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National prospective cohort study describing how financial stresses are associated with attrition from surgical residency

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ABSTRACT

Background: Attrition from general surgery residency is high with a national rate of 20%. We evaluated potential associations between financial considerations and attrition.
Methods: National prospective cohort study of categorical general surgery trainees.
Results: Of the 1048 interns who started training in 2007, 681 (65%) had complete survey and follow-up data. In logistic regression, those with higher starting attending salary expectations (>$300K) were more likely to leave training (OR 2.9, 95% CI 1.2–6.9). Women with a partner who earned more (>$50K/year) were more likely to leave training (OR 4.1, 95% CI 1.6–10.5). In a subgroup of interns undecided about their future practice setting (academic, community, private practice, industry), those with less debt (≤$100K) were more likely to leave training (OR 2.4, 95% CI 1.1–5.2).
Conclusions: Several financial matters were associated with attrition. Addressing these financial concerns may help decrease attrition in surgical training and improve surgical training.

Introduction

The average US medical student finishes medical school with over $175K in student loans. In fact, the average graduating debt has consistently risen over the past decade.[1] General Surgery residents typically train for at least five years, and many who pursue academic careers are learners for at least seven years. For these learners, debt can be particularly high as interest accumulates over time. A recent regional survey of surgery residents found that 75.3% of respondents worry about their finances, with around half of respondents reporting that they have loans in excess of $200K, and 28.9% have loans in deferment, forbearance, or default.[2]

Over the past twenty years, attrition from residency training has been a significant problem for general surgery programs across the United States. One in five surgical trainees do not complete training, which is significantly higher than attrition that has been observed for other surgical specialties.[3] There are many factors associated with non-completion of training that have been previously investigated.[3–12] Despite the debt burden of trainees and concern about financial considerations, no published studies have looked closely at the association between these factors and the likelihood of residents completing surgical training.

As part of a longitudinal cohort study of surgical trainees across the United States, we asked residents at the start of their training about financial considerations and debt. Nine years after they started their residency training, we evaluate how expectations for reimbursement and reality of debt were associated with residents' likelihood of completing surgical training.

Material and methods

All general surgery interns in the entering Class of 2007–2008 who participated in the National Study of Expectations and Attitudes of Residents in Surgery (NEARS) who competed our survey were included.[13] The NEARS study has been well-described previously in the literature.[4,10,12–15] Interns who participated in this survey were followed for eight years using linkable data provided by the American Board of Surgery. This study was initially approved by the Yale School of Medicine institutional review board, and has now been transferred and reapproved by the Weill-Cornell Medicine institutional review board.[4]

Development of the survey was based on qualitative interviews

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of general surgery residents who left their training programs, as well as prior literature on attrition and collaboration with the American Board of Surgery.[13] Survey questions gathered information about intern demographics, expectations for residency training, reasons why interns chose specific residency programs, and expectations of life as an attending surgeon. A subset of eight questions specifically addressed financial considerations, including cost of living and starting salary expectations, as well as student loan debt burden. For our analysis, the Likert scale responses of Strongly Agree/Agree were collapsed into a single Agree category, and Neutral/Disagree/Strongly Disagree were grouped into a single Neutral/Disagree category. Also, for our analysis, we combined two survey questions about loans into one and pooled answers into more relevant groups (See appendix for a list of the original questions).

Our primary study endpoint was attrition from residency training, specifically exploring what financial factors, if any, were associated with resident attrition. For this study, only those interns who completed the sociodemographic and financial burden questions on the survey questionnaire were included. There was no significant difference between interns who were included versus excluded in our analysis with respect to attrition and sociodemographic characteristics.

Cohort characteristics were examined. Univariate analysis comparing sociodemographic factors and their association with interns' answers to the financial survey questions was conducted by comparing responses among those residents who completed training with their colleagues who dropped out. These analyses were performed and differences between groups assessed using chi-squared tests.

A multivariable logistic regression analysis was performed to ascertain the likelihood of attrition as predicted by interns' answers to financial questions. This model controlled for individual intern characteristics, including gender, race, family status (Married with children, Married without children, Unmarried with partner, or Single/Divorced/Widowed), and graduation from a foreign medical school, as well as training program characteristics, including type (Academic, Community, Military), size (more than 5 graduating chiefs vs. less), and geographic location (Northeast, South, Midwest, West). Interactions between participant characteristics, program size and type, and financial survey questions were examined. The interaction between a resident's planned practice setting and debt burden, as well as the interaction between intern gender and spouse/partner salary, were tested for significance and included in the final model. Univariate hypothesis tests were two-sided; statistical significance was defined as a p-value < 0.05. The statistical analysis was performed using SAS Version 9.3 (Cary, NC).

Results

There were a total of 1048 categorical general surgery interns who started their training in 2007; 836 (80%) had linkable survey data (Appendix). Of these, 155 (19%) were excluded due to incomplete data, leading to a final cohort of 681 residents (65% of the initial population). The cohort was 64% (n = 436) male and 71% (n = 481) white. Overall attrition in this cohort was 20%, similar to our larger longitudinal NEARS cohort (Table 1).[12]

On univariate analysis, gender, ethnicity, and program type were associated with attrition (Table 2). These factors were controlled for in our multivariable logistic regression model. There were also several financial factors that were associated with attrition in univariate analysis (Table 3). Of interns who dropped out compared to those who completed training, a higher percentage expressed expectations for a higher starting salary (>$300K) as an attending (8.9% vs. 3.7%, p = 0.03) and those who were undecided about their plans following residency/fellowship (42.2% vs. 32.8%, p = 0.03).

Table 1
Demographic characteristics of the cohort.

Demographic	N = 681; n (%)
Gender	
Men	436 (64.0)
Race	
White	481 (70.6)
Non-white	200 (29.4)
Ethnicity	
Non-Hispanic	624 (91.6)
Hispanic	57 (8.4)
Family status	
Married with children	76 (11.2)
Married no children	186 (27.3)
Unmarried with partner	178 (26.1)
Single, divorced or widowed	241 (35.4)
US or Canadian med school	604 (88.7)
Family lives nearby	388 (57.0)
Family members in medicine	382 (56.1)
Program location	
Northeast	188 (27.6)
South	242 (35.5)
Midwest	165 (24.2)
West	86 (12.6)
Program type	
Academic	414 (60.8)
Community	239 (35.1)
Military	28 (4.1)
Large program size (> 5 chief residents)	179 (26.3)
Overall attrition	135 (19.8)

After controlling for intern and residency program variables in a multivariable logistic regression analysis, residents who expected to be offered a starting salary of greater than $300K were still more likely to drop out when compared to their colleagues who expected a starting salary below $200K (OR 2.89, 95% CI 1.22–6.85) (Table 4). In the subgroup of respondents who were undecided around their future practice setting, having loans less than $100K was associated with a higher likelihood of dropping out compared to colleagues with similar plans and more debt (OR 2.44, 95% CI 1.14–5.21). For those respondents planning a career in academics and respondents planning a career in community or private practice, the amount of their student loan debt was not associated with attrition (Table 4). Women with a spouse who earned a salary greater than $50K per year were more likely to drop out than women with spouses who earned a lower salary (OR 4.10, 95% CI 1.61–10.45). The risk of attrition among men with spouses earning more than $50K per year and men with spouses earning less than $50K per year were similar.

Discussion

This is the first nationwide, prospective, longitudinal study of categorical general surgery trainees that evaluates the role of financial expectations, financial support, and debt burden on resident attrition. We found several associations between various financial concerns and likelihood of attrition. Residents who expected to earn a higher salary as a junior attending, a subgroup of residents with less debt, and women with spouses who earned more than $50K per year were more likely to leave training.

There is a lack of transparency regarding financial information in general surgery, or sub-specialties within general surgery, with a large percentage of program graduates wishing they were given more information around financial and business matters.[16] Lack of transparency around salaries and earning potential may lead to medical students and residents making misinformed decisions about their careers. This is a difficult problem to address, as general surgery training lasts 5–10 years, and wage markets in any profession can change drastically in that time frame. The compensation landscape can change even more drastically in medical professions, as they

Table 2
Univariate analysis of demographic and program variables by chi-squared test.

Demographic/Program Variables	Completed N = 546 (80.2%) n (%)	Dropped Out N = 135 (19.8%) n (%)	p-value
Gender			0.04
Men	360 (65.9)	76 (56.3)	
Women	186 (34.1)	59 (43.7)	
Race			0.26
White	391 (71.6)	90 (66.7)	
Non-white	155 (28.4)	45 (33.3)	
Ethnicity			0.02
Non-Hispanic	507 (92.9)	117 (86.7)	
Hispanic	39 (7.1)	18 (13.3)	
Family status			0.92
Married with children	62 (11.4)	14 (10.4)	
Married no children	151 (27.7)	35 (25.9)	
Unmarried with partner	143 (26.2)	35 (25.9)	
Single, divorced or widowed	190 (34.8)	51 (37.8)	
US/Canadian medical school	490 (89.7)	114 (84.4)	0.08
Family lives nearby	311 (57.0)	77 (57.0)	0.99
Family members in medicine	236 (43.2)	63 (46.7)	0.47
Program location			0.49
Northeast	145 (26.6)	43 (31.9)	
South	201 (36.8)	41 (30.4)	
Midwest	131 (24.0)	34 (25.2)	
West	69 (12.6)	17 (12.6)	
Program type			0.02
Academic	330 (60.4)	84 (62.2)	
Community	199 (36.5)	40 (29.6)	
Military	17 (3.1)	11 (8.2)	
Large program size (> 5 chief residents)	136 (24.9)	43 (31.9)	0.1

depend on reimbursement rates and the changing organization of the healthcare system.[17,18] However, the reality of mounting student loan debt,[1,19] as well as other financial burdens, make transparency with respect to financial matters critical. In order to reduce this as a risk factor for resident attrition, it is important that contemporary information be made available for learners making career decisions over the course of their training.

A major finding in our study is that trainees who expected to earn a starting salary greater than $300K were more likely to drop out of residency. A contemporaneous (2009) study from the initial NEARS intern survey reported that the mean salary for mid-level trauma and surgical critical care faculty was $282K,[20] which was

Table 3
Univariate analysis of financial questions by completed/dropped out, p-values determined by chi-squared test.

Survey Responses	Completed N = 546 (80.2%) n (%)	Dropped Out N = 135 (19.8%) n (%)	p-value
Cost of living is important			0.06
Agree	255 (46.7)	51 (37.8)	
Neutral/disagree	291 (53.3)	84 (62.2)	
Good benefits/compensation are important			0.57
Agree	236 (43.2)	62 (45.9)	
Neutral/disagree	310 (56.8)	73 (54.1)	
I expect to make a lot of money as a surgeon			0.17
Agree	246 (45.1)	52 (38.5)	
Neutral/disagree	300 (54.9)	83 (61.5)	
Plans after training			0.03
Academic	198 (36.3)	53 (39.3)	
Community/private practice	155 (28.4)	23 (17.0)	
Other	14 (2.6)	2 (1.5)	
Undecided	179 (32.8)	57 (42.2)	
I expect my starting salary to be			0.03
<$200,000	274 (50.2)	69 (51.1)	
$200,000–300,000	252 (46.2)	54 (40.0)	
>$300,000	20 (3.7)	12 (8.9)	
I have loans			
Yes, ≤$100,000	120 (22.0)	39 (28.9)	
Yes, >$100,000	365 (66.8)	76 (56.3)	
No	61 (11.2)	20 (14.8)	0.07
Estimated spouse salary			
<$10,000	73 (13.4)	19 (14.1)	0.4
$10,000–50,000	166 (30.4)	33 (24.4)	
$50,001–100,000	76 (13.9)	22 (16.3)	
>$100,000	23 (4.2)	10 (7.4)	
No spouse/partner	208 (38.1)	51 (37.8)	
Home ownership			
Yes	278 (50.9)	62 (45.9)	0.3
No	268 (49.1)	73 (54.1)	

Table 4
Multivariable logistic regression analysis of financial questions reported as odds ratios (95% confidence interval). Odds ratios are the odds of dropping out of training compared to completion.

Survey Responses	OR (95% CI)
I expect my starting salary to be:	
<$200,000	Ref
$200,000–300,000	1.18 (0.75–1.86)
>$300,000	2.89 (1.22–6.85)
Do you have loans from college or medical school?	
For those who planned to be in academia	
Yes, >$100,000	Ref
Yes, ≤$100,000	0.45 (0.17–1.19)
No	1.17 (0.48–2.89)
For those who planned to be in community or private practice	
Yes, >$100,000	Ref
Yes, ≤$100,000	2.30 (0.88–6.03)
No	0.73 (0.08–6.44)
For those who were undecided or planned to be in other career	
Yes, >$100,000	Ref
Yes, ≤$100,000	2.44 (1.14–5.21)
No	1.40 (0.51–3.85)
What is your spouse/partner's average annual income?	
For male	
<$50,000	Ref
>$50,000	0.40 (0.14–1.11)
No spouse/partner	0.43 (0.16–1.18)
For female	
<$50,000	Ref
>$50,000	4.10 (1.61–10.45)
No spouse/partner	1.18 (0.34–4.09)
Do you own a home, or are you in the process of purchasing a home?	
Yes	Ref
No	1.07 (0.68–1.68)

lower than trainees' expectations at that time. Furthermore, a study surveying academic surgeons showed that only 50% of surgeons were satisfied with their compensation, and surgeons' satisfaction with compensation decreased as their clinical responsibilities increased.[21] A possible explanation of our finding is that trainees who have higher starting salary expectations may be more likely to leave the profession when confronted with the realization that attending surgeons work hard, make tremendous personal sacrifices, and all for less compensation than they thought they would earn for those personal costs. Prior work has shown that residents who leave transfer to other medical or surgical specialties where reimbursements or work-life balance are better.[22]

We found that having a lower amount of student loan debt (less than $100K) was a risk factor for attrition, specifically among interns who were undecided around entering academic vs. private practice after finishing training or interns who planned a career outside of clinical practice. Several recent studies have shown that loans and amount of debt influence career choices among medical trainees.[23–25] Many trainees have expressed that their choices around specialty choice are heavily modified by anticipated remuneration that is associated with different career paths and the impact that this will have on their assembled debt.[26] The effect of loans can also be seen in the popularity of the Public Service Loan Forgiveness (PSLF), with 40% of U.S. medical school graduates in 2014 planning on applying for loan forgiveness,[27] a program that requires 10 years of payments while working for a qualifying employer. The surgical training process usually helps trainees make at least 7 years of qualifying payments. This might in part explain our finding that higher student loan burden is protective from attrition, especially among those who are undecided around their career path. Leaving residency training to explore other career options is taking a financial risk, with potentially reduced income, as well as becoming ineligible for loan forgiveness by taking a job with a non-qualifying employer. Many trainees are likely unwilling or unable to take that financial risk, even if they are unhappy with their current career path. Those trainees with less debt may be more likely to leave, as it is less of a financial risk for them to do so. We provide further data showing that the cost of education leading to insurmountable student debt needs to be addressed. Solutions need to be proposed to reduce the cost of education, to help assure that trainees choose careers that align with their personal goals rather than external financial forces.

Women with spouses who earn a salary in excess of $50K a year were more likely to drop out of training. Recent US household survey data show women perform more childcare than men (1.1 h compared to 26 min per day) and more household work (2.6 compared to 2.1 h on days where household work was performed).[28] Our finding could reflect broader, ongoing societal problems in which the expectation is still that women should make sacrifices in their careers to focus on childcare and household work. Perhaps when there are two working professionals, women are more likely to give up their career for their partners or make concessions in their professional lives, which is troubling because there is already a relative scarcity of women in the surgical workforce.[29] A very different observation was made among male interns, among whom there was a trend toward not dropping out of residency if their spouse earned an annual salary greater than $50K. There are recent data showing that women in general surgery, on average, earn $40K per year less than men, and they are significantly less likely to reach senior leadership positions (e.g. full professors or division chiefs).[30] Women may not see their career potential to be as profitable as their partners' and may therefore be at higher risk to change jobs, professions, or leave the work force entirely. We must continue to strive to achieve pay parity and equal advancement opportunities for women in all medical professions so that this discrepancy does not exist.

There are several limitations to the study. First, the subjects of the cohort were not periodically reassessed during the study period to see how, if, and when their financial expectations and situations changed or how that may have coincided with attrition. Also, we do not know specific reasons as to why residents dropped out or the role financial matters played in that decision, if any. The monetary cutoffs for our survey answers were developed in a very different landscape of student loan debt burden in the U.S.[19] Because of this, the sensitivity of our analysis may be limited.

Conclusions

Categorical general surgery residents are more likely to drop out of training if they have higher starting salary expectations. Loan burden appears to play a role in attrition during surgical residency, with lower student loan debt associated with a higher risk of attrition in a subset of trainees. Women trainees with spouses who earn more than $50K per year were more likely to drop out of training. By improving transparency with regard to financial matters within general surgery, addressing high education costs, and closing the gender wage gap, we may reduce attrition rates and improve career satisfaction among general surgery trainees.

Declaration of competing interest

Dr. Yeo's spouse receives salary from Bioscrip, Inc. a home infusion company. Dr. Sosa is a member of the Data Monitoring Committee of the Medullary Thyroid Cancer Consortium Registry supported by Novo Nordisk, GlaxoSmithKline, Astra Zeneca, and Eli Lilly. Drs. Dolan and Symer receive support from an NIH AHRQ T-32HS000066 grant. The authors have no other potential conflicts to disclose.

Appendix. Original Finances Survey Questions

Cost of living in the region was very important to me
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

Good benefits/compensation were important to me
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

I expect to make a lot of money as a surgeon
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

What are your plans after residency/fellowship?
Academic
Community/private practice
Other
Undecided

I expect my starting salary to be:
<$100,000
$100,000 - 200,000
$200,000 - 300,000
>$300,000

Do you have loans from college or medical school?
Yes
No

If you have loans, how much do you owe?
<$20,000
$20,000 - 50,000
$50,001 - 100,000
>$100,000

What is your spouse/partner's average annual income
<$10,000
$10,000 - 50,000
$50,001 - 100,000
>$100,000
No spouse/partner

Do you own a home, or in the process of purchasing a home?
Yes
No

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