Evolution of Workforce Diversity in Surgery☆

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OBJECTIVE: Assessing workforce diversity over time is essential to understanding how it has evolved and anticipating its future. We conducted the current study to evaluate gender, racial/ethnic, and duty trends over the past decade in general surgery and surgical subspecialties.

DESIGN: This is a cross-sectional study. We calculated ratios and relative changes to assess potential differences of physicians' characteristics across time and surgical subspecialties.

SETTING: We evaluated data acquired by the Association of American Medical Colleges.

PARTICIPANTS: We extracted data from the 2000 to 2013 including the overall number of surgeons, surgeon race/ethnicity, gender, and primary professional activity.

RESULTS: During 2000 to 2013, the total number of surgeons increased 11.5%, reaching 172,062 active surgeons and residents, the majority of whom were White (64%) or male (75%). However, from 2000 to 2013, most specialties showed some improvement in terms of including minorities and females. Most surgeons (98%) participate in patient care while a small portion are devoted to other activities (e.g., administrative, research, teaching; 2%). Both groups increased over the study period.

CONCLUSIONS: Our findings suggest that the face of surgery is changing. Continuous monitoring of the surgical workforce is important to anticipate future needs and to serve a diverse patient population. (J Surg Ed 76:1015–1021. © 2018 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: surgery, diversity, workforce, education

COMPETENCIES: Professionalism

INTRODUCTION

Over the past generation, American postsecondary educational institutions have made significant improvements in their student body diversity. Universities have started prioritizing ethnic, gender, and experiential diversity and nearly all have a diversity mission statement as part of their admissions policy.[1] This contributes to a significant and steady increase in diversity among students even from 1990s[1] with approximately 25% of total college students being under–represented minorities.[2] According to the US Department of Education, diversity has numerous benefits such as reducing disparities, providing opportunities for minorities, preparing students for future success in a global society, and promoting creative thinking.[3] Educational institutions have recognized that diversity is not solely limited to race, but a multitude of other factors including sex, ethnicity, gender, socioeconomics, sexual orientation, physical ability, and many others.[4]

In the field of medicine, diversity in the physician workforce helps provide accessible high-quality healthcare to patients. Despite being 26% of the US population, racial/ethnic minorities such as Blacks and Hispanics are under-represented in medicine, only comprising 6% of physicians.[5] Previous studies have shown that patients report better outcomes and increased trust when they are able to identify similarities with their physician, usually by race, background, or socioeconomic status.[6] Additionally, non-White physicians are reported

Funding: None.

☆Presentations: The present work was presented at the American College of Surgeons Clinical Congress (October 22-26/2017, San Diego, CA) and at Plastic Surgery the Meeting of the American Society of Plastic Surgeons (October 6-10/2017, Orlando, FL).

Ethical Approval: Not applicable. The study is based on already published material and de-identified information and conforms with the Declaration of Helsinki. Appropriate approval for use of data has been obtained by the Association of American Medical Colleges.

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  1931-7204/$30.00 https://doi.org/10.1016/j.jsurg.2018.12.009

as more likely to work in underserved areas, care for minority groups, and care for patients who are disproportionately ill.[7] Therefore, increasing diversity in the physician workforce is essential for reducing health disparities in vulnerable groups.

Residency programs have greatly improved trainee diversity. This was made possible through studying the reasons behind lack of diversity, promoting dialogue among involved groups, implementing counter measures, and creating educational opportunities for under−represented students while in medical school, such as increased contact with mentors.[8,9] Certain specialties such as internal medicine have greatly emphasized these points and exhibited similar increases in physician workforce diversity over time.[9] However, specialties such as surgery remain dominated by White men.[10]

In this study, we examine recent workforce trends in general surgery and surgical subspecialties to better anticipate future changes and needs. Areas to be explored include changes in gender, race/ethnicity, and occupations for surgeons from 2000 to 2013, based on the most updated data available.

MATERIALS AND METHODS

We evaluated publicly available annual reports published by the American Medical Association and American Association of Medical Colleges (AAMC). AAMC is a not-for-profit organization that prospectively collects and publishes demographic characteristics of faculty and residents in the series "Physician Characteristics and Distribution in the US" to increase member awareness and promote relevant medical research. As such, the inclusion of this data was exempt from review by our institution's Internal Review Board.

We assessed the most recent report regarding physicians involved in surgery, "Physician Characteristics and Distribution in the US" 2015 (based on information gathered in 2013). Older reports were also assessed. The following surgical specialties were evaluated: colon and rectal surgery, general surgery, neurological surgery, obstetrics and gynecology (OB/GYN), ophthalmology, orthopedic surgery, otolaryngology, plastic surgery, thoracic surgery, and urological surgery. Two authors independently (CS and RMP) extracted the data of interest to ensure accuracy. This included annual total number of physicians in surgical specialties, distribution of age, race/ethnicity, and gender and primary career activity (patient care or other) from 2000 to 2013.

We calculated proportions or ratios of physicians in each category for each surgical specialty across the study period. We calculated relative differences between outcomes of the initial (2000) and latest AAMC report (2015).

Definitions

Nonsurgeons were considered as all physicians not affiliated with general surgery or one of the aforementioned surgical subspecialties. For comparison, we also examined the diversity of all or total physicians as a separate group, including both surgeons and nonsurgeons together. Physicians whose primary appointments were listed as "office-based clinicians" or "residents/fellows or staff" were considered predominately involved in patient care while nonclinician positions included those in research, medical technologies, and administrative roles. For racial/ethnic calculations, non-White physicians included African-Americans, Asians, Hispanics, Native Americans, and others. Physicians of unknown race were excluded.

RESULTS

Workforce Size

From 2000 to 2013 and based on the most recent AAMC report (2015), the number of active surgeons increased by 17,696, achieving a relative increase of approximately 11.5% (154,366-172,062). Among the different surgical subspecialties, transplantation surgery represented the most remarkable relative increase of 215% (66−208), while thoracic surgery decreased almost 6% (4953−4668). Overall the physician and nonsurgeon workforces achieved an increase of 30% (Fig. 1, Table 1).

While more than 24% of the total nonsurgeons were active after the age of 65 as of 2013 (most recent AAMC report of 2015), only 14.8% of the surgeon group were active. (Table 2, online Supplementary Material). This value closely represents all subspecialties except for transplantation surgery, for which only 6% of surgeons were still active after the age of 65. Changes over time are presented in Table 2 (online Supplementary Material), which shows that overall surgeons and nonsurgeons over 65 increased, and nonsurgeons had higher rate. However, the number of general surgeons over age 65 tends to decrease over time.

Race/Ethnicity

Our results regarding racial/ethnic diversity suggest that over the period of the study, the number of White surgeons was nearly 3 times more than non-White surgeons (White-to-non-White ratio = 2.86, Table 3, online Supplementary Material). Among different subspecialties, the same ratio ranged from 2.29 (OB/GYN) to 4.84 (transplantation surgery). Ophthalmology demonstrated the highest degree of change (a 48% decrease of the White-to-non-White ratio) from 2000 to 2013. Conversely, transplantation surgery demonstrated a 35% increase in the White-to-non-White ratio (Fig. 2).

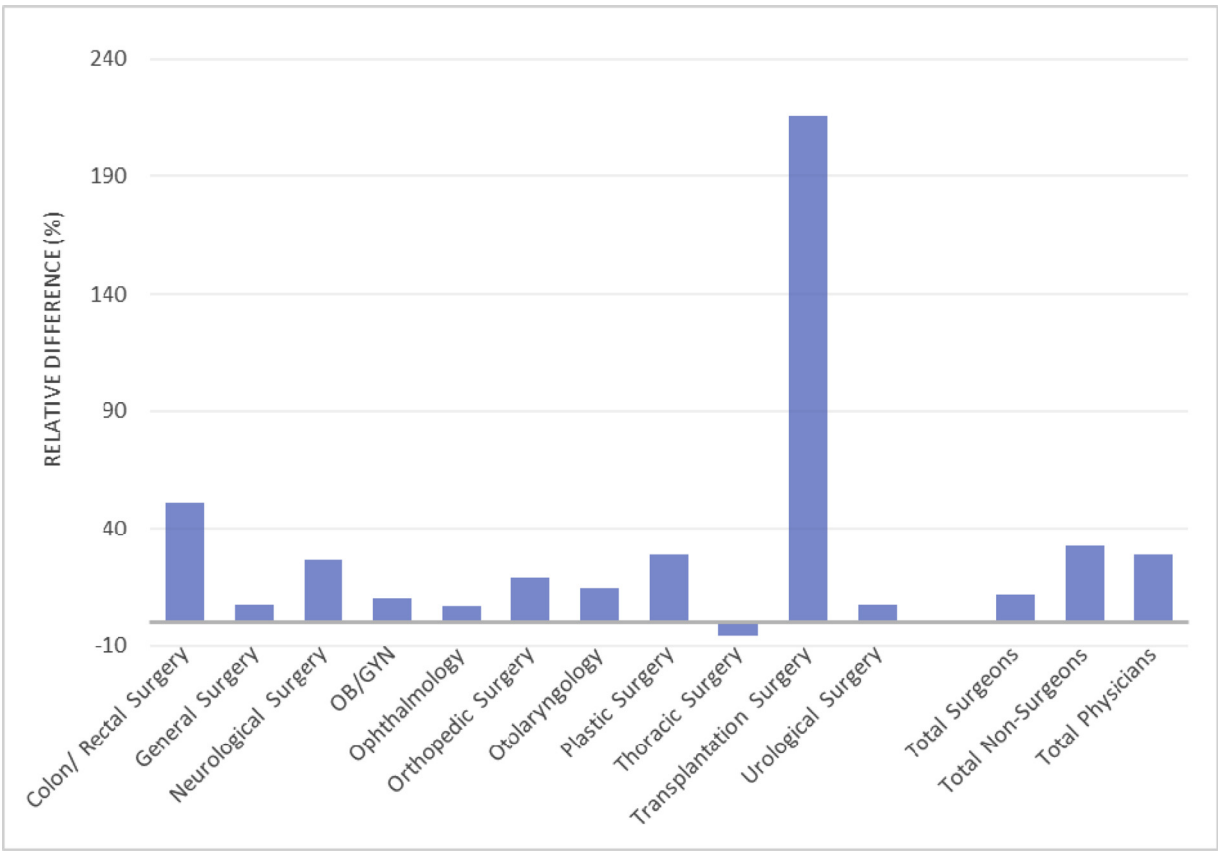

FIGURE 1. Depiction of the relative differences in physician workforce size from 2000 to 2013. Positive differences indicate increases and negative differences indicate decreases over time.

In comparison to surgeons, nonsurgeons and total physicians presented a lower White-to-non-White ratio of approximately 2 and a relative change throughout the years of (−)29% and (−)32%, respectively, while for surgeons the same change was (−)34%. This indicated an increase in non-White surgeons, nonsurgeons, and physicians in total.

Gender

Apart from OB/GYN, males were the predominant gender for every specialty, according to the most recent report (Table 4, online Supplementary Material). In 2013, the male to female (M:F) ratio was 2.95 for surgical specialties in general, ranging from 0.87 in OB/GYN to

TABLE 1. Size of Workforce

	2000	2008	2013	Relative Difference (%) (2013-2000)
Colon/rectal surgery	1127	1412	1702	51.02
General surgery	36,650	37,797	39,247	7.09
Neurological surgery	4997	5508	6314	26.36
OB/GYN	40,241	42,635	44,299	10.08
Ophthalmology	18,126	18,217	19,355	6.78
Orthopedic surgery	22,287	24,822	26,477	18.80
Otolaryngology	9417	10,200	10,766	14.33
Plastic surgery	6200	7216	7970	28.55
Thoracic surgery	4953	4622	4668	−5.75
Transplantation surgery	66	180	208	215.15
Urological surgery	10,302	10,493	11,056	7.32
Total surgeons	154,366	163,102	172,062	11.46
Total nonsurgeons	659,404	791,122	873,848	32.5
Total physicians	813,770	954,224	1,045,910	28.5

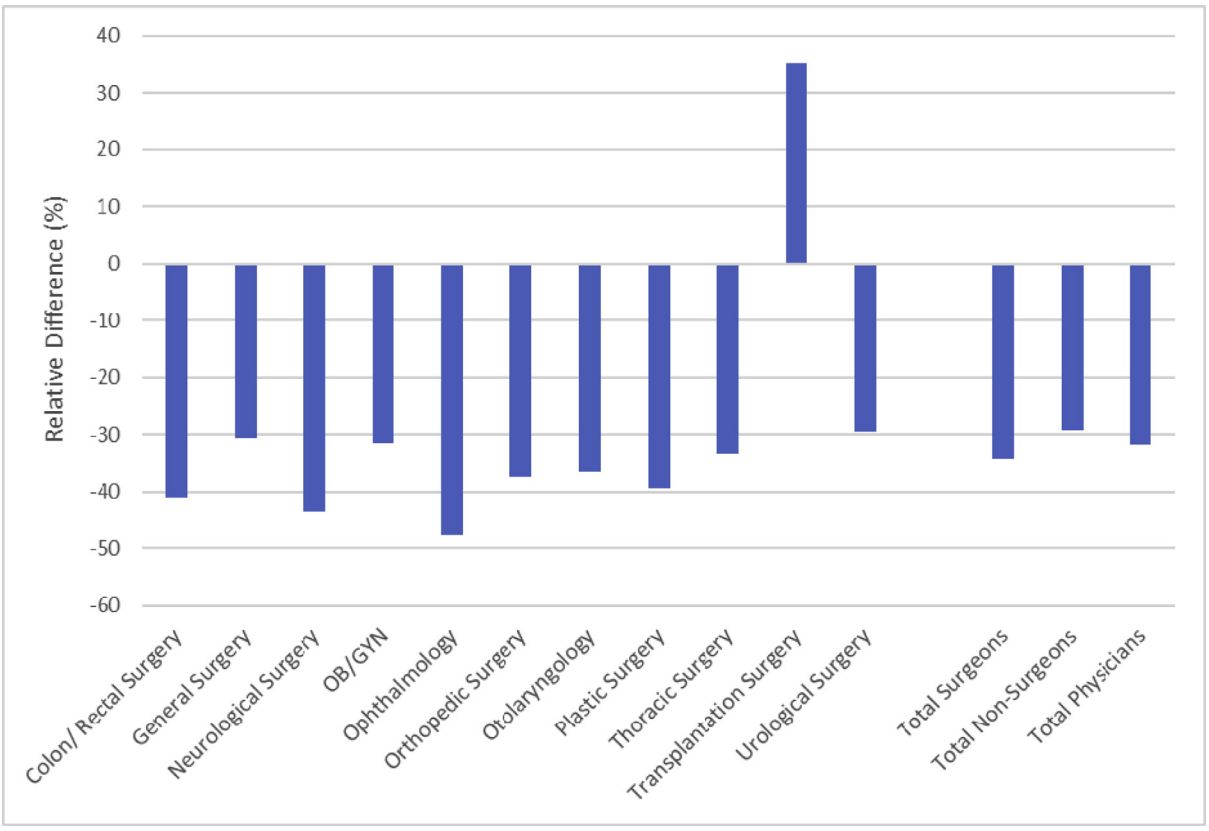

FIGURE 2. Depiction of the relative differences of White-to-non-White physicians from 2000 to 2013. Positive differences indicate increased ratios and negative differences indicate decreased ratios of White physicians over time.

almost 15 in thoracic surgery. From 2000 to 2013 all subspecialties presented a mild decrease of the ratio indicating more inclusion of women. Only in thoracic surgery did the M:F ratio increase (Fig. 3).

In comparison to surgical subspecialties, nonsurgical specialties had a M:F ratio ranging from 2.84 in 2000 to 2.02 in 2013. Male-to-female ratios demonstrated relative decreases of (−)46.2% for surgeons and (−)29% for nonsurgeons.

Activity

Throughout our study period, most surgeons' primary appointments were to patient care (clinicians); surgeon-clinicians increased by 26%, and nonclinicians by 7%. The most remarkable changes were noted in the field of transplant surgery with relative increases of clinicians and nonclinicians of (+)218% and (+)183%, respectively (Table 5, online Supplementary Material). Surgeon nonclinicians also increased; however, nonclinician nonsurgeons decreased.

DISCUSSION

For many specialties and residency programs, increasing diversity has become a priority. It is thought that physician diversity in regards to age, gender, race, social background, and more promotes healthcare service quality by creating a culturally rich environment that also reflects patient demographics.[11] Additionally, this workforce diversity improves educational opportunities and the cultural competency of medical students and residents.[11] In our study, we sought to evaluate how physician workforce diversity has changed from 2000 to 2013, based on the most recent AAMC report of 2015 and previous versions.

Gender Diversity

In 2012, female trainees were lowest in number for orthopedics, neurologic surgery, urology, and radiology.[12] Women predominated in pediatrics and obstetrics & gynecology accounting for 73.5% and 82.4% of the subspecialty workforce, respectively. Claims have been made stating that an insufficient applicant pool is a barrier to promoting diversity in training programs; however, this is inaccurate.[1] With nearly half of all graduating medical students being women and 15% representing ethnic minorities, commitments to diversity and inclusion can be implemented to help address this issue.[1]

Although diversity is promoted in the medical school student selection process, not all residency programs display a similar commitment. In a survey to Pediatrics

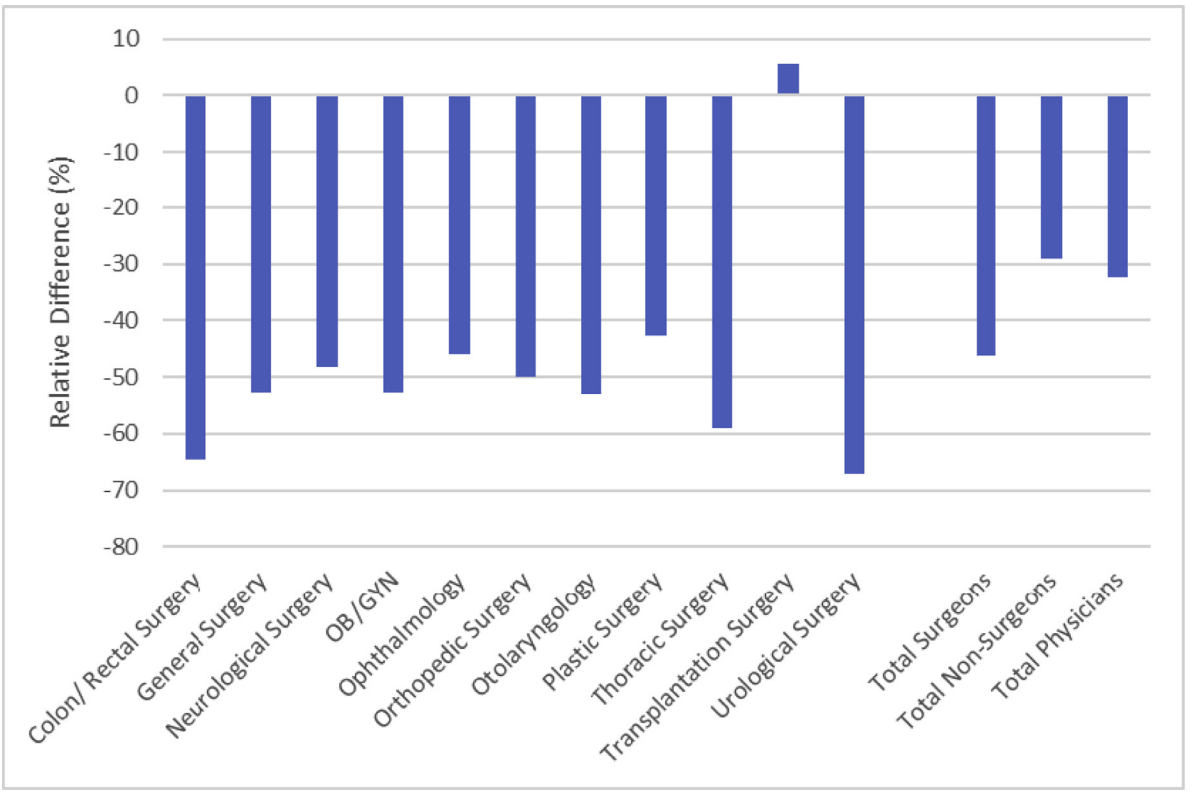

FIGURE 3. Depiction of the relative differences in the male-to-female ratio from 2000 to 2013. Positive differences indicate increased ratios and negative differences decreased ratios of male physicians over time.

department chairs, 25% of responders stated they had no plan or were not following their medical school's plan to increase workforce diversity.[13] The authors also revealed that although medical schools have nearly equal female-to-male ratios, women are poorly represented in chair positions. Gender-biases in the workforce are not limited to medicine; they are prevalent throughout the field of science. In the 2012 double-blind study by Moss-Racusin et al.,[14] science faculty members rated identical applications, one assigned a male and a duplicate assigned a female name. In this study, male applicants were deemed more competent, hirable, and offered a higher starting salary. This indicates that despite efforts to recruit a diversified workforce, subtle inherent biases may persist. Thus, it is important to have an ongoing commitment to the promotion of workforce diversity.

From 2000 to 2013, the male-to-female ratio in surgery decreased from 5.49 to 2.95 indicating a relative rate reduction of (−)46.18%. This change indicated that the gender gap in the surgical workforce is narrowing, but not to the same degree as it has in nonsurgical specialties. Research in the field of radiology has shown that the lack of female role models or mentors may account for male predominance in the specialty.[1,15] The same held true in a study examining female role models and the choice of female medical students to pursue surgery.[16] Specific to academic general surgery, women report fewer opportunities for career advancement and lower financial compensation compared to their male colleagues.[17,18] Additionally, the age at which physicians are retiring appears to be increasing, effectively diluting the impact of diverse entrants into the various fields of medicine. These particular reasons may help explain the gender-balance lag in surgery despite commitments to promote diversity.

Racial Diversity

Racially matched care providers have been shown to improve patient satisfaction and outcomes.[4] Recent trends in census data indicated that the US population will become increasingly racially and ethnically diverse in the coming generations.[4] Yet the reasons why the academic physician workforce lags in its diversified population are not entirely clear. While diversifying the workplace can lead to improved patient-centered care and cultural competency,[19] the opposite is also true: without establishing a more diverse physician workforce, minority groups already susceptible to healthcare disparities are further prevented from receiving equal access to and quality care.[4,20] Cultural

competency is a proficiency that is actively promoted in medical and resident education but is rarely part of practicing physicians' continuing medical education, a potentially high-yield area for improvement.

Our results show that the number of practicing physicians who are racial minorities increased between 2000 and 2013, and the upsurge is more apparent in the surgeon versus the nonsurgeon group (White-to-non-White relative difference ratios: (−)34.28 [surgeons] versus (−)29.23 [nonsurgeons]). The surgeon group, however, remained less diverse in terms of racial identification. Excepting transplantation surgery which remains a predominantly White male specialty, racial minority numbers increased across all surgical subspecialties. Interestingly, it is known that ethnic minorities are less likely to be listed for transplantation, are less likely to access information about transplantation surgery, and experience higher rates of graft failure.[21] While the reasons for this are multifactorial, intended or unintended discrimination at the healthcare workforce level may be at play. Improving diversity in this particular surgical specialty may improve under-represented minority patients' trust and quality of care. Heterogeneity in the physician workforce contributes to creativity and innovation[22] which may facilitate better recognition of barriers and innovative solutions to better promote equal healthcare for all patients.

Limitations

Limitations of this study include the retrospective review of source data (AAMC database), our inability to check the accuracy of the AAMC database, and inability to account for multiracial identification. There were 5 times as many nonsurgeons than surgeons so information may be skewed for the surgical group. Further, we were unable to examine other characteristics that contribute to diversity such as cultural/ethnic identification, sexual orientation, religious affiliation, and others as they were not collected or shared by the AAMC. Finally, although our study showed that physician workforce is expanding, we were unable to make any correlations on whether or not this expansion could sufficiently meet future workforce demands. Additional studies are necessary to elucidate this point.

Future Direction

It is not enough to simply state a commitment to improving diversity: active recruitment and retention of gender and racial minorities is necessary. Financial support, mentoring programs, and facilitating academic networks are tested and suggested recruitment and retention methods.[20,23] Universities can partner with their teaching hospitals to encourage diversity training and education and create a shared mission such as that between Johns Hopkins University School of Medicine and Johns Hopkins Hospital. Commitment to minority health research helps identify disparities in minority patients, improve access to healthcare, and shed light on inequalities; it may also reveal disparities among the care providers who treat these patients.[24] By successfully partnering all the stakeholders in a shared goal, the climate of diversity can be championed.[25]

CONCLUSIONS

Although the surgical workforce continues to be predominantly male and White, the results of this study demonstrate increasing diversity of the physician workforce between 2000 and 2013. During this time more women and racial minorities entered both surgical and nonsurgical specialties with surgery demonstrating a greater relative improvement.

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SUPPLEMENTARY INFORMATION

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.jsurg.2018.12.009.