The American Journal of Surgery 220 (2020) 256–261

Contents lists available at ScienceDirect

The American Journal of Surgery

journal homepage: www.americanjournalofsurgery.com

Gender and compensation among surgical specialties in the Veterans Health Administration

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ARTICLE INFO

Article history:
Received 17 October 2019
Received in revised form
17 February 2020
Accepted 23 February 2020

Findings were presented at the American College of Surgeons Clinical Congress 2019, San Francisco, CA, Oct 28, 2019.

Keywords:
Gender disparity
Surgery
Pay gap
Veterans affairs
Pay transparency

ABSTRACT

Background: A gender pay gap has been reported across many professions, including medicine.
Methods: Surgeons employed at complex Veterans Affairs Medical Centers (VAMC) nationwide in 2016 were identified. Data on salary, gender, years since medical school graduation, professorship status, h-index, and geographic location were collected.
Results: Of 1993 surgeons nationwide, 23% were female. On average, female surgeons had significantly lower salaries compared to male surgeons ($268,429 ± 41,339 versus $287,717 ± 45,379, respectively; $p < 0.001$). Among each surgical specialty, there were no significant differences in salary on univariate analysis. Women were underrepresented in higher paying specialties and more heavily represented in lower paying specialties. On multivariate analysis, gender ($p < 0.001$), time since medical school graduation ($p < 0.001$), surgical specialty ($p = 0.031$), h-index ($p < 0.001$), and geographic location ($p < 0.001$) were significant predictors of salary.
Conclusion: Female gender significantly predicted lower salary among VAMC surgeons, however within each surgical specialty, there was no significant gender pay gap.
Sentence summary: Independent predictors of salary included gender, surgical specialty, experience, h-index, and geographic location. Although female surgeons had lower overall salaries compared to male surgeons in the Veterans Health Administration (VHA), there were no significant gender differences in salary among each surgical specialty. Pay transparency, unique to the VHA, along with the use of rational and objective criteria to establish and adjust salaries, may play a role in reducing the gender pay gap among VHA surgeons.

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Introduction

Although the number of women entering U.S. medical schools is now surpassing men,[1] women are underrepresented in surgical specialties and report lower salaries compared to their male counterparts.[2] In fact, a recent survey of 65,000 U.S. physicians from over 40 specialties found that female physicians earned 27.7%, an average of $105,000, less than male physicians in 2017.[3] This gap appears to be widening and can be attributed to a variety of factors, including practice type, hours worked, and household obligations.[4,5] Not only is there a gender gap in salary, but women physicians are less likely than men to hold leadership positions, sit on editorial boards, or obtain research funding.[6–11]

Despite this national trend, we recently found that salaries for otolaryngologists working in the Veterans Health Administration (VHA) were gender-neutral.[12] This finding is likely attributed to the specific and objective criteria used to establish physician salaries

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https://doi.org/10.1016/j.amjsurg.2020.02.045
0002-9610/Published by Elsevier Inc.

and the transparency of salary data in the VHA. In our current study, we investigated whether gender pay disparities exist throughout all surgical specialties in a government-based model. We hypothesized that other surgical specialties would demonstrate a similar gender neutrality in regard to salary. We also sought to identify predictors of salary among male and female surgeons in the VHA nationwide.

Methods

This study was approved by the Georgetown University Institutional Review Board (IRB#20171309). Methodology has been previously described in Dermody et al.[12] All board-certified surgeons employed at complex Level 1 Veterans Affairs Medical Centers (VAMC) were identified using the online directory "Our Providers" for each facility. VAMCs are categorized according to complexity into three levels with Level 1 being the most complex. Complexity is based on the characteristics of the patient population, clinical services offered, administrative complexity and the educational and research missions of the facility. Each surgeon's full name, gender, and site of medical training was collected. Academic surgeons affiliated with universities and residency training programs while also employed by the VHA were included.

The Federation of State Medical Boards "DocInfo" tool was used to verify the information listed on the VAMC websites and to obtain information on year of medical school graduation for each surgeon in our cohort.[13] Faculty title for each surgeon was identified using Doximity.com, a publicly available physician database, as well as individual institution websites. Geographic regions were determined using the regional divisions as per the United States Census Bureau classification: Region 1-Northeast, Region 2-Midwest, Region 3-South, Region 4-West. Region 1 was subdivided into New England and Mid-Atlantic.[14] These five distinct geographic cohorts were used for analysis in our study.

Salary compensation for 2016 was collected for each surgeon using the Enterprise Human Resources Integration-Statistical Data Mart (EHRI-SDM), a publicly available database under the Employee Lookup Tool on FederalPay.org.[15] The salary listed on this website is the full-time equivalent salary for each surgeon. For instance, a part-time surgeon working 60% of her time at a VAMC would earn 60% of the salary listed on the FederalPay.org website. Full-time and part-time surgeons were included in the analysis and all salaries were analyzed as the equivalent of full-time salaries. As a proxy for scholarly productivity, each surgeon's h-index was queried using the Scopus database.[16] The h-index of an author, as described by J.E. Hirsch in 2005, is defined as the author's *h* of the number of papers published (N_p) that have at least *h* citations each, while the author's other published papers have less than *h* citations.[17] This metric utilizes data from Scopus, Google Scholar, and Web of Knowledge to reflect the impact of an author's scholarly contributions in addition to the absolute number of publications and has been used by others as an objective measure of scholarly productivity.[18]

Statistical analysis

The finalized dataset was stratified by gender. Significant differences in mean salary between male and female surgeons were determined using parametric unpaired two-tailed t-tests. The primary outcome was the mean salary of male and female surgeons employed at complex VAMCs nationwide. The dataset was further stratified by surgical specialty. Associations were then made using ANOVA, *t*-test, and chi-square between male and female mean salary and four variables: number of years since medical school graduation, faculty rank, h-index, and geographic area, each stratified by gender and surgical specialty.

Variables were then examined via multivariate and univariate linear regression to determine the association between salary and gender, while controlling for number of years since medical school graduation, surgical specialty, faculty rank, h-index, and geographic area. A multivariate linear regression prediction model was created using salary in 2016 as the dependent variable. The multivariate linear regression model to predict salary was created using a stepwise reduction system with $p < 0.05$ as the cutoff threshold. Only faculty rank ($p = 0.196$) was removed as it was not statistically significant. SAS Version 9.4 (SAS Institute Inc., Cary, NC) was used for all data analyses with $p < 0.05$ to indicate statistical significance.

Results

Demographic data

Our cohort consisted of physicians board-certified in 13 surgical specialties: general surgery, cardiothoracic surgery, colorectal surgery, surgical oncology, surgical critical care, otolaryngology, orthopedic surgery, plastic surgery, urology, neurosurgery, vascular surgery, ophthalmology, and obstetrics and gynecology. A total of 2597 surgeons were identified. Of the 2597 surgeons in our cohort, 604 did not have salary data posted on FederalPay.org. A separate analysis showed that there was no significant difference in gender or surgical specialty among those surgeons with and without salary data. The 604 surgeons without salary data and two salary outliers were excluded from the analysis.

Demographic data are described in Table 1. Twenty-three percent of surgeons were female (450/1993) and 77% were male (1543/1993). On average, female surgeons had significantly lower salaries compared to male surgeons in 2016 ($268,429 ± 41,339 versus $287,717 ± 45,379, respectively; $p < 0.001$; Table 2; Fig. 1). There was a significant gender difference in the distribution of faculty rank ($p < 0.001$), with fewer women in the study possessing the status of "Professor" than men (8% versus 17.8%, respectively; $p < 0.001$; Table 1). Women surgeons had significantly lower h-index scores ($p < 0.001$) and fewer years since graduation ($p < 0.001$) compared to men (Table 1).

When stratified by faculty rank, women had consistently lower salaries compared to men in each faculty category, with the most prominent discrepancy among Assistant Professors ($p < 0.001$; Table 2). However, salaries among women and men Professors were not significantly different. There were also significant differences in salary by gender for those who were 11–20 years ($p < 0.001$) and 21–30 years ($p < 0.001$) out from medical school graduation, but not 0–10 years or 31+ years (Table 3).

Salary by surgical specialty

On univariate analysis, there was no significant gender gap in salary by surgical specialty (Table 4; Fig. 1). The absolute difference in mean salaries for men and women surgeons in each specialty is illustrated in Fig. 2. In ten specialties (cardiothoracic, colorectal, plastic, general, orthopedic, urology, otolaryngology, obstetrics & gynecology, surgical oncology, vascular), the absolute salary in US dollars was higher for men. In the remaining three specialties - neurosurgery, critical care, and ophthalmology - the absolute salary was higher for women.

Women were underrepresented in higher paying specialties (orthopedics: 9.3% female; neurosurgery: 11.8%; cardiothoracic surgery: 13.7%) and more heavily represented in lower paying specialties (ophthalmology: 40% and obstetrics & gynecology: 59.7%; Fig. 1). Men and women both had the highest average salary in neurosurgery at $342,658 ± 53,593 and $359,588 ± 29,272,

Table 1
Surgeon demographics by gender.

DEMOGRAPHICS	FEMALE (N = 450)	MALE (N = 1543)	P-VALUE
Years Since Graduation, Mean ± SD	18.12 ± 9.1	26.33 ± 12.6	<0.001*
Range (Min-Max)	4–49	4–81	
0–10 years, N (%)	106 (23.6)	155 (10.1)	
11–20 years, N (%)	182 (40.4)	431 (28.0)	
21–30 years, N (%)	110 (24.4)	356 (23.1)	
31+ years, N (%)	52 (11.6)	600 (38.9)	
H-Index, Mean ± SD	9.16 ± 8.9	13.59 ± 12.4	<0.001*
Range (Min-Max)	1–45	1–77	
Geographic Distribution, N (%)			0.576
Midwest	94 (20.9)	337 (21.8)	
Northeast	85 (18.9)	244 (15.8)	
South	155 (34.4)	565 (36.6)	
West	116 (25.8)	397 (25.7)	
Professorship Status, N (%)			<0.001*
Assistant Professor	150 (33.3)	417 (27.0)	
Associate Professor	70 (15.6)	281 (18.2)	
Professor	36 (8.0)	275 (17.8)	
None or Missing	194 (43.1)	569 (36.9)	

SD – standard deviation.
*indicates statistical significance.

respectively.

There were significant differences in salary based on the number of years since medical school graduation for general surgery, ophthalmology, otolaryngology, urology, vascular surgery, and colorectal surgery ($p < 0.05$). There were also significant differences in salary based on faculty rank for general surgery, ophthalmology, otolaryngology, plastic surgery, urology, and critical care surgery ($p < 0.05$).

On multivariate regression analysis (Table 5), gender ($p < 0.001$), time since medical school graduation ($p < 0.001$), surgical specialty ($p = 0.031$), h-index ($p < 0.001$), and geographic area of employment ($p < 0.001$) were all significant and independent predictors of salary. Faculty rank ($p = 0.196$) was not a significant predictor of salary on univariate analysis and therefore not included in the multivariable linear regression model. The prediction model was as follows: Salary = 241417 + 11309*Gender [male = 1, Female = 0] + 411.1*Years since Graduation + 737.3*Specialty [based on ranking outlined below] + 533.7*H Index + 5327*Geographic Region [Midwest = 1; Northeast = 2; South = 3; West = 4].

Discussion

In contrast to many other practice environments, we found that male and female surgeons employed at the VHA and practicing in the same field of surgery had similar salaries on univariate analysis. However, when taking into account a robust sample size and controlling for multiple variables, slight gender differences in salary persist. Reasons for this are multifactorial, but the disproportionate under-representation of women in the highest paying specialties is likely a contributing factor.

Aside from gender and surgical specialty, time since medical school graduation, h-index, and geographic location were also significant predictors of salary. Understandably, salaries tend to rise with increased years of experience and higher h-index, a surrogate marker for academic productivity. The cost of living varies according to geographic location, which corresponds to differences in locality pay as determined by each VHA. Interestingly, faculty rank was not an independent predictor of salary. Reasons for this are unclear, but may be related to the unique criteria for promotion or advancement in faculty rank at various academic affiliates.

Table 2
Salary data by gender.

DEMOGRAPHICS	SALARY, MEAN ± SD Female (N = 450)	Male (N = 1543)	P-VALUE
Salary, Mean ± SD	268429 ± 41339	287717 ± 45379	<0.001*
Range (Min-Max)	$100957-395582	$100957-403849	
Years Since Graduation, Mean ± SD	<0.001*	<0.001*	
0-10	254226 ± 43426	265310 ± 47307	0.056
11-20	269902 ± 37490	282945 ± 39295	<0.001*
21-30	273411 ± 40955	296235 ± 42150	<0.001*
31+	281687 ± 43931	291860 ± 48509	0.145
Geographic Distribution, Mean ± SD	0.004*	<0.001*	
Midwest	258237 ± 44568	278266 ± 47631	<0.001*
Northeast	261458 ± 39047	277955 ± 43377	0.002*
South	274024 ± 36678	293858 ± 45964	<0.001*
West	274322 ± 44189	293002 ± 41393	<0.001*
Faculty Rank, Mean ± SD	<0.001*	<0.001*	
Assistant Professor	264996 ± 37187	282509 ± 28711	<0.001*
Associate Professor	284977 ± 36710	297099 ± 44002	0.034*
Professor	294287 ± 39273	295314 ± 47862	0.902
None or Missing	260315 ± 42979	283427 ± 47974	<0.001*

SD – standard deviation.
Salary in US dollars.
*indicates statistical significance.

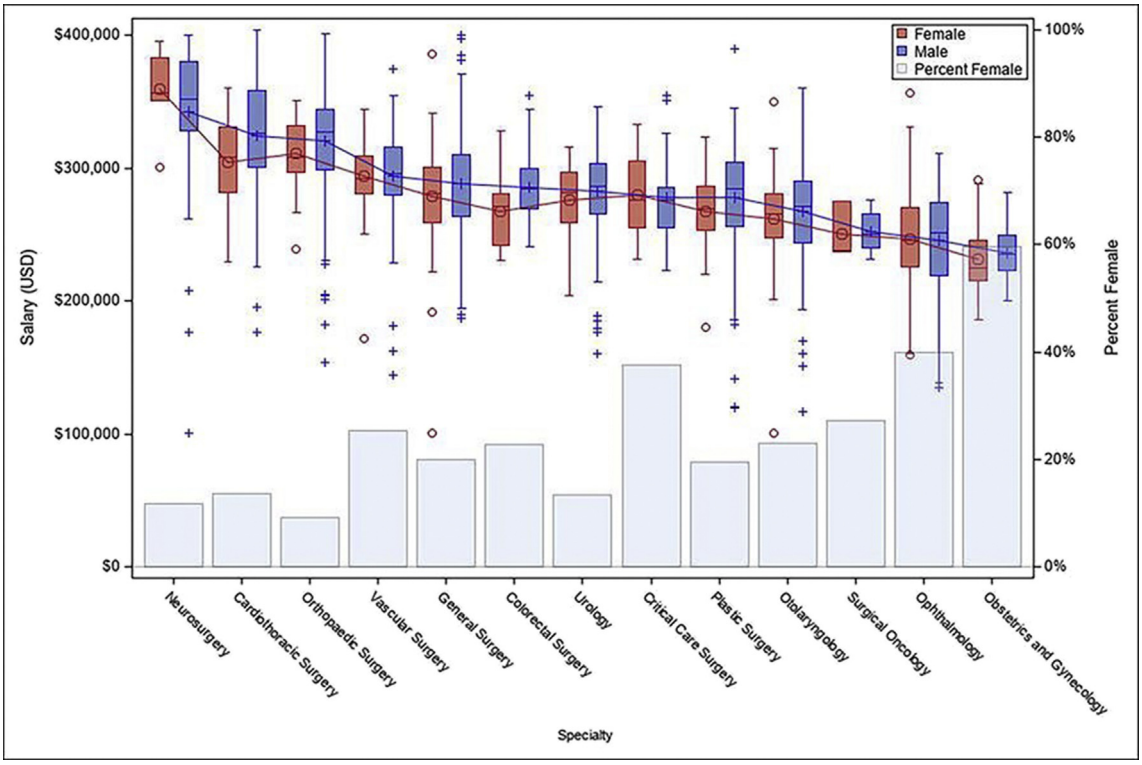

Fig. 1. Salary by gender according to surgical specialty. Salary in United States dollars (USD) is depicted on the left-hand x-axis by the box-and-whisker plot. The boxes represent average salary for each specialty and gender within one standard deviation; The whiskers represent the range of data and the circles and pluses represent salary outliers for women and men, respectively. The proportion of women in each specialty is depicted on the right-hand x-axis by the bar graph.

Although controversial, h-index may serve as a more accurate proxy for academic status.

Female surgeons in mid-career (11–30 years following medical school graduation) had significantly lower salaries compared to their male counterparts. Interestingly, there was no significant difference in salary among men and women within ten years of graduation. It is plausible that this is due to increased awareness of gender disparities in medicine. Additionally, the structure of the VHA hiring process leaves little room for negotiation among new hires, likely leading to this lack of discrepancy seen among the younger surgeons.

In addition to the mid-career salary discrepancy among men and women, we found a similar discrepancy among all geographic locations and among all faculty ranks, except for full Professor. We have previously shown that among otolaryngologists in the VHA nationwide, women have lower h-index scores in mid-career compared to their male counterparts. These findings are likely multifactorial, encompassing family/childcare responsibilities, lack of mentorship for women surgeons, and even network reach among academic institutions. Further investigation is warranted to elucidate these interesting results.

A growing number of studies have demonstrated a gender pay gap across many professions, including medicine.[19] Despite a steady increase in physician compensation over the past several

Table 3
Average salary by surgical specialty and time since graduation.

SPECIALTY	SALARY BY TIME SINCE GRADUATION (MEAN ± SD)				
	0–10 years	11–20 years	21–30 years	31+ years	p-value
General (n = 300)	260554 ± 44358	282298 ± 27610	293014 ± 32560	289027 ± 44212	<0.001*
Neurosurgery (n = 68)	311001 ± 75502	356461 ± 24533	346650 ± 29336	350070 ± 55548	0.115
Obstetrics and Gynecology (n = 72)	218774 ± 17399	236956 ± 23577	229723 ± 23735	237168 ± 22209	0.155
Ophthalmology (n = 278)	228475 ± 35952	252040 ± 34191	251682 ± 34590	248516 ± 35705	<0.001*
Orthopedics (n = 279)	309086 ± 32591	319263 ± 30363	321721 ± 45043	320154 ± 39703	0.551
Otolaryngology (n = 243)	248623 ± 36867	262379 ± 30839	278174 ± 28482	272629 ± 36273	<0.001*
Plastics (n = 102)	253263 ± 49527	273793 ± 36770	290510 ± 28891	275740 ± 54539	0.093
Urology (n = 283)	272387 ± 29899	275754 ± 29737	291028 ± 29267	284248 ± 32108	0.007*
Vascular (n = 158)	288426 ± 25536	284668 ± 32021	308572 ± 28092	292246 ± 41218	0.001*
Colorectal (n = 48)	257870 ± 19131	274475 ± 22575	294413 ± 27730	300896 ± 38811	0.007*
Critical Care (n = 56)	273132 ± 22897	271191 ± 22929	278551 ± 33897	297952 ± 38517	0.06
Cardiothoracic (n = 95)	328452 ± 2994	313511 ± 40303	330939 ± 42733	320347 ± 54543	0.508
Surgical Oncology (n = 11)	252861 ± 30916	251524 ± 15482	–	–	–

SD – standard deviation.
Salary in US dollars.
*indicates statistical significance

Table 4
Average salary by surgical specialty and gender.

SPECIALTY	GENDER		SALARY, MEAN ± SD		P-VALUE
	Female, n (%)	Male, n (%)	Female	Male	
General (n = 300)	60 (13.3)	240 (15.5)	278832 ± 39649	287876 ± 37052	0.097
Neurosurgery (n = 68)	8 (1.8)	60 (3.9)	359588 ± 29272	342658 ± 53593	0.386
Obstetrics and Gynecology (n = 72)	43 (9.6)	29 (1.9)	230982 ± 24980	235835 ± 19629	0.383
Ophthalmology (n = 278)	111 (24.7)	167 (10.8)	246434 ± 36010	245468 ± 36290	0.828
Orthopedic (n = 279)	26 (5.8)	253 (16.4)	311234 ± 28514	320064 ± 39113	0.264
Otolaryngology (n = 243)	56 (12.4)	188 (12.2)	261974 ± 34036	267313 ± 34332	0.307
Plastic (n = 102)	20 (4.4)	82 (5.3)	267636 ± 32044	277849 ± 45988	0.351
Urology (n = 283)	38 (8.4)	245 (15.9)	276164 ± 28390	282250 ± 31491	0.263
Vascular (n = 158)	40 (8.9)	118 (7.6)	294044 ± 30321	294112 ± 35822	0.991
Colorectal (n = 48)	11 (2.4)	37 (2.4)	267243 ± 28627	285663 ± 28999	0.070
Critical Care (n = 56)	21 (4.7)	35 (2.3)	279900 ± 29684	278142 ± 30706	0.835
Cardiothoracic (n = 95)	13 (2.9)	82 (5.3)	304735 ± 37995	324113 ± 46180	0.154
Surgical Oncology (n = 11)	3 (0.7)	8 (0.5)	249893 ± 21508	252470 ± 16632	0.836

SD – standard deviation.
Salary in US dollars.

years, gender pay disparity has persisted and even widened among private and academic institutions.[3,5,19,20] A recent Doximity report announced that female physicians earned 27.7% less than their male counterparts. Furthermore, they found no medical specialty in which female physicians earned more than their male counterparts.[3] A variety of factors contribute to this pay gap, including choice of specialty, starting salary, hours worked, practice type, and family/household obligations.[4,5] Although women represent 50% of matriculating medical students,[1] they remain underrepresented in surgery and are more heavily represented in lower-paying specialties. This finding is critical to understanding the overall landscape of gender pay disparity in surgery.

The gender pay equity among each surgical specialty in the VHA can be partly explained by the unique characteristics of the government-payment model. First, salary data for government-employed physicians is publicly accessible. Pay transparency in medicine is unique to the VHA and may play a critical role in gender pay equality.[21] Secrecy among salary can lead to inadvertent gender discrimination.[21] When salary data is transparent, there is less room for unconscious bias and a framework for physicians to negotiate. Not only can pay transparency improve gender equality in medicine, but can also boost clinical and academic productivity. In fact, research has shown that transparency in productivity metrics among faculty in an academic surgical practice increases clinical productivity.[22]

Second, the VHA uses an objective and tier-based system for determining pay. Physician annual pay is established by the sum of the base pay and market pay, intended to reflect the recruitment

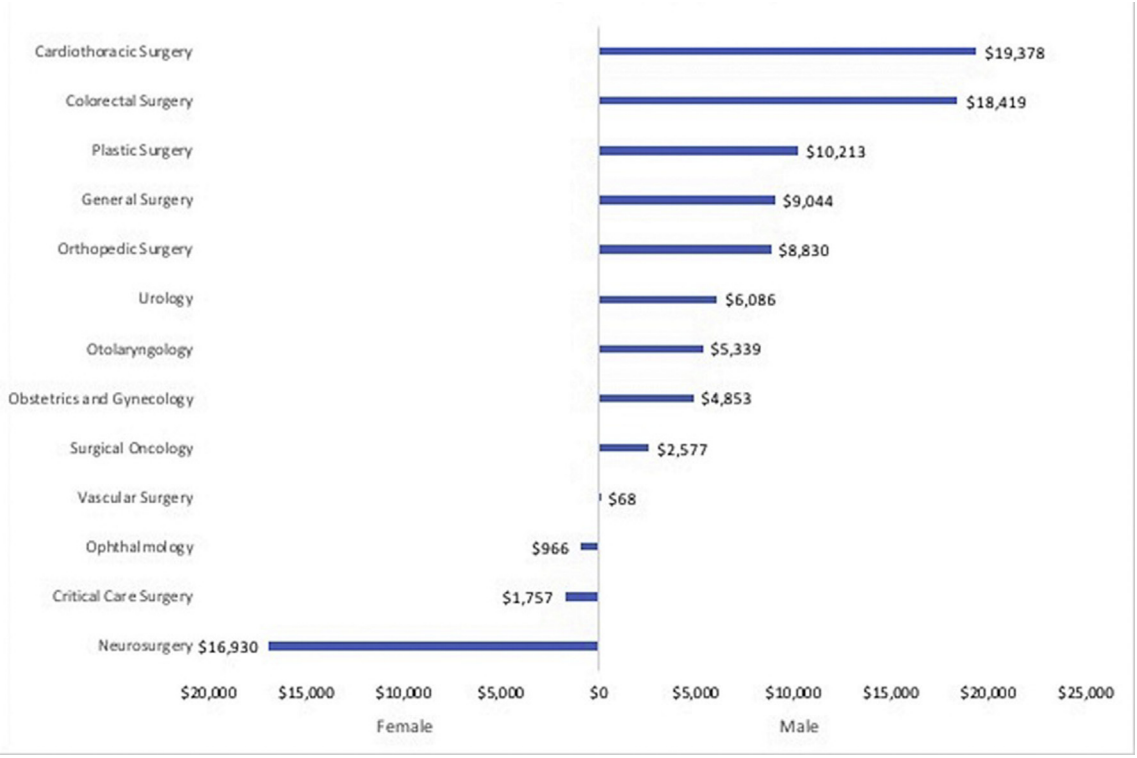

Fig. 2. Absolute difference in average salary (USD) among men and women by surgical specialty. Bars to the right indicate the specialties in which men have higher salaries by average dollar amount. Bars to the left indicate the specialties in which women have higher salaries by average dollar amount.

Table 5
Multivariate linear regression model.

VARIABLES	Individual predictors	Adjusted model	Unadjusted model
Gender	<0.001	<0.001	<0.001
Time since graduation	<0.001	<0.001	<0.001
Specialty	<0.001	0.031	0.032
Faculty rank	0.395	–	0.196
H-index	<0.001	<0.001	<0.001
Geographic area	<0.001	<0.001	<0.001

$R^2 = 0.086$.

and retention needs for the specialty. The base pay is a fixed rate regulated by law whereas the amount of market pay incorporates physician level of experience, need for the specialty, health care labor market, and physician accomplishments. At least once every two years, nationwide minimum and maximum amounts of annual pay are established for different specialties. Furthermore, there may be up to four tiers of pay for each specialty for which a separate range of pay has been approved. Each tier reflects different professional responsibilities, professional achievements, or administrative duties.[23]

There are several limitations of our study. First, the data was drawn from only complex VAMCs. Therefore, the data does not reflect smaller hospital settings or community clinics. We chose to include only complex VAMCs to create a homogenous cohort of surgeons who are more likely to be affiliated with academic institutions, involved in research and have a faculty rank. Second, publicly available salary data were missing for a portion of VHA surgeons. This may reflect those surgeons on contract who are not directly employed by the VHA, or it may represent new hires that did not have salary data in 2016. Unfortunately, there is a delay in publicly available salary data which confined our data to the year 2016. Additionally, faculty rank was obtained through online profiles and in some cases may be inaccurate for someone who experienced a recent promotion or transition.

Finally, the R^2 of 0.08 for the linear regression model is low, suggesting that a large portion of the variance in salary is not explained by our predictive model. This “negative” finding is promising in that gender did not largely predict salary. It does, however, suggest that there are other variables, perhaps social factors or other metrics for academic achievement, that were not captured in the predictive model.

Conclusions

Overall, several factors are predictive of salary among surgeons in the VHA, including gender, surgical specialty, experience, h-index, and location. Overall, women surgeons in the VHA have significantly lower salaries than their male counterparts. However, on deeper analysis among each surgical specialty, the gender pay gap begins to narrow. In fact, we found no significant gender difference in salary among each of the 13 surgical specialties. Although women have lower salaries overall, this can largely be explained by the lower proportion of women in higher-paying specialties. Pay transparency, similar starting salaries, and the use of rational and objective criteria to establish and adjust salaries, may play a role in reducing the gender pay gap among VHA surgeons.

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