al⁷ reported that emergency medicine residency applicants preferred additional information such as the application process details, alumni information, and personal statements or candid narratives from the residents. Chen et al²⁵ showed that while plastic surgery residency applicants considered career and fellowship placement very important information, this information was not available on most program websites. Lambdin et al³³ showed that students applying into surgical specialties identified fellowship acquisition, faculty information, application contact information, and resident wellness as the most important website content; however, information on fellowship acquisition and resident wellness were identified only on 60% and 27% of residency websites, respectively. Our study further highlights the incongruence between the information applicants seek and what residency programs present.

The discrepancy between the information valued by applicants and information presented on residency websites may account for the use of crowdsourcing sites that provide the word-of-mouth component of residency information in online formats. Our study shows that some students are using Reddit spreadsheets and Student Doctor Network forums as their main resource, and some consider the Reddit spreadsheets the most useful source in their decision-making process (Figure 2).^{21,26} The Reddit spreadsheets link to open-access shared Google Sheets for each medical specialty and applicants across the US share information such as interview dates and applicant experiences at the interviews with a questionand-answer section. This content may fill in the gap for students to learn about a program's culture, training environment, and resident life that is often not represented on residency websites or other online sources. 5,6,25 While this may be beneficial, this information may not be readily vetted by programs to ensure accuracy and may mislead applicants.

This study had several limitations. The is a survey study with lack of narrative input from the subjects. The study quality is limited by the survey design, which is not validated in the literature. Other similar studies in the literature did not include their survey questions, so we based our questionnaire form discussions within a focus group with our study team, which also included a dean of the medical school. The sample size is also limited, and the study was performed at a single institution. The study design subjects the findings to response bias. We anticipate that the findings of the study are readily translatable to other institutions and other cohorts since the residency application process does not change significantly from year to year. To bridge the gap between desired and available website content, residency programs can make these topics easily accessible on program websites. Additionally, the websites should be frequently updated to reflect pertinent changes in the aforementioned areas. These websites could also be advertised on platforms such as Instagram or Twitter



to allow programs to enhance their online presence. Furthermore, although the sample size was limited, we had representation from applicants applying to a variety of specialties. Continued data acquisition over several application cycles and inclusion of multiple institutions could reveal more information and trends.

Administering the survey after the interview season could have introduced some bias in students' response.

Lastly, this study did not examine the role of other social media platforms in the applicants' decision-making process. Future study directions could examine the value of specific social media platform content in applicant decision making, with differentiation between decision regarding program selection, interview process, and matching rank list. Additionally, surveying residency website creators could provide further insight into the process of creating these sites and any mismatch that may exist between the advertised content and applicants' needs.



REFERENCES.

- Benson NM, Stickle TR, Raszka W V. Going "Fourth" From Medical School: Fourth-Year Medical Students' Perspectives on the Fourth Year of Medical School. Acad Med. 2015;90(10):1386–93.
- 2. Callaway P, Melhado T, Walling A, Groskurth J. Financial and Time Burdens for Medical Students Interviewing for Residency. Fam Med. 2017;49(2):137–40.
 - 3. 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(3):e22.
- 4. Winters, M. (2016, July 13). Online database simplifies residency, fellowship search.

 https://www.ama-assn.org/residents-students/match/online-database-simplifies-residency-fellowship-search. Accessed on March 28, 2020.
 - 5. Reilly EF, Leibrandt TJ, Zonno AJ, Simpson MC, Morris JB. General surgery residency program websites: usefulness and usability for resident applicants. Curr Surg. 2004;61(2):236–40.
 - 6. Stoeger SM, Freeman H, Bitter B, Helmer SD, Reyes J, Vincent KB. Evaluation of general surgery residency program websites. Am J Surg. 2019;217(4):794–9.
 - 7. Gaeta TJ, Birkhahn RH, Lamont D, Banga N, Bove JJ. Aspects of residency programs' web sites important to student applicants. Acad Emerg Med. 2005;12(1):89–92.
 - 8. FREIDA Residency Program Database: Medical Fellowship Database. (n.d.). Available at: https://freida.ama-assn.org/Freida/#/. Accessed on March 28, 2020.
 - 9. ACGME Home. (n.d.). Available at: https://www.acgme.org/. Accessed March 28, 2020.
 - 10. Svider PF, Gupta A, Johnson AP, et al. Evaluation of otolaryngology residency program websites. JAMA Otolaryngol Head Neck Surg. 2014;140(10):956–60.
 - 11. Hashmi A, Policherla R, Campbell H, Zuliani G, Shkoukani MA, Eloy JA, et al. How Informative are the Plastic Surgery Residency Websites to Prospective Applicants? J Surg Educ. 2017;74(1):74–8.
 - 12. Oladeji LO, Yu JC, Oladeji AK, Ponce BA. How Useful are Orthopedic Surgery Residency Web Pages? J Surg Educ. 2015;72(6):1185–9.
 - 13. Silvestre J, Tomlinson-Hansen S, Fosnot J, Taylor JA. Plastic surgery residency websites: a critical analysis of accessibility and content. Ann Plast Surg. 2014;72(3):265–9.
 - 14. Skovrlj B, Silvestre J, Ibeh C, Abbatematteo JM, Mocco J. Neurosurgery Residency Websites: A Critical Evaluation. World Neurosurg. 2015;84(3):727–33.
 - 15. Wakefield D V, Manole BA, Jethanandani A, May ME, Marcrom SR, Farmer MR, et al. Accessibility, availability, and quality of online information for US radiation oncology residencies. Pract Radiat Oncol. 2016;6(3):160–5.
 - Hansberry DR, Bornstein J, Agarwal N, McClure KE, Deshmukh SP, Long S. An Assessment of Radiology Residency Program Websites. J Am Coll Radiol. 2018;15(4):663–6.
- Mulcahey MK, Gosselin MM, Fadale PD. Evaluation of the content and accessibility of web sites for accredited orthopaedic sports medicine fellowships. J Bone Joint Surg Am. 2013;95(12):e85.



- 18. Shaath MK, Yeranosian MG, Ippolito JA, Adams MR, Sirkin MS, Reilly MC. Evaluation of the Content and Accessibility of Web Sites for Accredited Orthopaedic Trauma Surgery Fellowships. J Bone Joint Surg Am. 2018;100(9):e60.
 - 19. Chu LF, Young CA, Zamora AK, Lowe D, Hoang DB, Pearl RG, et al. Self-reported information needs of anesthesia residency applicants and analysis of applicant-related web sites resources at 131 United States training programs. Anesthesia & Analgesia. 2011;112(2):430-9.
 - *** Paul HY, Novin S, Vander Plas TL, Huh E, Magid D. How does the current generation of medical students view the radiology match?: An analysis of the AuntMinnie and Student Doctor Network online forums. Academic radiology. 2018 Jun 1;25(6):699-707.
 - Doximity Residency Navigator. Available at: https://residency.doximity.com/. Accessed on March 28, 2020.
 - [Residency] 2019-2020 Interview Spreadsheets (so far). (2019, August 16).
 https://www.reddit.com/r/medicalschool/comments/cr7pcp/residency-20192020 interview spreadsheets so far/. Accessed on March 28, 2020
 - 22. Residency Explorer. https://www.residencyexplorer.org/Account/Login?ReturnUrl=/. Accessed on March 28, 2020.
 - 23. AAFP Home: American Academy of Family Physicians. (2015, October 16). https://www.aafp.org/home.html. Accessed on March 28, 2020.
 - 24. Deloney LA, Perrot LJ, Lensing SY, Jambhekar K. Radiology resident recruitment: a study of the impact of web-based information and interview day activities. Academic radiology. 2014;21(7):931-7.
 - 25. Chen VW, Hoang D, Garner W. Do Websites Provide What Applicants Need? Plastic Surgery Residency Program Websites Versus Applicant Self-reported Needs. Plast Reconstr Surg Glob Open. 2018;6(10):e1900.
 - 26. John E, Marcus J, Burnett W, Shapiro B. Home Student Doctor Network. https://www.studentdoctor.net/. Accessed on March 28, 2020.
 - 27. "Improving Physician Well-Being, Restoring Meaning in Medicine." *ACGME Main Page*, www.acgme.org/What-We-Do/Initiatives/Physician-Well-Being. Accessed on April 21, 2020.
 - 28. "Clinical Learning Environment Review (CLER)." *ACGME Main Page*, <u>www.acgme.org/What-We-Do/Initiatives/Clinical-Learning-Environment-Review-CLER</u>. Accessed on May 20, 2020.
 - 29. "The FIRST Trial Home Page." *The FIRST Trial Home Page*, www.thefirsttrial.org/. Accessed on May 20, 2020.
 - 30. Ellis RJ, Hewitt DB, Hu YY, Johnson JK, Merkow RP, Yang AD, et al. An Empirical National Assessment of the Learning Environment and Factors Associated With Program Culture. Annals of surgery. 2019;270(4):585-92.
 - 31. Virtual Interviews: Tips for Program Director. https://www.aamc.org/system/files/2020-05/Virtual_Interview_Tips_for_Program_Directors_05142020.pdf. Accessed May 20, 2020.
- 32. AAMC (American Association of Medical Colleges). Specialty Response to COVID-19.

 https://students-residents.aamc.org/applying-residency/article/specialty-response-covid-19/.

 Accessed March 28, 2020.



33. Lambdin J, Lin RP, DeAngelis EJ, Vaziri K, Lin P, Lee J, Jackson HT. Analysis of Surgery Residency Website Content: Implications during the COVID-19 Era. J Surg Educ. 2022 Jul-Aug;79(4):904-908. doi: 10.1016/j.jsurg.2022.03.006.





SUMMARY - ACCELERATING TRANSLATION

Residency application is a competitive endeavor for fourth-year medical students. Among all the resources used, individual program websites often provide valuable information. However, the type of information presented on these websites can vary significantly. In this study, we used a survey to identify the most common resources utilized by applicants at a single institution. Additionally, we determined the specific content that were deemed most useful.

We found that 54% of fourth-year medical student completed the survey. Most commonly used resources included residency websites, the Fellowship and Residency Electronic Interactive Database (FREIDA) website, and the Doximity website. The most valued website content included resident wellness information, resident fellowship acquisition, faculty data, residency location and resident lifestyle, and the application point of contact. While resident wellness was the most valued content, this information was often not included on residency websites. Residency programs can more adequately use information from this study to address applicant needs.

1 FIGURES AND TABLES.

2 **Table 1.** List of Survey Question Topics with Categories

Question Categories	Question Items
1. Training Structure	 Rotation structure Description of training sites Research requirements Education components Morbidity & Mortality Conferences and Grand Rounds Morning Case Reports or Journal Clubs Question Banks Skills Simulations Lab Protected Time for Studying
2. Resident and Faculty Information	 Resident Information a) Names and Photos b) Medical School c) Number of Publications Fellowship Acquisition Board Pass Rates Faculty Information
3. Program Logistics	 Application Specifics Application Contact Information Residency Policies
4. Program Environment	 Primary Residency Location Site/Resident Living Resident Wellness Current Events Within the Department/Residency

Table 1.1. Survey Question

Question Categories	Question Items
1. Demographics	 What is your age? What is your gender identity? Are you of Hispanic, Latino, or Spanish origin? How would you describe your race?
2. Resources	1) What was your most common source of information when searching for residency program? (ACGME Website, FREIDA website, Doximity website, program website) 2) What was the most useful source of information when searching for residency program? (ACGME Website, FREIDA website, Doximity website, program website)



3. Application Logistics	 What specialty(ies) are you applying for? How many residency programs did you apply to? Do you plan on further training in a subspecialty? 	
4. Importance of residency program website content	In general, how important is the information on a residency program's website when you decide to apply to or rank that program?	
5. Website Information on Residency Program Training Structure	Please rate how important it is, on a scale of 1-5, for the program website to include the following information: 1.Rotation structure 2.Description of training sites 3.Research Requirements 4.Education Components – M&M & Grand Rounds 5.Education/Didactic Components – Morning Case Reports or Journal Club 6.Education/Didactic Components – Question Banks 7.Education/Didactic Components – Skills Simulation Lab 8.Education/Didactic Schedule – Protected Time for Studying	
Resident and Faculty Information	Please rate how important it is, on a scale of 1-5, for the program website to include the following information: 1.Resident Information – Names and Photos 2.Resident Information – Medical School 3.Resident Information – Number of Publications 4.Fellowship Acquisition 5.Board Pass Rates 6.Faculty Information	
Program Logistics	Please rate how important it is, on a scale of 1-5, for the program website to include the following information: 1.Application Specifics 2.Application Contact 3.Residency Policies	
Program Environment	Please rate how important it is, on a scale of 1-5, for the program website to include the following information: 1.Primary Residency Location Site/Resident Life 2.Resident Wellness 3.Current Events within the Department/Residency	



- 4 **Table 2.** Comparison of residency website content importance by procedural specialty applicants
- 5 versus non-procedural specialty applicants. Important includes Likert scale 4 and 5. Values in
- 6 parentheses are percentages. (*) indicates statistical significance, with P-value < 0.05.

Category	Question Topics	Procedural specialty applicants (n = 34)	Non-procedural specialty applicants (n = 57)	P-value
1. Training	Rotation Structure	21 (61.8)	44 (77.2)	0.389
Structure	Description of Training Sites	24 (70.6)	46 (80.7)	0.111
	Research Requirements	18 (52.9)	19 (33.3)	0.014*
	M&M Conferences/Grand Rounds	9 (26.5)	17 (29.8)	0.923
	Case Reports/Journal Clubs	14 (41.2)	29 (50.9)	0.610
	Question Banks	12 (35.2)	21 (36.8)	0.899
	Skills Simulation Lab	26 (76.5)	19 (33.3)	0.0001*
	Protected Time for Studying	18 (52.9)	27 (47.3)	0.105
2. Resident and	Resident Names and Photos	23 (67.6)	44 (77.2)	0.490
Faculty	Resident Medical School	19 (55.9)	34 (59.7)	0.438
Information	Resident Number of Publications	5 (14.7)	7 (12.3)	0.042*
	Fellowship Acquisition	32 (94.1)	45 (78.9)	0.007*
	Board Pass Rates	25 (73.5)	45 (78.9)	0.982
	Faculty Information	30 (88.2)	46 (80.7)	0.837
3. Program	Application Specifics	23 (67.6)	32 (56.1)	0.490
Logistics	Application Contact Information	28 (82.4)	44 (77.2)	0.311
	Residency Policies	15 (44.1)	42 (73.7)	0.009*
4. Program	Location Site/Resident Life	26 (76.5)	48 (84.2)	0.300
Environment	Resident Wellness	26 (76.5)	52 (91.2)	0.273
	Events within the Department	17 (50.0)	33 (57.9)	0.370

Table 3. Top Five most important residency website content for procedural vs. non-procedural applicants

Procedural Specialties	Non-Procedural Specialties
 Fellowship acquisition (94.1%) Faculty information (88.2%) Application contact information (82.4%) Skills simulation lab (76.5%) Location site/Resident life (76.5%) Resident wellness (76.5%) Board pass rates (73.5%) 	 Resident wellness (91.2%) Location site/Resident life (84.2%) Description of training site (80.7%) Faculty information (80.7%) Fellowship acquisition (78.9%) Board pass rates (78.9%)



Figure 1.

2 Chart of the most common source of information when searching for and learning about residency 3 programs. Other includes the ACGME website (3.3%), AAFP website (2.2%), SDN website (1.1%), 4

Residency explorer website by the AAMC (1.1%), and Reddit spreadsheets (1.1%). ACGME =

Accreditation Council for Graduate Medical Education; FREIDA = Fellowship and Residency

Electronic Interactive Database; AAFP = American Academy of Family Physicians; SDN = Student doctor network; AAMC = Association of American Medical Colleges.

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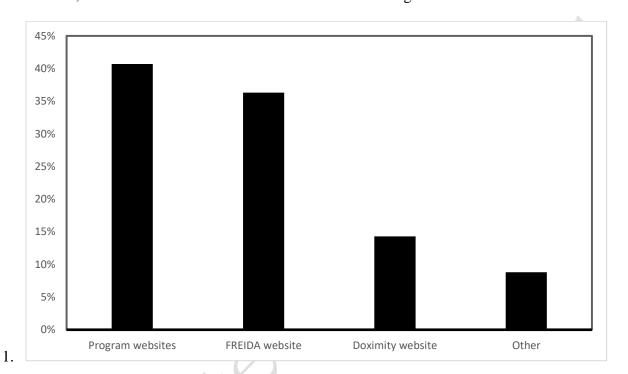




Figure 2.

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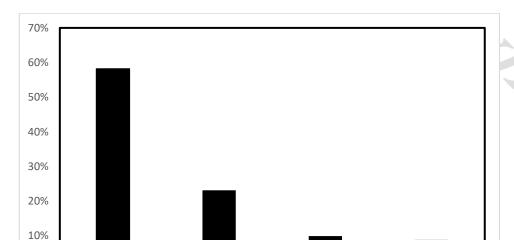
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Chart of the most useful source of information when searching for and learning about residency programs. Other includes Reddit spreadsheets (2.2%), ACGME website (2.2%), shared Google spreadsheets within the program (1.1%), Residency explorer website by the AAMC (1.1%), AAFP website (1.1%), and discussion with advisors (1.1%). ACGME = Accreditation Council for Graduate Medical Education; FREIDA = Fellowship and Residency Electronic Interactive Database; AAFP = American Academy of Family Physicians



Doximity website

Other

FREIDA website

0%

Program websites



1 **Table 4.** List of specialties in subgroup analysis categories

Procedural Specialties (n=34, 37.4%)	Non-Procedural Specialties (n=57, 62.6%)
Anesthesiology (6, 6.6%)	Child neurology (3, 3.3%)
General surgery (7, 7.7%)	Dermatology (1, 1.1%)
Neurosurgery (1, 1.1%)	Diagnostic Radiology (5, 5.5%)
Obstetrics and Gynecology (6, 6.6%)	Emergency Medicine (7, 7.7%)
Orthopedic surgery (8, 8.8%)	Family Medicine (14, 15.4%)
Otolaryngology (4, 4.4%)	Internal Medicine (13, 14.3%)
Plastic surgery (1, 1.1%)	Neurology (1, 1.1%)
Vascular surgery (1, 1.1%)	Ophthalmology (1, 1.1%)
	Pediatrics (6, 6.6%)
	Pediatrics/Emergency Medicine (1,1.1%)
	Psychiatry (4, 4.4%)
	Physical Medicine and Rehabilitation (1, 1.1%)



Table 5. Preferred website content: Top 5 content comparison of existing literature and our current
 study.

Study (Year)	Specialty (Number of Participants)	Response Rate	Most common source of information	Most important residency website content for participants (Top 5 content from most highly ranked to the least)
Embi et al ³ (2003)	Internal medicine (n=218)	51%	Residency websites	 Schedule information Career and fellowship placement Resident information Residency benefits Residency contact information
Gaeta et al ⁷ (2005)	Emergency medicine (n=188)	82%	Not applicable	 Application process Alumni information and outcomes Personal statements and candid narratives from the residents Bulletin News about residency Explanation of salary and benefits
Chen et al ²⁵ (2018)	Plastic surgery (n=87)	46%	Residency websites	 Faculty information Residency curriculum Current residents Career and fellowship Resident research
This study (2020)	All specialties (n=91)	54%	Residency websites	 Resident wellness Fellowship acquisition Faculty information Resident life Application contact information



Table 6. Overview of the existing literature on residency website content. Listed are website content represented in more than 50% of the residency websites reviewed.

Study (Year)	Specialty	Number of Websites Reviewed	Website Content
Hansberry et al ¹⁶ (2018)	Radiology	179	Facility description (89%) Contact email (88%) Academic courses available (83%) Current residents (78%) Benefits (69%) Location/surrounding area information (66%) Past research projects (65%) Faculty listing (63%) Rotation schedule (62%) Call schedule (61%) Research description (59%) Link to ERAS (57%) Fellowship placement (55%) Salary (51%)
Silvestre et al ¹³ (2014)	Plastic Surgery	63	Faculty listing (93%) Resident listing (66.7%) Rotational schedule (61.4%) Faculty research interests (61.4%) Resident research requirements (59.6%) Salary (57.9%) Average work hours per week (50.8%)
Stoeger et al ⁶ (2019)	General Surgery	254	Program coordinator information (94%) Faculty names and specialty (85%) Rotations (88%) Hospital information (88%) Research requirements (85%) Resident names (83%) Morbidity and mortality conferences (82%) Alumni position/fellowship (69%) Resident salaries (64%) Skills lab (64%) Vacation (63%) Interview process (60%) Visa status (59%) Neighborhood information (51%)
Lambdin et al ³³ (2022)	All specialties	91	Program description (100%) Faculty information (95%) Application contact (85%) Resident names and photos (85%) Residency location (79%) Didactics (78%)



Lournal club (51%)			Meetings/Conferences/Courses (77%) Research requirements (74%) Rotation schedule (72%) STEP 2 information (53%) Journal club (51%)
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Figure 3.

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- 3 Visualization of the importance of residency program website information on a Likert scale, sorted
- by questions that had the most to the least percentage of Likert scale of 5.
- 5 1 = not important, 2 = maybe important, 3 = somewhat important, 4 = very important, 5 = crucial in
- 6 decision making

