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Evaluation of surgical oncology fellowship websites: Are we showing what applicants need to see?☆



Zain Aryanpour, BS^{a,1}, Shivani Ananthasekar, MD^{a,1}, Shrikiriti S. Rajan, MD^a, Sushanth Reddy, MD^{b,*}

^a University of Alabama at Birmingham School of Medicine, Birmingham, AL, USA

^b Department of Surgery, Division of Surgical Oncology, University of Alabama at Birmingham, Birmingham, AL, USA

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ABSTRACT

Background: The Internet is a major resource for surgery fellowship applicants, especially during the COVID-19 pandemic. Online information for surgical oncology and breast oncology training programs can be found on the Society of Surgical Oncology's webpage and fellowship institution websites. The goal of this study was to analyze the comprehensiveness of complex general surgical oncology and breast oncology fellowship websites.

Materials and methods: A list of all accredited surgical oncology and breast oncology fellowships was recorded from the Society of Surgical Oncology website and stratified by region. Then, a Google search was performed on each fellowship program to determine each institution's webpage. Two of the authors then analyzed 2 web resources, institutional website and Society of Surgical Oncology webpage, for each fellowship program to determine if information valued by applicants was provided.

Results: Online information of 29 surgical oncology fellowships and 59 breast oncology fellowships was analyzed. Statistical differences were found among criteria in major information categories between Society of Surgical Oncology and institutional webpages for both fellowship types. Detailed criteria were more present on institutional rather than Society of Surgical Oncology webpages.

Conclusion: For applicants to surgical oncology fellowships, institutional webpages provided the most pertinent information and may be used as a primary resource to guide fellowship application. For applicants to breast oncology fellowships, Society of Surgical Oncology webpages may be used as a primary resource to guide fellowship application. Both Society of Surgical Oncology and institutional pages lacked pertinent information regarding interview dates, and these resources should be updated to reflect program highlights as well as pertinent information for applicants.

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INTRODUCTION

Attracting superior talent has been the critical component to building competitive advantages in the marketplace for many industries [1]. Online communication has become a staple in corporate recruitment, with companies posting increasing information on their websites about their mission, values, goals, and benefits [2,3]. This Internet-based "war for talent" has not previously crossed over into recruiting candidates for medical training.

The COVID-19 pandemic has affected the system of medical education as a whole. The entire career path for senior medical students and residents applying to residency and fellowship, respectively, has been

altered. For the 2020–2021 cycle, applicants are relying on the Internet to gather program information and determine the next step in their professional journeys [4–8]. General surgeons applying to further subspecialty training are relying heavily on online program information to guide the fellowship application process—much as their contemporaries in nonmedical fields have done for years.

Because of this, online fellowship information has likely become a staple resource in determining the next step in the careers of this highly trained group. Recruitment efforts must outline the core concepts of the fellowship training programs and demonstrate the principles important to the applicant. Thus, the extent of information presented in these resources is of utmost importance in making a truly informed decision of where to spend the next 1 to 3 years of training. Although many studies have evaluated the content of online fellowships in a multitude of specialties, few have delved into differences in the information presented by online resource type [5–14].

The Society of Surgical Oncology (SSO) has remained dedicated to the education, research, and practice of quality cancer care for the past

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* Corresponding author at: Department of Surgery University of Alabama at Birmingham, BDB 607, 1808 7th Ave S, Birmingham, AL 35233.

E-mail address: sreddy@uabmc.edu (S. Reddy).

¹ Co-first authors.

80 years. SSO serves as a primary resource for all things related to cancer care training for the general surgeon [15]. The SSO website holds quality information for accredited fellowships in complex general surgical oncology and breast oncology for the United States and Canada. Most institutions also have their own webpages dedicated to their training programs. This study aims to evaluate the comprehensiveness of the SSO national database and surgical oncology and breast oncology fellowship program websites with the intent of highlighting potential areas of improvement.

MATERIALS AND METHODS

A list of all accredited complex general surgical oncology [16] (referred to as *surgical oncology* in the remainder of the text) and breast surgical oncology [17] fellowships was recorded from the SSO website in August 2020 and stratified by region (Table 1). Institutional review board approval was not required, as this study was a report of publicly available data. A Google search was performed on all included programs to determine each institution's website. Each program's SSO webpage and institutional webpage were independently analyzed by the authors (ZA and SSR) for the presence or absence of multiple categorical criteria. Criteria were selected based on previously published literature on webpage information applicants deemed important for residency programs from various medical specialties. Criteria were selected based on 5 broad categories and then subdivided into specialized components: contact information (ie, coordinator, faculty, fellows), personnel information (ie, faculty list, faculty number, job choice of previous fellows), applicant information (ie, eligibility, selection criteria, interview dates), program information (ie, positions available, description, teaching responsibilities, didactics), and benefits and/or miscellaneous information (ie, insurance options, vacation times, salary). Items were then placed into quartiles based on percentage of overall item fulfillment from institutional websites: 0%–25% fulfillment for quartile IV, 26%–50% fulfillment for quartile III, 51%–70% fulfillment for quartile II, and 71%–100% fulfillment for quartile I.

For surgical oncology fellowships, items that had a frequency of zero for both SSO and institutional webpages were excluded from the final analysis, which included alumni contact, selection criteria, and active and previous research. For breast oncology fellowships, items that had a frequency of zero for both SSO and institutional webpages were excluded from the final analysis, which included fellow and alumni contact information, call schedule, and ERAS links. Programs were assessed for functional SSO webpages. For those with a functional SSO webpage, the presence of an external link to their institutional webpage was also assessed. Descriptive statistics and χ^2 tests were used where appropriate. All analyses were conducted with SPSS Statistics (IBM SPSS Statistics for Windows, Version 26.0; IBM Corp, Armonk, NY).

RESULTS

Per the Society of Surgical Oncology website, there were a total of 29 surgical oncology fellowships and 59 breast oncology fellowships. The largest number of both surgical oncology and breast oncology fellowships is located in region 1. The region with the least number of fellowships was region 4 for surgical oncology and region 5 for breast oncology. The initial data collection error between 2 independent

collectors was 3.9%, after which the information was reconciled by reassessment in duplicate by the data collectors; no significant differences were found.

Of the 29 surgical oncology programs, 26 of the 29 programs (89.7%) had an associated SSO webpage. The 3 remaining programs did not have a functional SSO webpage; the hyperlink instead redirected to their main institutional webpage. When searched on Google, 1 of the 29 programs (3.4%) did not have an institutional webpage. Of all 29 programs, only 2 institutions with functional SSO webpages (6.9%) also included an external link to their respective institutional webpage. Of the 59 breast oncology programs, all 59 programs (100%) had an SSO webpage. When searched on Google, 13 of the 59 programs (22%) did not have institutional webpages. Of all 59 programs, only 2 SSO webpages (3.4%) also included an external link to the institutional webpage.

Content categories present among the surgical oncology and breast oncology fellowship programs are summarized in Tables 2 and 3. Items that were consistently in the first quartile for both surgical oncology and breast oncology fellowship webpages were coordinator contact information, fellowship description, eligibility, research requirements, curriculum, and number of positions available.

There was no difference in the amount of information on fellowship program websites when analyzed for program size ($P > .05$) or program geographical location ($P > .05$). For surgical oncology fellowships, major items whose presence varied significantly between the SSO and institutional webpages include application eligibility ($P = .023$), didactics ($P = .043$), faculty list ($P = .002$), research opportunities ($P = .003$), ERAS link ($P = .001$), and hospital size ($P = .006$). For breast oncology fellowships, the major items whose presence varied significantly with webpage type were information regarding coordinator contact ($P = .010$), research requirements ($P = .004$), curriculum ($P = .013$), didactics ($P = .002$), faculty list and clinical sites ($P = .001$), research opportunities ($P = .007$), journal clubs ($P = .044$), vacation and hospital size ($P = .001$), other benefits and miscellaneous categories ($P = .045$), and teaching responsibilities ($P = .001$).

DISCUSSION

This is the first analysis of surgical oncology and breast oncology fellowship websites in providing information for future applicants. The COVID-19 pandemic has unearthed the importance of virtual interactions—a trend that may continue in future application cycles. Providing information that fellowship applicants value through the Internet has become critical to the recruitment process. However, there are also generational gaps between program directors and their applicants, which can lead to further discordance in information supplied on the Internet. Millennials have increased priorities toward work–life balance, schedule flexibility, and location. This trend is prevalent among millennial medical professionals as well [18–20]. Our study demonstrates that many of these variables, such as call schedule, vacation, and city information, along with pertinent fellowship details such as contract, teaching responsibilities, and operative case list, are not being reported on surgical and breast oncology fellowship websites. This may lead to applicants making decisions with limited or unreliably sourced information.

We found that information items that were consistently in the first quartile for both SSO and institutional pages for surgical oncology and

Table 1
Demographics of surgical oncology and breast oncology fellowships

Region	States	Surgical oncology, n (%)	Breast oncology, n (%)
1	New England (CT, ME, MA, NH, RI, VT) & Middle Atlantic (NJ, NY, PA)	8 (27.6%)	21 (35.6%)
2	East North Central (IL, IN, MI, OH, WI) & West North Central (IA, KS, MN, MO, NE, ND, SD)	5 (17.2%)	14 (23.7%)
3	South Atlantic (DE, DC, FL, GA, MD, NC, SC, VA, WV, PR)	7 (24.1%)	9 (15.3%)
4	East South Central (AL, KY, MS, TN) & West South Central (AR, LA, OK, TX)	3 (10.3%)	9 (15.3%)
5	Mountain (AZ, CO, ID, MT, NV, NM) & Pacific (AK, CA, HI, OR, WA)	6 (20.7%)	6 (10.2%)
Total		29 (100%)	59 (100%)

Table 2
Content criteria assessment for surgical oncology fellowship websites

Quartile	Item	Programs fulfilling criteria, %		P value
		SSO	Institution	
I	Fellowship description	96	100	.752
	No. of positions	85	93	.367
	Eligibility	76	92	.023*
	Coordinator contact	96	88	.706
	Research requirements	88	84	.326
II	Curriculum	72	84	.052
	Faculty photos	0	72	–
	Faculty list	12	64	.002*
	Didactics	80	60	.043*
	Clinical sites	56	60	.161
III	Research opportunities	84	56	.003*
	Electives	56	52	.165
	Faculty contact	0	44	–
	Rotation schedule	40	44	.324
	ERAS link	8	40	.001*
IV	Fellow list	0	40	–
	Journal club	48	32	.161
	Fellow photos	0	32	–
	Vacations/leave	0	28	–
	Insurance	12	28	.179
V	Salary	12	28	.179
	Message from PD/Chairman	0	24	–
	Fellow education	0	24	–
	Recent grads	0	24	–
	Interview dates	16	20	.785
VI	Benefits/misc ^a	0	20	–
	Alumni prior job choice	0	20	–
	Hospital size	44	16	.006*
	Teaching responsibilities	24	16	.336
	Contract	0	12	–
VII	Operative case list	0	12	–
	City info	0	4	–
	Call schedule	0	4	–
	Fellow contact	0	4	–

^a Benefits/misc: night float, board pass rates, debt management, education funds, work hours, parking, meals, and FAQ.

breast oncology fellowships included fellowship description, curriculum, research requirements, eligibility, and number of positions available. These items were essential information that creators of these webpages should include for prospective applicants. Didactics, faculty list, and clinical sites were consistently in the second quartile for both program types and groups, likely highlighting the importance of these information items. Items in the third and fourth quartiles for both program types and groups were regarding the fellowships themselves, such as fellow information such as photos and education, contract information, city information, and benefits such as salary, vacation time, and insurance options. Although these items of information were likely shared during the traditional in-person recruitment and/or interview process, providing this information online may give applicants a more well-rounded picture of a program. The presence of information regarding interview dates has historically remained low for online fellowship websites, and our study found this to be true as well with a maximum frequency of 24% [9–14]. This is a pertinent area of information to update, as it may help guide online interview scheduling.

Overall, results of our study resonate with what has been previously found in studies with other surgical training programs. For example, an analysis of thoracic surgery fellowship websites showed increased representation of general program details (ie, coordinator contact, fellowship description, curriculum) but poor representation of specific details (ie, salary, community information, operative case list) that current applicants may find important [9]. Along with interview dates, information regarding call schedule, selection criteria, and salary and other benefits was consistently in the third and fourth quartiles in our study. These patterns of findings have been present on residency and fellowship websites in many other surgical specialties as well, such as

Table 3
Content criteria assessment for breast oncology fellowship websites

Quartile	Item	Programs fulfilling criteria, %		P value
		SSO	Institution	
I	Fellowship description	100	97.8	–
	Curriculum	100	87	.013*
	Coordinator contact	93	83	.010*
	Research requirements	89	83	.004*
	Eligibility	89	78	.061
II	No. of positions	78	78	–
	Didactics	65	63	.002*
	Journal club	48	54	.044*
	Clinical sites	63	52	.001*
	Faculty list	15	50	.001*
III	Faculty photos	0	50	–
	Research opportunities	46	37	.007*
	Vacations/leave	4.3	30	.001*
	Fellow list	0	27	–
	Benefits/misc ^a	4.3	22	.045*
IV	Hospital size	35	22	.001*
	Teaching responsibilities	39	22	.001*
	Faculty contact	0	22	–
	Insurance	2.2	22	.217
	Salary	2.2	22	.217
V	Rotation schedule	6.5	17	.074
	Message from PD/Chairman	0	17	–
	Fellow education & photos	0	15	–
	City info	2.2	13	.083
	Recent grads	0	13	–
VI	Alumni prior job choice	0	11	–
	Contract	0	8.7	–
	Interview dates	0	6.5	–
	Electives	6.7	4.4	.130
	Operative case list	0	2.2	–
VII	Call schedule	0	0	–
	Fellow contact	0	0	–
	ERAS link	0	0	–

^a Benefits/misc: night float, board pass rates, debt management, education funds, work hours, parking, meals, and FAQ.

orthopedics, vascular surgery, and plastic surgery [10–14]. Interestingly, information on operative case lists was significantly higher in similar previous studies in other surgical specialties, whereas it placed in the fourth quartile for both surgical oncology and breast oncology fellowship websites [12,14].

Surgical Oncology Fellowship Websites. Our results indicate that most of the baseline information regarding fellowship details resides in the first and second quartile categories, with associated details found primarily in the third and fourth quartile categories. Information that was more significantly associated with institutional webpages included program eligibility, faculty list, and ERAS links. Program eligibility is an important consideration, and thus, it may be beneficial to increase the availability of this information on SSO pages, as they serve as a streamlined version of information. Information that was more significantly associated with SSO webpages included didactics, research opportunities, and hospital size. Academic productivity is an important consideration for residency and fellowship applicants and thus may denote as to why didactics and research opportunities were found more frequently on SSO webpages than on institutional webpages to provide an important highlight of program ideals and values [21–23]. Presence of interview dates was similar for both SSO and institutional webpages, albeit the maximum frequency was 20%.

Although distribution of these information items may represent a true discrepancy between SSO and institutional webpages, the significant difference may be due to the smaller number of surgical oncology fellowship websites as a whole ($N = 29$). Categorical items in the third and fourth quartiles represent specific program details and thus may best be showcased on institutional webpages rather than on the SSO webpage, as the SSO tends to present a streamlined version of

information. Thus, for applicants to surgical oncology fellowships, our data suggest that institutional webpages seem to provide the most pertinent information.

Breast Oncology Fellowship Websites. Our evaluation of breast oncology fellowship websites found similarities to surgical oncology fellowship websites in terms of quartile placement but also found many significant differences between SSO and institutional webpages. Information that was more significantly associated with institutional webpages included journal club, faculty list, and benefits, all of which are specific program details that are most appropriately sourced either from institutional webpages or through the interview process. However, information that was more significantly associated with SSO webpages included coordinator contact, research requirements and opportunities, curriculum, didactics, clinical sites, hospital size, and teaching responsibilities.

Similarly to surgical oncology fellowship websites, there was increased presence of information regarding academic productivity on SSO webpages, likely highlighting the importance for programs to showcase this information. Increased presence of program details such as curriculum and teaching responsibilities on SSO webpages is an important distinction, as applicants may use this information to tailor fellowship application strategies. Associated program details such as benefits, electives, and operative case lists were more appropriately associated with institutional webpages, albeit the overall frequency was low. Interview dates were exclusively found on institutional webpages but only at a frequency of 6.5%.

The increased items with significant differences between SSO and institutional webpages for breast oncology fellowships are possibly due to an increased data pool ($N = 59$) compared to surgical oncology fellowships ($N = 29$). However, our data suggest that SSO webpages may be used as a primary resource for applicants to breast oncology fellowships.

Limitations and Future Directions. Our study has several limitations to consider. Our data were collected primarily through an online search that may present significant degrees of variation. Because these data present information from a particular timeframe, they may not be current. Additionally, the quality of the data was not assessed. Although no statistical differences were found between the demographics of the webpage groups, confounders may be present.

As the SSO serves as a single clearinghouse for information on many topics related to surgical oncology and breast oncology training, it uniquely tailors this resource to maximize comprehensiveness separate from conglomerate institutional webpages. This is especially advantageous if programs do not have institutional webpages, as we found that 22% of breast oncology fellowships did not have institutional webpages. Future directions would entail an implementation arm on how institutions can provide standardized information on the SSO and institutional webpages to align the information that is presented with the information valued by potential applicants. It is recommended that all programs include a link to institutional webpages on their SSO webpages, as our study found that this was significantly lacking; this provides applicants a reliable source of adjunct program information that individuals may value. Given that future application cycles may continue with a virtual format, it is also recommended that the SSO and associated institutions include anticipated interview schedules and dates on their webpages. Secondary information such as operative case list, rotation and call schedule, teaching responsibilities, and benefits such salary and insurance options may also be useful to consolidate and include in both resources.

In conclusion, although most SSO and institutional webpages provide a wide variety of information regarding surgical and breast oncology fellowships, there is considerable variation between the 2 resources. At this time, for applicants to surgical oncology fellowships, institutional webpages provide the most pertinent information and

can be reliably used to guide application strategies. For applicants to breast oncology fellowships, SSO webpages can be reliably used as a primary resource to guide application strategies. However, we recommend that both SSO and institutional webpages be updated to address gaps in pertinent information such as interview schedules and dates and to consolidate current information available to highlight important facets of programs to prospective applicants. In light of the COVID-19 pandemic and the increasing importance of online information, improving the quality and distribution of online information could mitigate impending confusion and uncertainty regarding future application cycles.

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Author Contribution

All authors (S. Ananthasekar, Z. Aryanpour, S. Rajan, S. Reddy) were directly involved in the collection of resources, formulation of ideas, writing the manuscript, and approving the final version for submission.

Conflict of Interest

None.

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Ethics Approval

Ethics/IRB approval was not necessary as this was an analysis of publicly available data.

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