

Original Paper

Orthopedic Surgery Residency Program Website Content and Accessibility During the COVID-19 Pandemic: Observational Study

Muhammad El Shatanofy^{1*}, BSc; Lauryn Brown^{1*}, BA; Peter Berger¹, MD; Alex Gu¹, MD; Abhinav K Sharma², MD; Joshua Campbell¹, MD; Sean Tabaie^{1,3}, MD

¹Department of Orthopedic Surgery, The George Washington University School of Medicine and Health Sciences, Washington, DC, United States

²Department of Orthopedic Surgery, School of Medicine, University of California, Irvine, Orange, CA, United States

³Division of Orthopedics and Sports Medicine, Children's National Medical Center, Washington, DC, United States

*these authors contributed equally

Corresponding Author:

Abhinav K Sharma, MD

Department of Orthopedic Surgery

School of Medicine

University of California, Irvine

101 The City Drive South

Pavilion III, Building 29A

Orange, CA, 92868

United States

Phone: 1 281 633 6088

Email: abhinaks@hs.uci.edu

Abstract

Background: The exceptional competitiveness of the orthopedic surgery specialty, combined with the unclear impact of the COVID-19 pandemic on residency recruitment, has presented significant challenges to applicants and residency program directors. With limited in-person opportunities in the 2020-2021 application cycle, applicants have been pressed to gauge chances and best fit by browsing program websites.

Objective: The aim of the study was to assess the accessibility and content of accredited orthopedic surgery residency program websites during the COVID-19 pandemic.

Methods: Using the online database of the Electronic Residency Application Service (ERAS), we compiled a list of accredited orthopedic surgery residency programs in the United States. Program websites were evaluated across four domains: program overview, education, research opportunities, and application details. Each website was assessed twice in July 2020, during a period of adjustment to the COVID-19 pandemic, and twice in November 2020, following the October ERAS application deadline.

Results: A total of 189 accredited orthopedic surgery residency programs were identified through ERAS. Of these programs, 3 (1.6%) did not have functional website links on ERAS. Data analysis of content in each domain revealed that most websites included program details, a description of the didactic curriculum, and sample rotation schedules. Between the two evaluation periods in July and November 2020, the percentage of program websites containing informative videos and virtual tours rose from 12.2% (23/189) to 48.1% (91/189; $P < .001$) and from 0.5% (1/189) to 13.2% (25/189; $P < .001$), respectively. However, the number of programs that included information about a virtual subinternship or virtual interview on their websites did not change. Over the 4-month period, larger residency programs with 5 or more residents were significantly more likely to add a program video ($P < .001$) or virtual tour ($P < .001$) to their websites.

Conclusions: Most residency program websites offered program details and an overview of educational and research opportunities; however, few addressed the virtual transition of interviews and subinternships during the COVID-19 pandemic.

(*JMIR Med Educ* 2021;7(3):e30821) doi: [10.2196/30821](https://doi.org/10.2196/30821)

KEYWORDS

orthopedic surgery residency programs; COVID-19; website; residency applicants; residency; medical student; content; accessibility; observational; surgery

Introduction

Applicants to orthopedic surgery residencies spend significant time and resources gathering information about potential programs [1-7]. A valuable resource that has been shown to influence application decisions across specialties is program websites [8]. Multiple studies have found that applicants heavily use residency websites when deciding where to apply and interview and, subsequently, how to rank programs [7,9-11]. In orthopedics specifically, Yong et al surveyed 610 applicants to an orthopedic surgery residency program and found that 98% of students used program websites to gather information [9].

Despite the clear utility of websites for residency applicants and programs alike, content is inconsistent and often severely lacking. In a recent review of orthopedic surgery residency websites, Oladeji et al found widespread inconsistencies and noted a scarcity of information desired by prospective applicants [12]. Yong et al also found that, although applicants referenced websites frequently, the quality of information was ranked lower than that provided by medical school advisors or orthopedic surgery residents at home programs [9]. While it was possible to supplement inadequate information found on websites with in-person experiences in previous years, the COVID-19 pandemic has limited this year's applicants to mostly virtual experiences. Consequently, applicants have been forced to rely more heavily on websites in the 2020-2021 application cycle [9,13-15].

The purpose of this study was to assess the content and quality of orthopedic surgery residency program websites and to evaluate adaptations made in response to the COVID-19 pandemic. We hypothesized that, despite the evolving pandemic, updates to program websites, videos, and virtual tours would be limited. This study aims to both describe how orthopedic surgery programs adapted their websites in light of unprecedented circumstances and provide actionable items for programs to improve their online presence during future application cycles.

Methods

Overview

The Electronic Residency Application Service (ERAS) website contains an updated list of all accredited orthopedic surgery residency programs in the United States [16]. Upon accessing this website in July 2020, 189 accredited programs were identified and included in this study. A hyperlink to each program's website and accreditation IDs were gathered from the ERAS website. The hyperlinks were then accessed and classified as functional, indirect (ie, functional link, but required navigation to reach the orthopedic surgery residency page), or direct. Two authors independently gathered information from each website at two separate time periods of the application cycle. The first data collection occurred in the first 2 weeks of July 2020, a period of relative adjustment to COVID-19, and the second data collection occurred within the first 2 weeks of November 2020, a period shortly after the ERAS application deadline.

Information gathered from the orthopedic surgery websites fell into four broad domains: program overview, education, research opportunities, and application details.

Program Overview

Program overview included program director name; contact information, including email, phone number, and address; fellowship match lists; wellness opportunities; and salary and benefits information. Efforts to promote diversity were also reported for programs that mentioned underrepresented minorities or gender diversity in their mission statements.

Education

The education domain included the mention of extracurricular meetings and courses (ie, travel to conferences), didactic sessions, a journal club, sample rotation schedules, clinic and call responsibilities, and educational support, such as funding for loupes and leads.

Research

Research opportunities were identified by scanning websites for evidence of a research requirement, publication lists, lab spaces, or funding for national presentations and conferences.

Application Details

Application details gathered from the websites included the number of residents accepted into each program per year, a subinternship description, and guidelines for United States Medical Licensing Examination (USMLE) Step 2 score and Electronic Standardized Letter of Recommendation (eSLOR) submission.

Virtual Updates

Due to the nature of this virtual application cycle, websites were also assessed for the inclusion of program videos, video lengths if applicable, virtual tours, remote opportunities such as virtual subinternships, and details about virtual interviews.

All data collected from this study were analyzed after the second website review in November 2020. Data from July 2020 were compared to data from November 2020 to assess how programs have modified their websites in response to the virtual application cycle. Unless otherwise noted, statistics were reported on data obtained in July 2020. Analyses were performed using paired-sample *t* tests, Pearson chi-square tests, and Fisher exact tests. Significance was established at a *P* value of .05.

Results

Program Overview

Overall, 189 residency programs were identified on ERAS in July 2020. All but 3 residency programs (n=186, 98.4%) listed a functional link to the program website. Most programs listed the program director's name in July 2020 (n=164, 86.8%; Table 1). Email and phone number were included in 85.7% (n=162) and 84.1% (n=159) of websites, respectively, while address was included in 65.1% (n=123) of websites. Only 22.2% (n=42) of websites addressed underrepresented minorities and 20.6% (n=39) mentioned gender diversity. Efforts to promote wellness

or engagement in social events were identified among 50.3% (n=95) of websites. Only 56.1% (n=106) of programs included

a fellowship match list. Benefits and salary information was included in 63.5% (n=120) of websites.

Table 1. Content of orthopedic surgery residency program websites in July 2020.

Category	Value (N=189)
Program overview, n (%)	
Program director	164 (86.8)
Address	123 (65.1)
Phone	159 (84.1)
Email	162 (85.7)
Address underrepresented minorities	42 (22.2)
Address gender diversity	39 (20.6)
Wellness	95 (50.3)
Fellowship match list	106 (56.1)
Salary and benefits	120 (63.5)
Education, n (%)	
Didactics	159 (84.1)
Journal club	129 (68.3)
Rotation schedule	132 (69.8)
Call responsibility	96 (50.8)
Educational support	92 (48.7)
Meetings and courses	106 (56.1)
International opportunities	32 (16.9)
Research, n (%)	
Research requirement	138 (73.0)
Research output	68 (36.0)
Research support	139 (73.5)
Application details, n (%)	
Electronic Standardized Letter of Recommendation	27 (14.3)
Step 2	53 (28.0)
Number of residents per year, mean (SD)	4.6 (2.1)

Education

Of the 189 program websites, 84.1% (n=159) noted didactic sessions, 68.3% (n=129) mentioned a journal club, and 69.8% (n=132) included a sample rotation schedule (Table 1). Less commonly reported metrics included mention of meetings and courses outside of the traditional program curriculum (n=106, 56.1%), call responsibilities (n=96, 50.8%), international opportunities (n=32, 16.9%), and educational support (n=92, 48.7%).

Research

Most of the 189 program websites noted a research requirement (n=138, 73.0%) and demonstrated research support (n=139, 73.5%), such as funding for residents (Table 1). Research output, such as a list of resident publications, was less commonly included among websites (n=68, 36.0%).

Application Details

The average number of residents accepted into each program ranged from 4 to 5 residents per year (SD 2.1). Upon reviewing application requirements, only 28.0% (n=53) of 189 websites mentioned a Step 2 score requirement and 14.3% (n=27) requested an eSLOR.

Virtual Updates

Between July and November 2020, the number of program websites out of 189 that mentioned a virtual subinternship experience remained unchanged at 6.9% (n=13; $P>.99$; Figure 1). The percentage of websites including a program video rose from 12.2% (n=23) to 48.1% (n=91; $P<.001$), and the percentage of websites including a virtual tour increased from 0.5% (n=1) to 13.2% (n=25; $P<.001$; Table 2). A total of 71 program videos were identified across all 186 programs with

functional websites in November 2020. The length of the videos ranged from 57 seconds to 24 minutes and 40 seconds.

A chi-square analysis was performed to gauge whether larger programs, characterized as having 5 or more residents per year, were more likely than smaller programs to add program videos

or virtual tours by November 2020 (Table 3). Of the 94 larger programs, 48% (n=45) added videos, compared to only 24% (n=23) of the 95 smaller programs ($P<.001$; Multimedia Appendix 1). Larger programs (20/94, 21%) were also more likely than smaller programs (4/95, 4%) to add virtual tours by November 2020 ($P<.001$; Multimedia Appendix 2).

Figure 1. Percentage of orthopedic surgery residency program websites with updated virtual information between July and November 2020.

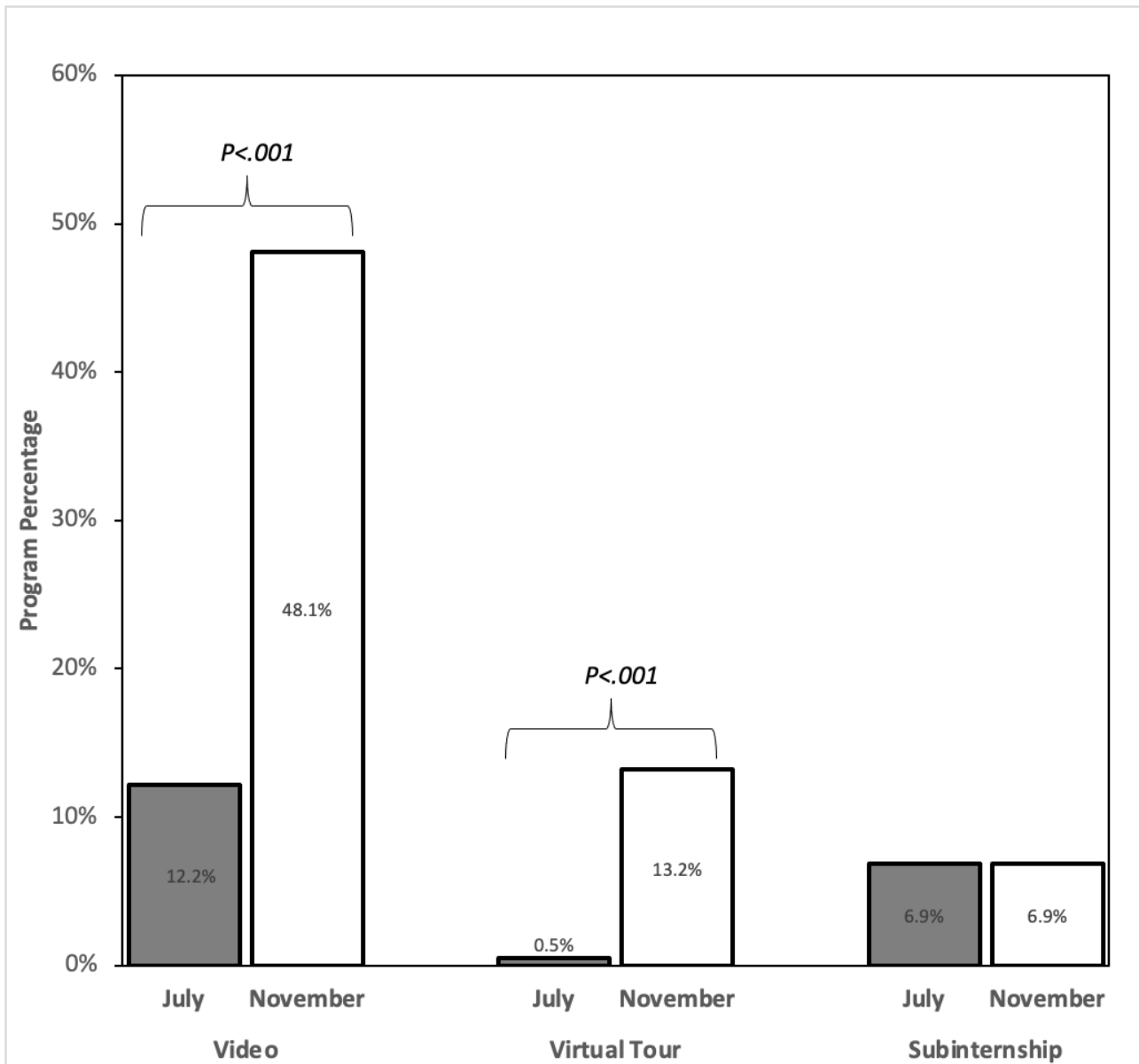


Table 2. Virtual offerings identified on program websites in July and November 2020.

Category	Websites (N=189), n (%)		P value ^a
	July 2020	November 2020	
Program video	23 (12.2)	91 (48.1)	<.001
Virtual tour	1 (0.5)	25 (13.2)	<.001
Subinternship	13 (6.9)	13 (6.9)	>.99

^aSignificance was established at $P<.05$.

Table 3. Orthopedic residency program websites with added virtual content between July and November 2020 compared by program size.

Category	Websites, n (%)		P value ^a
	Small programs (<5 residents/year) (n=95)	Large programs (≥5 residents/year) (n=94)	
Added program video	23 (24)	45 (48)	<.001
Added virtual tour	4 (4)	20 (21)	<.001

^aSignificance was established at $P<.05$.

Discussion

Principal Findings

The exceptional competitiveness of the orthopedic surgery specialty, compounded with the unclear impact of COVID-19 on residency recruitment, has presented significant challenges to both applicants and programs. Since most in-person opportunities and interviews in the 2020-2021 match cycle were cancelled due to COVID-19, we anticipated that applicants would increasingly rely on residency websites to gain insight into programs and cultural fit [13,17-19]. The purpose of this study was to explore the extent to which orthopedic surgery residency websites were updated throughout the pandemic.

In our study, we accounted for 98.4% (n=186) of the existing 189 orthopedic surgery residency programs through either hyperlinks provided by ERAS or via Google search. We reasoned that the programs would prioritize making COVID-19–related adjustments to websites prior to the ERAS application deadline in October 2020. Therefore, we recorded data in July 2020 and again in November 2020, once the ERAS deadline expired. Our analyses mostly supported our original hypothesis. While the percentage of program videos rose significantly from 12.2% (23/189) to 48.1% (91/189; $P<.001$) and the percentage of virtual tours rose significantly from 0.5% (1/189) to 13.2% (25/189; $P<.001$) from July to November 2020, the percentage of websites that mentioned a virtual subinternship experience remained stagnant at 6.9% (13/189). This is concerning because, historically, the role of the subinternship in pursuing orthopedic surgery residencies has been to provide both visiting students and programs an opportunity to assess fit based on personal skills, clinical aptitude, and the ability to integrate into program culture [5].

While our results suggest applicants would struggle to find updated information on websites regardless of program characteristics, virtual offerings were also evaluated by program size. Large programs with 5 or more residents were significantly more likely to add a program video ($P<.001$) and a virtual tour ($P<.001$) to their websites between July and November 2020. Further, with less than half (45/94, 48%) of larger residency programs and less than a quarter (23/95, 24%) of smaller programs adding a program video during the application season, applicants have been tasked with learning more about orthopedic surgery residency programs using dated videos and online information. Additionally, with only 21% (20/94) of larger programs and 4% (4/95) of smaller programs adding a virtual tour, applicants have limited representations of the physical environment surrounding their potential residency placements. Collectively, these findings indicate that smaller programs were

at a potential disadvantage for recruiting applicants since they were less likely than larger programs to have information that applicants would find critical in lieu of in-person interaction.

Comparison With Prior Work

Consistent with previous research, this study identified gaps in the quantity and quality of information on orthopedic surgery residency websites. Rozental et al completed the first review of orthopedic program websites at a time when only 40% of the United States had access to the internet and discovered that only 113 of 154 programs (73.4%) had working websites [20]. In a follow-up study conducted by Oladeji et al, 97% of programs had websites, but less than 50% provided information about call schedules, resident benefits, and resident research [12]. All of these factors have been ranked as important to residents [7,21]. Between the shared categories with Oladeji et al, we found that more programs mentioned resident salary, resident research requirements, publications, research and educational support, journal clubs, and didactics [12]. Information on call responsibility rose slightly to 50.8% (96/189), and resident wellness activities remained at 50.3% (95/189). Only information regarding rotation schedules dropped between studies (132/189, 69.8%).

For data collection unique to our study, we found that international opportunities were listed on 16.9% (32/189) of websites and fellowship match lists were included on 56.1% (106/189) of websites. While the mention of international opportunities was scarce, the low percentage of fellowship match lists was particularly concerning, given that over 90% of residents choose to complete an orthopedic surgery fellowship following graduation [22]. We also found that, despite the anticipated changes to application metrics, including scoring changes to USMLE Step 1, only 28.0% (53/189) of websites mentioned USMLE Step 2 application requirements and 14.3% (27/189) indicated preferences for an eSLOR [23].

Perhaps the most concerning of our findings was the low effort to promote racial and gender diversity on websites. Less than 25% of programs addressed either underrepresented minorities (42/189, 22.2%) or gender diversity (39/189, 20.6%). Over the past 10 years, racial and gender diversity among orthopedic surgery residency programs has remained stagnant compared to the rise observed in medical schools [24]. Despite feedback provided by faculty and residents, orthopedic surgery residency programs continue to have the lowest ratio of female to male residents than any other specialty [19,24].

Limitations

Several limitations to this study exist. Since this study started in July 2020, we could not capture COVID-19–related changes

prior to this period. Additionally, authors only documented if variables were mentioned on the websites and did not assess the quality of the information. Although data collection by two authors added to the internal validity of the study, we could not control for interrater variability. This study also did not include potential items of interest, such as interview dates, cases performed and their volumes, and operative approaches.

Recommendations

The data for this study were collected within a 5-month period from July to November 2020. Although traffic metrics are unavailable, it is reasonable to assume that most applicants visited sites during this time to prepare for ERAS deadlines. This study identified an overall paucity of information on program sites and an inadequate response to the COVID-19 pandemic. Further, websites were difficult to navigate, and important information was dispersed across several tabs. This may have led applicants to overlook time-sensitive application requirements and miss deadlines.

We propose several recommendations to improve website quality and quantity of information during the current pandemic and future states of emergency. First, we encourage the ERAS directory of programs to include hyperlinks for all orthopedic surgery residency programs. If a functional hyperlink to a program cannot be found, ERAS should contact the program and encourage it to either provide a link or create a new one if unavailable. Second, all programs should be made aware of standardized information and organization that applicants find

useful, such as the ones described in this study. It will ultimately be left to the discretion of the programs whether or not to adjust.

Due to the evolving situation of the COVID-19 pandemic, ERAS should encourage and potentially require websites to upload monthly updates. Uploading information about the program's response to COVID-19 not only has implications for recruitment, but also addresses concerns about safety [8,25]. Since travel restrictions have limited physical visits by applicants to programs, programs should also be encouraged to include at least one virtual tour and one program video on their websites. Additional videos should be uploaded to highlight program diversity and wellness. To make the application process more personable, applicants should also have the option to schedule video meetings with current residents and faculty via program websites [26]. The COVID-19 pandemic has drastically altered the virtual arena. Making the changes proposed in this study will undeniably facilitate the application process for future residents.

Conclusions

This study highlights the inadequate response of orthopedic surgery residency programs to update their websites during this entirely virtual application cycle. As a competitive specialty with the third-lowest specialty match rate, orthopedic surgery programs still have a lot of work to do to improve their online presence, promote diversity, and enhance opportunities for virtual applicants [1,19]. With limited information, applicants must identify unique ways to learn about residency programs and gauge their chances for a successful match.

Conflicts of Interest

None declared.

Multimedia Appendix 1

Orthopedic surgery residency program websites with added videos between July and November 2020 compared by program size. [\[PNG File , 51 KB-Multimedia Appendix 1\]](#)

Multimedia Appendix 2

Orthopedic surgery residency program websites with added virtual tours between July and November 2020 compared by program size.

[\[PNG File , 26 KB-Multimedia Appendix 2\]](#)

References

1. Rynecki N, Para A, Gantz O, Coban D, Gala Z, Gupta R, et al. An analysis of trends in National Residency Matching Program match data for orthopedic surgery. *Orthopedics* 2020 Nov 01;43(6):e616-e622. [doi: [10.3928/01477447-20200910-03](https://doi.org/10.3928/01477447-20200910-03)] [Medline: [32956473](https://pubmed.ncbi.nlm.nih.gov/32956473/)]
2. Schrock J, Kraeutler M, Dayton M, McCarty E. A comparison of matched and unmatched orthopaedic surgery residency applicants from 2006 to 2014: Data from the National Resident Matching Program. *J Bone Joint Surg Am* 2017 Jan 04;99(1):e1. [doi: [10.2106/JBJS.16.00293](https://doi.org/10.2106/JBJS.16.00293)] [Medline: [28060237](https://pubmed.ncbi.nlm.nih.gov/28060237/)]
3. Raman T, Alrabaa R, Sood A, Maloof P, Benevenia J, Berberian W. Does residency selection criteria predict performance in orthopaedic surgery residency? *Clin Orthop Relat Res* 2016 Apr;474(4):908-914 [[FREE Full text](#)] [doi: [10.1007/s11999-015-4317-7](https://doi.org/10.1007/s11999-015-4317-7)] [Medline: [25940336](https://pubmed.ncbi.nlm.nih.gov/25940336/)]
4. Mahler SA, Wagner M, Church A, Sokolosky M, Cline DM. Importance of residency program web sites to emergency medicine applicants. *J Emerg Med* 2009 Jan;36(1):83-88. [doi: [10.1016/j.jemermed.2007.10.055](https://doi.org/10.1016/j.jemermed.2007.10.055)] [Medline: [18439790](https://pubmed.ncbi.nlm.nih.gov/18439790/)]
5. O'Donnell SW, Drolet BC, Brower JP, LaPorte D, Ebersson CP. Orthopaedic surgery residency: Perspectives of applicants and program directors on medical student away rotations. *J Am Acad Orthop Surg* 2017 Jan;25(1):61-68. [doi: [10.5435/JAAOS-D-16-00099](https://doi.org/10.5435/JAAOS-D-16-00099)] [Medline: [28002215](https://pubmed.ncbi.nlm.nih.gov/28002215/)]

6. 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):236-240. [doi: [10.1016/j.cursur.2003.10.006](https://doi.org/10.1016/j.cursur.2003.10.006)] [Medline: [15051272](https://pubmed.ncbi.nlm.nih.gov/15051272/)]
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 Jan;12(1):89-92 [FREE Full text] [doi: [10.1197/j.aem.2004.08.047](https://doi.org/10.1197/j.aem.2004.08.047)] [Medline: [15635145](https://pubmed.ncbi.nlm.nih.gov/15635145/)]
8. Rai R, Sabharwal S. Availability and quality of online information on sub-internships in US orthopaedic residency programs. *JB JS Open Access* 2019 Mar 27;4(1):e0036 [FREE Full text] [doi: [10.2106/JBJS.OA.18.00036](https://doi.org/10.2106/JBJS.OA.18.00036)] [Medline: [31161150](https://pubmed.ncbi.nlm.nih.gov/31161150/)]
9. Yong TM, Austin DC, Molloy IB, Torchia MT, Coe MP. Online information and mentorship: Perspectives from orthopaedic surgery residency applicants. *J Am Acad Orthop Surg* 2021 Jul 15;29(14):616-623. [doi: [10.5435/JAAOS-D-20-00512](https://doi.org/10.5435/JAAOS-D-20-00512)] [Medline: [33156213](https://pubmed.ncbi.nlm.nih.gov/33156213/)]
10. 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 [FREE Full text] [doi: [10.2196/jmir.5.3.e22](https://doi.org/10.2196/jmir.5.3.e22)] [Medline: [14517113](https://pubmed.ncbi.nlm.nih.gov/14517113/)]
11. 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. *Anesth Analg* 2011 Feb;112(2):430-439. [doi: [10.1213/ANE.0b013e3182027a94](https://doi.org/10.1213/ANE.0b013e3182027a94)] [Medline: [21081766](https://pubmed.ncbi.nlm.nih.gov/21081766/)]
12. Oladeji LO, Yu JC, Oladeji AK, Ponce BA. How useful are orthopedic surgery residency web pages? *J Surg Educ* 2015;72(6):1185-1189. [doi: [10.1016/j.jsurg.2015.05.012](https://doi.org/10.1016/j.jsurg.2015.05.012)] [Medline: [26089163](https://pubmed.ncbi.nlm.nih.gov/26089163/)]
13. Tariq EF, Sah PK, Malik A. The plight of COVID-19 pandemic on medical students and residency applicants. *Ann Med Surg (Lond)* 2020 Dec;60:1-4 [FREE Full text] [doi: [10.1016/j.amsu.2020.10.010](https://doi.org/10.1016/j.amsu.2020.10.010)] [Medline: [33072311](https://pubmed.ncbi.nlm.nih.gov/33072311/)]
14. Aiyer A, Granger C, McCormick K, Cipriano CA, Kaplan JR, Varacallo MA, et al. The impact of COVID-19 on the orthopaedic surgery residency application process. *J Am Acad Orthop Surg* 2020 Aug 01;28(15):e633-e641 [FREE Full text] [doi: [10.5435/JAAOS-D-20-00557](https://doi.org/10.5435/JAAOS-D-20-00557)] [Medline: [32732651](https://pubmed.ncbi.nlm.nih.gov/32732651/)]
15. Boyd CJ, Inglesby DC, Corey B, Greene BJ, Harrington MA, Johnson MD, et al. Impact of COVID-19 on away rotations in surgical fields. *J Surg Res* 2020 Nov;255:96-98 [FREE Full text] [doi: [10.1016/j.jss.2020.05.049](https://doi.org/10.1016/j.jss.2020.05.049)] [Medline: [32543384](https://pubmed.ncbi.nlm.nih.gov/32543384/)]
16. Orthopaedic surgery. Association of American Medical Colleges, Electronic Residency Application Service. 2020. URL: https://services.aamc.org/eras/erasstats/par/display.cfm?NAV_ROW=PAR&SPEC_CD=260 [accessed 2020-12-01]
17. Dy CJ, Fabricant PD, White B, Shah A, Patel A. A helping hand for finding the right fellowship match. *Plast Reconstr Surg* 2013 Oct;132(4):696e. [doi: [10.1097/PRS.0b013e31829fe3ac](https://doi.org/10.1097/PRS.0b013e31829fe3ac)] [Medline: [24076741](https://pubmed.ncbi.nlm.nih.gov/24076741/)]
18. Aiyer A, Granger C, McCormick K. The impact of COVID-19 on the orthopaedic surgery residency application process. *J Am Acad Orthop Surg* 2020 Aug;28(15):e633-e641. [doi: [10.5435/jaaos-d-20-00557](https://doi.org/10.5435/jaaos-d-20-00557)]
19. Dooley JH, Bettin KA, Bettin CC. The current state of the residency match. *Orthop Clin North Am* 2021 Jan;52(1):69-76. [doi: [10.1016/j.ocl.2020.08.006](https://doi.org/10.1016/j.ocl.2020.08.006)] [Medline: [33222986](https://pubmed.ncbi.nlm.nih.gov/33222986/)]
20. Rozental TD, Lonner JH, Parekh SG. The internet as a communication tool for academic orthopaedic surgery departments in the United States. *J Bone Joint Surg Am* 2001 Jul;83(7):987-991. [doi: [10.2106/00004623-200107000-00002](https://doi.org/10.2106/00004623-200107000-00002)] [Medline: [11451966](https://pubmed.ncbi.nlm.nih.gov/11451966/)]
21. Deloney LA, Perrot L, Lensing SY, Jambhekar K. Radiology resident recruitment: A study of the impact of web-based information and interview day activities. *Acad Radiol* 2014 Jul;21(7):931-937. [doi: [10.1016/j.acra.2014.03.009](https://doi.org/10.1016/j.acra.2014.03.009)] [Medline: [24928162](https://pubmed.ncbi.nlm.nih.gov/24928162/)]
22. Gu A, Lehman JD, Sardana A, Cohen JS, Richardson SS, Sculco PK. Adult reconstruction hip and knee fellowship program content and accessibility. *J Arthroplasty* 2018 Jun;33(6):1630-1633. [doi: [10.1016/j.arth.2018.01.075](https://doi.org/10.1016/j.arth.2018.01.075)] [Medline: [29523444](https://pubmed.ncbi.nlm.nih.gov/29523444/)]
23. Liu B. The United States Medical Licensing Examination Step 1 is changing-US medical curricula should too. *JMIR Med Educ* 2020 Jul 30;6(2):e20182 [FREE Full text] [doi: [10.2196/20182](https://doi.org/10.2196/20182)] [Medline: [32667900](https://pubmed.ncbi.nlm.nih.gov/32667900/)]
24. Poon S, Kiridly D, Mutawakkil M, Wendolowski S, Gecelter R, Kline M, et al. Current trends in sex, race, and ethnic diversity in orthopaedic surgery residency. *J Am Acad Orthop Surg* 2019 Aug 15;27(16):e725-e733. [doi: [10.5435/JAAOS-D-18-00131](https://doi.org/10.5435/JAAOS-D-18-00131)] [Medline: [30676512](https://pubmed.ncbi.nlm.nih.gov/30676512/)]
25. Hamidian Jahromi A, Arnautovic A, Konofaos P. Impact of the COVID-19 pandemic on the education of plastic surgery trainees in the United States. *JMIR Med Educ* 2020 Nov 17;6(2):e22045 [FREE Full text] [doi: [10.2196/22045](https://doi.org/10.2196/22045)] [Medline: [33119537](https://pubmed.ncbi.nlm.nih.gov/33119537/)]
26. Katz M, Nandi N. Social media and medical education in the context of the COVID-19 pandemic: Scoping review. *JMIR Med Educ* 2021 Apr 12;7(2):e25892 [FREE Full text] [doi: [10.2196/25892](https://doi.org/10.2196/25892)] [Medline: [33755578](https://pubmed.ncbi.nlm.nih.gov/33755578/)]

Abbreviations

- ERAS:** Electronic Residency Application Service
eSLOR: Electronic Standardized Letter of Recommendation
USMLE: United States Medical Licensing Examination

Edited by G Eysenbach; submitted 03.06.21; peer-reviewed by C Wei, S Bernstein; comments to author 30.07.21; revised version received 05.08.21; accepted 07.08.21; published 10.09.21

Please cite as:

El Shatanofy M, Brown L, Berger P, Gu A, Sharma AK, Campbell J, Tabaie S

Orthopedic Surgery Residency Program Website Content and Accessibility During the COVID-19 Pandemic: Observational Study
JMIR Med Educ 2021;7(3):e30821

URL: <https://mededu.jmir.org/2021/3/e30821>

doi: [10.2196/30821](https://doi.org/10.2196/30821)

PMID: [34449406](https://pubmed.ncbi.nlm.nih.gov/34449406/)

©Muhammad El Shatanofy, Lauryn Brown, Peter Berger, Alex Gu, Abhinav K Sharma, Joshua Campbell, Sean Tabaie. Originally published in JMIR Medical Education (<https://mededu.jmir.org>), 10.09.2021. This is an open-access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work, first published in JMIR Medical Education, is properly cited. The complete bibliographic information, a link to the original publication on <https://mededu.jmir.org/>, as well as this copyright and license information must be included.