



Contents lists available at ScienceDirect

## The American Journal of Surgery

journal homepage: [www.americanjournalofsurgery.com](http://www.americanjournalofsurgery.com)

## Factors associated with general surgery residents' decisions regarding fellowship and subspecialty stratified by burnout and quality of life



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## ARTICLE INFO

## Article history:

Received 16 March 2019

Received in revised form

30 June 2019

Accepted 5 August 2019

## Keywords:

Surgery

Fellowship

Subspecialty

Burnout

Quality of life

## ABSTRACT

**Background:** Although most surgery residents pursue fellowships, data regarding those decisions are limited. This study describes associations with interest in fellowship and specific subspecialties.

**Methods:** Anonymous surveys were distributed to 607 surgery residents at 19 US programs. Subspecialties were stratified by levels of burnout and quality of life using data from recent studies.

**Results:** 407 (67%) residents responded. 372 (91.4%) planned to pursue fellowship. Fellowship interest was lower among residents who attended independent or small programs, were married, or had children. Residents who received AOA honors or were married were less likely to choose high burnout subspecialties (trauma/vascular). Residents with children were less likely to choose low quality of life subspecialties (trauma/transplant/cardiothoracic).

**Conclusions:** Surgery residents' interest in fellowship and specific subspecialties are associated with program type and size, AOA status, marital status, and having children. Variability in burnout and quality of life between subspecialties may affect residents' decisions.

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<https://doi.org/10.1016/j.amjsurg.2019.08.003>

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## Introduction

The proportion of general surgery residents pursuing fellowship training increased from 55% in 1992 to 80% in 2012.<sup>1</sup> Despite this dramatic rise, some subspecialties, such as trauma/surgical critical care, are undersubscribed with 14% of fellowship positions unfilled in 2018. In contrast, pediatric surgery is highly competitive, with 54% of applicants unmatched the same year.<sup>2</sup> To decrease these discrepancies and improve workforce planning, it is important to understand the motives underlying these subspecialty choices.

There is limited information regarding factors associated with surgery residents' decisions to pursue fellowship and subspecialty choice. Prior surveys suggest that interest in fellowship training is influenced by program type (university versus independent), program size (number of categorical residents per year), and geographic location (Northeast, South, Midwest and West),<sup>3,4</sup> as well as by whether the resident is married or has children.<sup>5</sup> Since the surveys were conducted a decade ago, it is important to reassess these factors in the current era of widespread fellowship completion. Furthermore, the surveys did not include information on subspecialty choice. Lifestyle is known to affect specialty choice among US medical students, and in one study, "controllable lifestyle" accounted for 55% of the variability in specialty preference.<sup>6</sup>

There are fewer data available regarding the influence of lifestyle on fellowship choices among general surgery residents. Surgical subspecialties vary in their quality of life (QOL), primarily due to differences in workload intensity and controllability.<sup>7,8</sup> Burnout rates also vary between surgical subspecialties. Burnout is likely multifactorial, although long work hours are likely a strong contributor.<sup>7</sup>

The objective of this study was to identify associations with surgery residents' interest in pursuing fellowship, and in addition, associations with their choice of subspecialty, grouped by levels of QOL and burnout.

## Methods

This study was approved by the Human Subjects Committee at Los Angeles Biomedical Institute. Anonymous surveys were distributed to 607 surgery residents at 19 programs across the United States. The survey was created via a series of meetings among a small group of the co-authors who are experts in surgical education. The survey was vetted for content, length and style. Once a preliminary survey was created, it was then shown to a larger group of program directors for additional review and revision. Finally, the survey was administered to a small group of residents to assure clarity of content and ease with completion. The survey was not formally validated. Survey question topics included demographics, undergraduate medical education, student loan debt, residency training, fellowship and career goals, and salary expectations. Our findings regarding student loan debt, career goals, and salary expectations have been reported elsewhere.<sup>9,10</sup> Residency programs that had collaborated on previous projects or expressed interest in collaboration were invited to participate via email to the Program Director. Program type was categorized as university, university affiliated, or independent. Program size was based on the annual number of categorical residents and 4 or fewer was defined as small, 5–7 was defined as medium, and 8 or more was defined as large. Program locations were divided into Northeast, Midwest, West, and South.

Subspecialties were stratified into low, medium, and high levels of QOL and burnout based on prior studies. QOL was determined

from two recent studies that reported measures of work intensity and controllability, including hours per week, call nights per week, and rates of work/home conflict.<sup>7,8</sup> Burnout rates for each subspecialty were derived from a recent study that used the Maslach Burnout Inventory, a validated questionnaire that is considered the gold standard for assessing burnout.<sup>7</sup> The QOL and burnout levels of subspecialties are shown in Table 1. There was no reported comparable data on QOL measures or burnout rates for minimally invasive, hepatobiliary, endocrine, and burn surgery and no reported comparable data on burnout rates for breast surgery.

Residents were compared with respect to their plans to pursue: 1) fellowship versus no fellowship, 2) high QOL subspecialty versus other subspecialty and low QOL subspecialty versus other subspecialty, and 3) high burnout subspecialty versus other subspecialty and low burnout subspecialty versus other subspecialty. Variables analyzed included age, gender, race/ethnicity, domestic or foreign medical school, Alpha Omega Alpha (AOA) honors status, United States Medical Licensing Examination (USMLE) Step 1 and 2 scores, program type, program size, program location, post-graduate year, student loan debt, career goals, marital status and children. The data were entered into Microsoft Excel and then imported into SAS Version 9.4 (DataFlux Corporation, Cary NC). Comparisons were performed using *t*-test or Wilcoxon test for continuous variables, chi-square or Fisher exact test for categorical variables and odds ratios for binomial variables. No adjustments were made for multiple testing. Due to concerns that program type could be a confounder, a multivariable analysis was performed to determine whether fellowship interest was an independent predictor of outcomes. In the QOL and burnout analyses, data were excluded from residents who were undecided on subspecialty or were interested in a subspecialty without reported comparable data on QOL measures and burnout rates.

## Results

### Resident population

A total of 407 residents completed the survey for a response rate of 67%. The mean age was 30 ± 3 years and 177 (43%) were female. The racial/ethnic distribution was: 253 (62%) Caucasian, 81 (20%) Asian, 20 (5%) Hispanic, 15 (4%) African-American, 15 (4%) other, 14 (3%) Middle Eastern, and 9 (2%) unknown. The type of program attended was university for 306 (75%) residents, independent for

**Table 1**

Subspecialties of interest to residents with their associated levels of burnout and quality of life.

Subspecialty	Residents interested	Burnout level	Quality of life level
Trauma/critical care	70 18.8%	High	Low
Oncology	39 10.5%	Low	High
Colorectal	37 9.9%	Medium	Medium
Pediatric	29 7.8%	Low	Medium
Minimally invasive	29 7.8%	N/A	N/A
Cardiothoracic	28 7.5%	Low	Low
Vascular	24 6.5%	High	Medium
Transplant	16 4.3%	Medium	Low
Plastic	9 2.4%	Medium	High
Breast	7 1.9%	N/A	High
Hepatobiliary	7 1.9%	N/A	N/A
Endocrine	5 1.3%	N/A	N/A
Burn	1 0.3%	N/A	N/A
Undecided	71 19.1%	N/A	N/A

61 (15%) residents, and university-affiliated for 40 (10%) residents. The size of program attended was small for 63 (15%) residents, medium for 261 (64%) residents, and large for 83 (20%) residents. The location of program attended was West for 303 (74%) residents, Northeast for 54 (13%) residents, Midwest for 32 (8%) residents, South for 18 (4%) residents. Post-graduate year level was 1–2 in 154 (38%) residents, 3–4 in 153 (38%) residents, and  $\geq 5$  in 100 (25%) residents. Overall, 177 (43%) were married and 82 (20%) had children. Plan to pursue fellowship was endorsed by 372 (91.4%) residents. The number of residents interested in each subspecialty, along with the QOL and burnout levels, is included in [Table 1](#).

#### Analysis of resident interest in pursuing fellowship

A bivariate analysis of residents who were interested in pursuing fellowships versus those who were not is summarized in [Table 2](#). The desire to pursue fellowship was significantly higher among residents who attended university programs (OR 6.3 [95%CI 3.0–13.0],  $p < 0.0001$ ) and lower among residents who attended independent programs (OR 0.08 [95%CI 0.04–0.17],  $p < 0.0001$ ) and small programs (OR 0.06 [95%CI 0.03–0.14],  $p < 0.0001$ ). Interest in pursuing fellowship was lower among residents who were married (OR 0.5 [95%CI 0.2–1.0]  $p = 0.04$ ) or had children (OR 0.4 [95%CI 0.2–0.9],  $p = 0.03$ ). Age, gender, race/ethnicity, domestic or foreign medical school, AOA status, USMLE scores, post-graduate year, and student loan debt were not associated with pursuing a fellowship.

**Table 2**

Characteristics of all residents stratified by whether or not they were interested in fellowship.

		Fellowship n (%) or mean $\pm$ SD	No Fellowship n (%) or mean $\pm$ SD	p value
Gender	Male	207 (90%)	23 (10%)	0.25
	Female	165 (93%)	12 (7%)	
Race/ethnicity	Caucasian	228 (90%)	25 (10%)	0.6
	African-American	15 (100%)	0 (0%)	
	Asian	77 (96%)	4 (4%)	
	Middle Eastern	13 (93%)	1 (7%)	
	Hispanic	17 (85%)	3 (15%)	
	Other	14 (93%)	1 (7%)	
Medical school	United States	348 (91%)	33 (9%)	0.86
	Foreign	24 (92%)	2 (8%)	
AOA honors	Yes	105 (91%)	11 (9%)	0.69
	No	267 (92%)	24 (8%)	
USMLE Score	Step 1	238 $\pm$ 16	239 $\pm$ 14	0.56
	Step 2	250 $\pm$ 11	248 $\pm$ 15	0.47
Program type	University	293 (96%)	13 (4%)	<0.0001
	University affiliated	39 (98%)	1 (3%)	
	Independent	40 (66%)	21 (34%)	
Program size	3–4 residents/year	40 (63%)	23 (37%)	<0.0001
	5–7 residents/year	254 (97%)	7 (3%)	
	8–9 residents/year	78 (94%)	5 (6%)	
Program location	Midwest	15 (47%)	17 (53%)	<0.0001
	South	16 (89%)	2 (11%)	
	Northeast	53 (98%)	1 (2%)	
	West	288 (95%)	15 (5%)	
Post-graduate year	1–2	144 (94%)	10 (6%)	0.34
	3–4	136 (89%)	17 (11%)	
	$\geq 5$	92 (92%)	8 (8%)	
Debt	> \$250,000	119 (91%)	12 (9%)	0.94
	< \$250,000	154 (91%)	16 (9%)	
Married	Yes	156 (88%)	21 (12%)	0.04
	No	216 (94%)	14 (6%)	
Children	Yes	70 (85%)	12 (15%)	0.03
	No	302 (93%)	23 (7%)	

SD: standard deviation, USMLE: United States Medical Licensing Examination, AOA: Alpha Omega Alpha.

Residents who planned to pursue fellowship were more likely to desire having an academic career (70% vs 9%, OR 24.4 [95%CI 7.3–81.5],  $p < 0.0001$ ) and being involved in teaching (88% vs 51%, OR 6.9 [95%CI 3.3–14.3],  $p < 0.0001$ ) and research (67% vs 11%, OR 16.1 [95%CI 5.5–46.6],  $p < 0.0001$ ). Residents who planned to pursue fellowship were more likely to aspire to become a field leader/expert (75% vs 29%, OR 7.4 [95%CI 3.4–16.0],  $p < 0.0001$ ), residency program director (29% vs 3%, OR 14.1 [95%CI 1.9–104.2],  $p = 0.0008$ ), division chief (50% vs 9%, OR 10.7 [95%CI 3.2–35.4],  $p < 0.0001$ ), or department chair (32% vs 6%, OR 7.8 [95%CI 1.8–32.9],  $p = 0.001$ ). Fellowship interest was an independent predictor for these outcomes after adjusting for program type.

#### Analysis of resident interest in high and low QOL subspecialties

The characteristics of residents stratified by the level of QOL of their subspecialty of interest are summarized in [Table 3](#). Residents with children were less likely to be interested in low QOL subspecialties (OR 0.4 [95%CI 0.2–0.8],  $p = 0.01$ ). Residents who were interested in high QOL subspecialties were more likely to anticipate having greater responsibility at home than their significant other (OR 2.0 [95%CI 1.1–3.8],  $p = 0.03$ ). There was a trend toward more female residents interested in high QOL subspecialties ( $p = 0.06$ ). Residents who were interested in high QOL subspecialties were less likely to have considered pursuing a residency specialty other than surgery in medical school (44% vs 61%, OR 0.5 [95%CI 0.3–0.9],

$p = 0.02$ ). Residents interested in low QOL subspecialties were more likely to agree that debt influenced their fellowship decision (49% vs 30%, OR 2.3 [95%CI 1.3–4.0],  $p = 0.006$ ) and were less likely to be happy with their choice of surgery (90% vs 97%, OR 0.3 [95%CI 0.1–1.0],  $p = 0.04$ ).

#### Analysis of resident interest in high and low burnout subspecialties

The characteristics of residents stratified by the level of burnout of their subspecialty of interest are summarized in Table 4. Residents who received AOA honors or were married were less likely to be interested in high burnout subspecialties (OR 0.5 [95%CI 0.3–1.0],  $p = 0.04$ , OR 0.6 [95%CI 0.3–1.0],  $p = 0.04$ , and OR 0.3 [95%CI 0.1–0.8],  $p = 0.02$  respectively). Residents interested in high burnout subspecialties were less likely to aspire to become division chief (OR 0.5 [95%CI 0.3–0.9],  $p = 0.01$ ) or department chair (OR 0.5 [95%CI 0.3–0.8],  $p = 0.01$ ) and were more likely to feel financially secure about their future (OR 1.8 [95%CI 1.0–3.2],  $p = 0.047$ ). Residents who were interested in low burnout subspecialties were more likely to want academic careers (88% vs 70%, OR 3.0 [95%CI 1.5–6.0],  $p = 0.001$ ) and be happy with their choice of surgery (98% vs 91%, OR 4.6 [95%CI 1.0–20.9],  $p = 0.03$ ) and were less likely to agree that flexible hours are important (84% vs 94%, OR 0.4 [95%CI 0.2–0.9],  $p = 0.03$ ) or they would quit surgery if they had another income source (23% vs 35%, OR 0.5 [95%CI 0.3–1.0],  $p = 0.04$ ).

## Discussion

This multi-institutional survey of 407 categorical general surgery residents at 19 programs across the United States sought to determine factors associated with fellowship interest and subspecialty choice. The main findings were that interest in pursuing a fellowship was very high, and was associated with factors related to both the program and the resident. Fellowship interest was associated with the desire to have an academic career and hold leadership positions, but interestingly was not associated with degree

of student debt. Furthermore, there were several associations when we grouped subspecialties by their known levels of QOL and burnout, offering potential insight into how personal life may affect residents' decisions.

Our study noted that fellowship interest was associated with several program factors, as well as with residents' family and professional goals. An interest in pursuing a fellowship was more common among residents at university programs and less common among residents at independent programs and small programs. These findings regarding program type and size are consistent with prior studies, which also found that interest in pursuing fellowship was higher in the Northeast and lower in the Midwest.<sup>3,4</sup> The findings regarding location were similar in our survey although the geographic scope was more limited. Fellowship interest was lower among residents who were married or had children, which was previously reported in a large national survey of general surgery residents.<sup>5</sup> Finally, our study demonstrated an association between a desire to pursue fellowship and an interest in having an academic career, being involved in teaching or research, and becoming a field leader/expert, residency program director, division chief or department chair. These factors highlight significant differences in the professional aspirations of residents who express an interest in pursuing a fellowship versus those who do not.

Career QOL is increasingly important in surgery. Our study found that residents with children were less likely to express an interest in subspecialties known to have lower QOL, whereas residents interested in subspecialties known to have higher QOL anticipated having greater responsibility at home than their significant other. The variability in QOL between subspecialties may affect the popularity of subspecialties and choices of residents, particularly those with familial obligations. Fellowship positions in high QOL subspecialties, such as surgical oncology, are significantly more competitive in the match than low QOL subspecialties, such as transplant and trauma/surgical critical care.<sup>2</sup> Interestingly, this seems to mirror interests of medical students, who are increasingly applying to residency specialties that have a controllable lifestyle.<sup>6</sup>

**Table 3**

Characteristics of residents stratified by the level of quality of life (QOL) of their subspecialty of interest.

		Low QOL Subspecialty		Medium/High QOL Subspecialty		p value
		n	%	n	%	
Gender	Male	66	44%	85	56%	0.91
	Female	48	44%	60	56%	
Race/Ethnicity	Caucasian	68	41%	98	59%	0.67
	African-American	6	60%	4	40%	
	Asian	23	49%	24	51%	
	Middle Eastern	6	60%	4	40%	
	Hispanic	5	42%	7	58%	
	Other	5	45%	6	55%	
Program type	University	90	43%	118	57%	0.83
	University Affiliated	11	50%	11	50%	
	Independent	13	45%	16	55%	
Program size	3–4 residents/year	16	53%	14	47%	0.52
	5–7 residents/year	73	43%	95	57%	
	8–9 residents/year	25	41%	36	59%	
Program location	Midwest	3	25%	9	75%	0.16
	South	3	21%	11	79%	
	Northeast	18	47%	20	53%	
	West	90	46%	105	54%	
Post-graduate year	1–2	42	51%	40	49%	0.27
	3–4	42	42%	59	58%	
	≥5	30	39%	46	61%	
	Married	Yes	48	40%	73	
No	66	48%	72	52%		
Children	Yes	16	29%	39	71%	<b>0.01</b>
	No	98	48%	106	52%	

**Table 4**  
Characteristics of residents stratified by the level of burnout of their subspecialty of interest.

		Low/Medium Burnout Subspecialty		High Burnout Subspecialty		p value
		n	%	n	%	
Gender	Male	93	62%	57	38%	0.78
	Female	65	64%	37	36%	
Race/Ethnicity	Caucasian	103	64%	57	36%	0.67
	African-American	6	60%	4	40%	
	Asian	30	64%	17	36%	
	Middle Eastern	4	40%	6	60%	
	Hispanic	8	67%	4	33%	
	Other	5	50%	5	50%	
Medical school	United States	149	62%	90	38%	0.62
	Foreign	9	69%	4	31%	
AOA honors	Yes	53	73%	20	27%	<b>0.04</b>
	No	105	59%	74	41%	
Program type	University	128	63%	76	37%	0.08
	University Affiliated	10	45%	12	55%	
	Independent	20	77%	6	23%	
Program size	3–4 residents/year	18	64%	10	36%	0.73
	5–7 residents/year	100	61%	64	39%	
	8–9 residents/year	40	67%	20	33%	
Program location	Midwest	6	60%	4	40%	0.08
	South	9	69%	4	31%	
	Northeast	30	81%	7	19%	
	West	113	59%	79	41%	
Post-graduate year	1–2	47	59%	33	41%	0.63
	3–4	62	63%	36	37%	
	≥5	49	66%	25	34%	
Married	Yes	83	69%	37	31%	<b>0.04</b>
	No	75	57%	57	43%	
Children	Yes	37	67%	18	33%	0.43
	No	121	61%	76	39%	

Burnout rates also vary between surgical subspecialties and this too may affect their popularity, especially as it relates to residents' professional goals. Fellowship positions in low burnout subspecialties, such as pediatric surgery and surgical oncology, are also significantly more competitive in the match compared to high burnout subspecialties, such as vascular surgery and trauma/surgical critical care.<sup>2</sup> The relative popularity of subspecialties was similar in our survey when taking into account the size of the field (number of interested residents per annual fellowship positions). In the present study, residents who received AOA honors were less likely to express interest in high burnout subspecialties. Residents interested in low burnout subspecialties felt more satisfied with their decision to pursue surgery and were more likely to desire an academic career. Residents interested in high burnout subspecialties were less likely to want administrative leadership positions such as division chief or department chair.

This study has several important limitations. The survey response rate was 67% so there is potential for respondent bias. Residents' survey responses were not independently verified or subsequently confirmed. Residents' plans regarding fellowship and subspecialty may change during the course of training and may not correspond to actual application and completion. However, our findings related to fellowship interest are supported by the available studies on fellowship completion suggesting some validity to our survey. In the QOL and burnout analyses, data were excluded from 30% of residents who planned to pursue fellowship because they were undecided on subspecialty or were interested in a subspecialty without reported comparable burnout rates and QOL measures. Also, inferences about geography may not be accurate given the small number of programs included and may be confounding by overlapping characteristics (i.e. only small programs in the Midwest). Finally, the survey included only 19 residency programs, with a disproportionate number of university programs, and therefore may have selection bias and may not be broadly

applicable. Nevertheless many of the findings are similar to prior national surveys.

It is important for residency and fellowship program directors to be aware of these associations, which may affect recruitment. Certain subspecialties inherently have more emergencies and greater demands for work at nights and weekends, leading to low QOL and contributing to high burnout. Perhaps these fellowships can examine how to make their subspecialties more appealing to residents with a family or those who desire to have children. There is not exactly an inverse relationship with quality of life due to other contributors to burnout, such as patient volume, productivity-based compensation, administrative tasks, and lack of autonomy.<sup>11</sup> The impact of these issues may vary between subspecialties and addressing them may affect subspecialties' burnout rates and desirability to residents.

## Conclusions

The desire to pursue fellowship is associated with factors related to the program including type, size and geographic location, as well as factors related to the resident including marital status, having children, and professional goals. Subspecialties vary in QOL and burnout rates and this may affect residents' subspecialty choices, especially considering the interplay with familial obligations and professional goals. Understanding the motives underlying residents' choices is important for recruitment, decreasing discrepancies in popularity between subspecialties, and workforce planning.

## Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

## Conflicts of interest

All authors have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

## Acknowledgements

We would like to thank all of the residents who participated in this survey.

## Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.amjsurg.2019.08.003>.

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