

# Ethnic and Gender Diversity Comparison between Surgical Patients and Caring Surgeons

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**Background:** Diversity within the medical workforce remains a topic of discussion in academia, particularly when it comes to the underrepresentation of certain ethnic groups and gender in the surgical specialties. In this article, we look at how the gender and ethnicity of surgeons at a large academic institution in a rural setting compare with those of the population it serves.

**Methods:** We looked at demographic data from 2008 to 2018 and compared population trends among surgeons and patients.

**Results:** We found that while whites represent the large majority in both the surgeon and patient populations, absolute number and percentage of whites in the patient population seem to be trending downward from 2008 to 2018, but trending upward among surgeons (attending and residents). In addition, we found that while Asians make up only 1% of the patient population, they represent the second largest group (17%) among surgeons, with more than twice the proportion percentage of the second largest group within the patient population, composed of Hispanics (6%). Finally, we found a significant gender difference between the 2 populations with almost two-thirds of the surgeons being men, compared with the nearly even split of men and women within the patient population.

**Conclusions:** Ultimately, understanding how gender and ethnic diversity in the surgical workforce compares with that of the patient population being served may aid in designing training programs to address cultural competency and awareness as well as in impacting administrative decisions and hiring. (*Plast Reconstr Surg Glob Open* 2020;8:e3198; doi: [10.1097/GOX.00000000000003198](https://doi.org/10.1097/GOX.00000000000003198); Published online 29 October 2020.)

## INTRODUCTION

The US population is continually evolving and becoming more diverse.<sup>1,2</sup> African Americans, Hispanics, and Native Americans make up 33% of the US population in 2017 when compared with 21.9% in 1990.<sup>2</sup> The physician workforce in the United States, on the other hand, has historically been less diverse than the population it serves, and even more so within the surgical specialties.<sup>3–10</sup> For example, the percentages of African Americans, Hispanics, or Native Americans in medicine remain at low

levels, representing less than 9% of physicians in practice in 2013 and 15% of medical school matriculants in 2011.<sup>11</sup> Some historically male-dominated specialties however are starting to see changes, with 37.5% of general surgery residents now being women compared with 17.6% of general surgeons in practice.<sup>12,13</sup>

As the patient population continues to evolve and become more diverse, one may wonder in particular if the surgeon workforce at large academic institutions is catching up to the gender and ethnic changes that we are witnessing. In this study, we analyze the composition and trends of the patient population at our academic medical center—Penn State Hershey Medical Center located in Hershey, Pennsylvania—and compare it with that of our surgeon workforce as well as with national statistics over the same time span. We hypothesize that with recent patterns of migration and diversification in rural America,<sup>14</sup> we would see an increased diversity of patients being reflected as a result, but that this change would not necessarily mirror the surgeon workforce diversity in terms of

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both ethnicity and gender. It has been shown extensively that diversity in healthcare and the ability of patients to receive care from physicians and surgeons that look like them lead to better healthcare delivery and outcomes as well as decreased disease burden.<sup>15,16</sup> Furthermore, research has shown that minority Americans (African Americans and Hispanics) often sought care from physicians of their own ethnicity because of personal preference and language and not solely because of geographic accessibility.<sup>17</sup>

In this article, we hope to provide some insights into the demographic trends happening at one large academic institution, within the patient population and use it as a framework for evaluating and comparing it with the diversity landscape among the surgeon workforce in a rural academic setting.

## MATERIALS AND METHODS

The authors retrospectively reviewed ethnicity (from 2008 to 2018) and gender (from 2014 to 2018) data of patients and surgeons in various specialties at their academic institution. For context, the home institution is located in a rural area with the following ethnicity breakdown, according to the 2010 census: 83.5% whites, 6.6% Asians, 6.2% African Americans, 3.4% Hispanics and 3.5% in other categories. However, it is important to note that the institution is the region's only university-level academic medical center and therefore patients also do come from nearby other cities with varying demographic compositions. For patients with multiple visits, only data at the time of first visit was included in the analysis; therefore, no patient data were duplicated. Ethnicity and gender data were collected for the following surgical specialties and subspecialties: general surgery, neurosurgery, plastic surgery, orthopedics surgery, and colorectal surgery. Surgeons' data included both attending physicians and resident physicians. Physician assistants, nurse practitioners, and other healthcare professionals were not included in the study.

Ethnicity was categorized into the following groups: African American, Asian, Hispanic, White and Other. Individuals who indicated ethnicity as Hispanic but race as white or African American were classified as Hispanic in the analysis. Multiethnic individuals and individuals who indicated an ethnicity other than African American, Asian, Hispanic, or white were classified as Other in the analysis. Race and ethnicity are constantly evolving concepts that are often interchangeably used. The US census for some time only recognized 2 races, with "white" as the default race and "non-white" for anything else.<sup>18</sup> In the past 50 years, many sub-racial ethnicities have been defined and used to reflect the diversity in the population. For the sake of simplicity, in this article we have chosen to use the term "ethnicity" to refer to the different groups of the patient and surgical workforce populations. Overall, each individual could only belong to one group or classification in the analysis, meaning that an individual who is biracial is only accounted for in Other and does not appear again in either of the ethnicities he or she identifies to. For comparison, when available, ethnicity and gender data for the same groups were also taken from the

Association of American Medical Colleges (AAMC) census of physicians and faculty in surgery departments across the United States, from 2014 to 2018.

First, we compared ethnic and gender diversity between patients and surgeons among the 5 surgical specialties at our institution and nationally by calculating the average proportions of ethnic groups among the specialties from 2014 to 2018 (total patients  $N = 338,576$ ; surgeons average  $N/\text{year} = 120$ ). Then, we assessed the trends in ethnic diversity among the 5 surgical specialties among surgeons and patients between 2008 and 2018 by directly comparing the ethnic compositions by surgical specialty.

## Statistical Analysis Methods

The data were analyzed using the statistical program R, version 3.6.0 (<https://www.r-project.org>) together with the knitr package<sup>19</sup> to generate a fully reproducible statistical analysis. Calculations of linear trends were performed using linear regression.

## RESULTS

### Comparison of Gender Diversity among 5 Surgical Specialties from 2014 to 2018

In the patient population, male-to-female ratio was nearly at 1:1 during the 2014–2018 time span, with slightly more female (53%,  $N = 178,266$ ) than male patients (47%,  $N = 160,310$ ). However among surgeons, the average percentage of men during that same period was higher than that of women, with 60% ( $N = 72$ ) of surgeons being men (Fig. 1). The larger number of men in the surgeon population was also reflected at the national level with 72% ( $N = 11,705$ ) of surgeons being men compared with just 28% of women from 2014 to 2018 (Fig. 1).

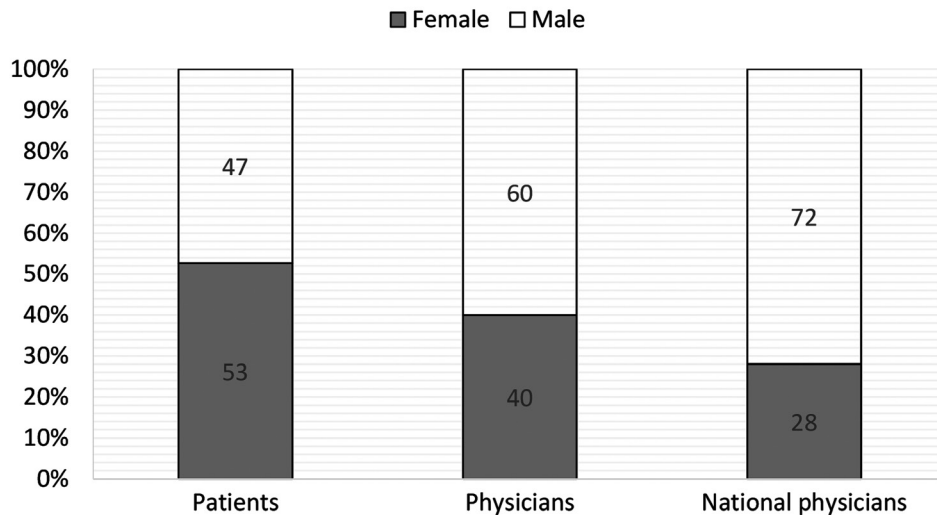
### Comparison of Ethnic Diversity among 5 Surgical Specialties from 2014 to 2018

Whites make up the majority of the patient population (84%) as well as the surgeon (77%) workforce, which is higher than what has been observed at the national level (71%). No other ethnicity made up more than 7%, with Hispanics making up the second largest group (6%) followed by African Americans (5%), Asians (1%), and Others (3%) (Fig. 2). While the surgeon population is also largely made up of whites, the second largest group however is different from what we saw for the patient population, with Asians making up 16% of surgeons, which is significantly higher than the percentage of Asian patients (1%). This is also reflected at the national level, with Asians making up 17% of the surgeon workforce (Fig. 2). The percentage of Hispanics (6%) in the patient population is higher than that of the Hispanic surgeons (3%) at our institution but similar to that of the Hispanic surgeon workforce nationally, while the percentage of Others (3%) is the same at our institution (2%) as nationally (2%).

### Overall Trend in Patient and Physician Ethnicity from 2008 to 2018

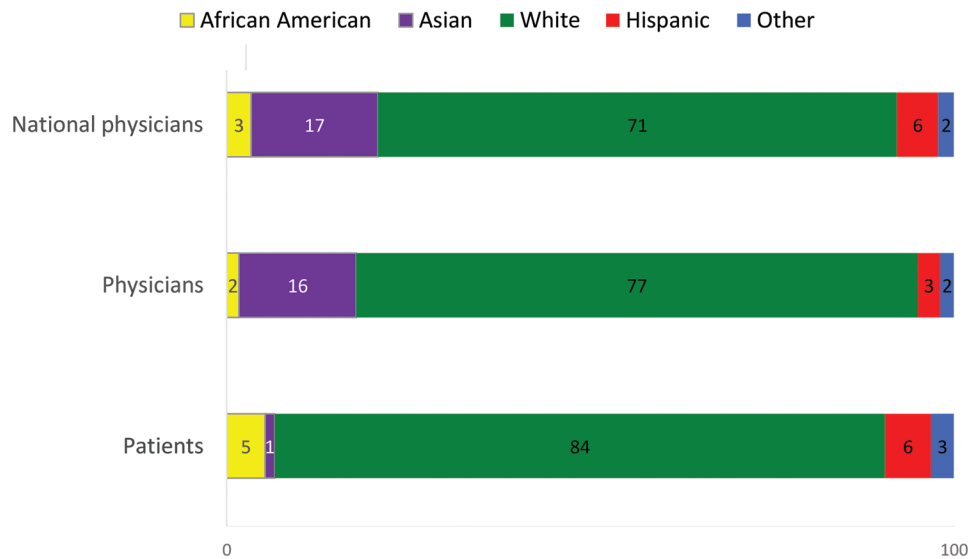
Although the absolute change in number of patients from most of the different ethnic backgrounds was

### Gender diversity during 2014–2018



**Fig. 1.** Gender diversity among patients and physicians among the 5 surgical specialties during the 2014–2018 period.

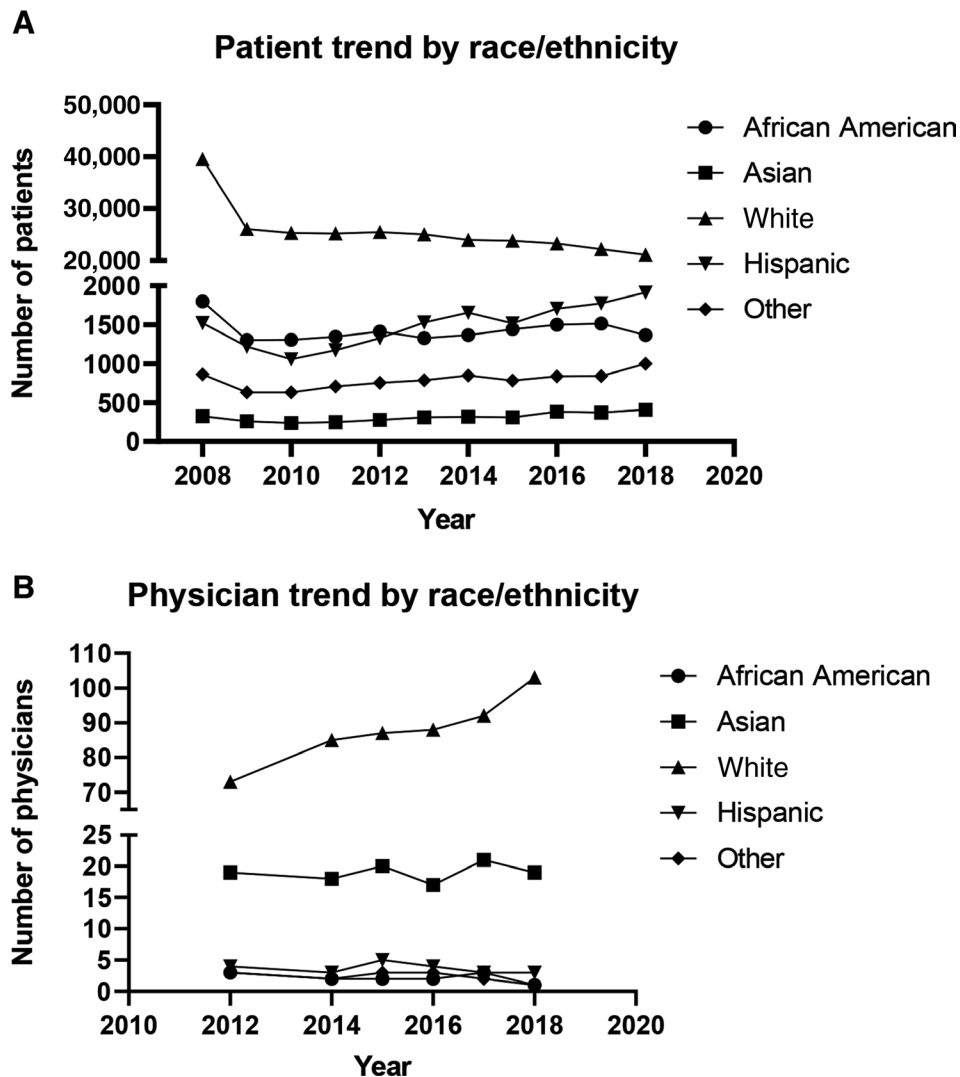
### Ethnic diversity during 2014–2018



**Fig. 2.** Ethnic diversity in patients and physicians among the 5 surgical specialties in the past 5 years. Yellow indicates African American; purple, Asians; green, Whites; red, Hispanics; blue, other.

relatively small, we found statistically significant proportion changes ( $P < 0.05$ ) of whites (−8.8%), Hispanics (+114%) and Others (+97%) in the patient population from 2008 to 2018 (Fig. 3A). Particularly, the white patient population seems to trend downward in prevalence (0.74%/year) while populations of the Hispanic and Others are trending upward (0.38%/year and 0.16%/year, respectively;  $P < 0.05$ ). The African American and Asian populations do not significantly change in prevalence. In comparison, from 2012 to 2018 in the surgeons group, the white population is trending upward in prevalence (1.2%/year,  $P < 0.05$ ) while all the others do not significantly change (Fig. 3B).

A closer look at individual surgical specialties shows further trend differences within the patient population. From 2008 to 2018, neurosurgery, orthopedic, and plastic surgery witnessed an upward trend in prevalence in the non-white populations and particularly in the Hispanic population (0.31%/year, 0.44%/year, 0.37%/year, respectively.  $P > 0.05$ ) and a recent downward trend in the white population (−0.61%/year, −0.91%/year, −0.74%/year, respectively;  $P > 0.05$ ) although the absolute numbers overall were smaller in the non-white groups compared with the white group (Fig. 4B–E). General surgery witnessed a downward trend in prevalence across all



**Fig. 3.** Trend in the total number of (A) patients by ethnicity from 2008 through 2018 and (B) surgeons by ethnicity from 2012 through 2018 in all 5 surgical specialties. Total number of surgeons each year includes surgeons from the previous year who remained on staff.

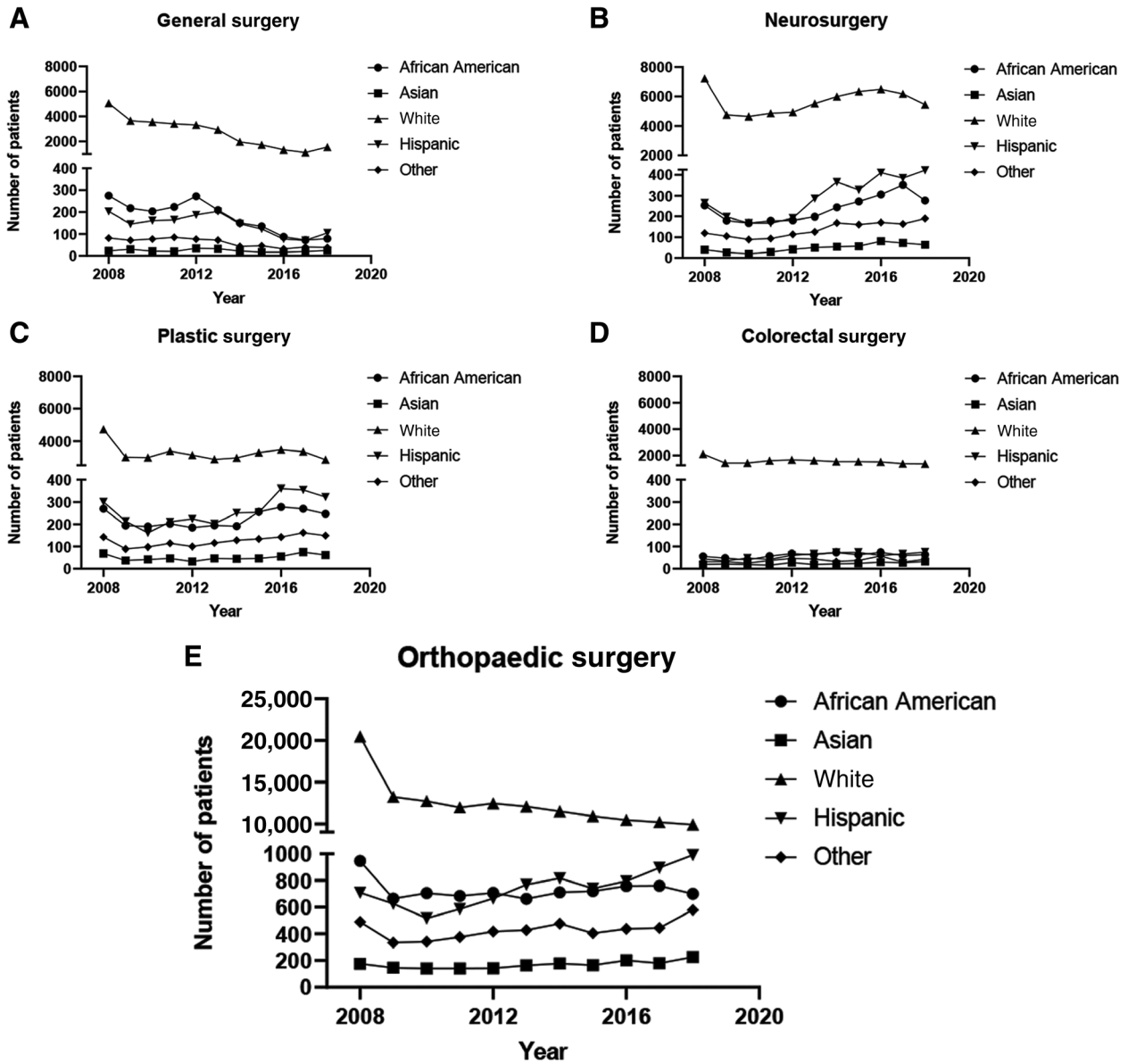
ethnicities, correlating with an overall decrease in the number of patients in the service (Fig. 4A). From 2008 to 2018, colorectal surgery patient numbers have remained virtually unchanged, as every ethnicity showed a flat linear growth (Fig. 4D).

### DISCUSSION

Overall, we sought out to compare the gender and ethnic diversity of patients within various surgical specialties at our academic medical center, with that of the caring surgeon workforce (attending and residents). PAs, NPs, or other health professionals were not included in our study although they continue to play an increasing role in the health care setting. We also compared these metrics to the national physician workforce demographics based on the available AAMC data. Although limited, our study shows that the patient population was much more balanced in terms of gender ratio (~1:1) than the surgeon population, which was nearly composed of two-third men

both at our institution and at the national level. From an ethnicity perspective, we found that although whites made up the majority of the patient and surgeon populations, their overall prevalence trend from 2008 to 2018 seems to be heading into opposite directions, particularly for specialties like neurosurgery, orthopedic, and plastic surgery. What we found is that for these 3 specialties, the Hispanic and Other populations' prevalence was overall trending upward, although the African American and Asian populations remained relatively on a flat growth line.

Interestingly, we also found that while Asians represented only 1% of the patient population, they made up the second largest group of surgeons (17%). The white population, on the other end, demonstrated a downward trend in total numbers although white patients still made up the overwhelming majority of the patient population. Interestingly, the white surgeon population prevalence continued to trend upward from 2012 to 2018, while all the other groups have remained relatively stagnant.



**Fig. 4.** Trend in the total number of patients by ethnicity in surgical specialties: general surgery (A), neurosurgery (B), plastic surgery (C), colorectal surgery (D), and orthopedic surgery (E).

Taken together, our data confirmed some of the recent trends that have been observed by others<sup>4</sup> at similar academic institutions, suggesting a more widespread subtle shift in the overall composition of the patient population and a disconnect in terms of proportional representation of gender and ethnicity among surgeons. A limitation of our study however remains: we had to combine attending surgeons and residents in the same group due to very low number of attending surgeons for some specialties, which ultimately limits our analysis and compromises a true stratification of the surgeon workforce and accurate comparison with the national statistics. Nonetheless, our observations in terms of the trends within the surgeon workforce diversity not mirroring that of the patient population being served align well with what has been shared and discussed over the past two decades or so at

the national level. With this article, we want to contribute to the conversation and continue to make a case for addressing the issue of disproportional gender and ethnic representation in the surgical specialties.

Although we have made significant progress nationally to close the gender gap in surgery<sup>20</sup>—likely attributed to “the pipeline” of those graduate residents to come in the next 5–10 years—the ethnic diversity continues to be an ongoing issue across all the surgical specialties.<sup>3,21–26</sup> Historically, some of the barriers contributing to ethnic disparities in care have included the lack of diversity in health care leadership and workforce,<sup>27,28</sup> poor communication between providers and patients of various ethnic, or socioeconomic backgrounds,<sup>29,30</sup> as well as systems of care that are poorly designed to meet the needs of diverse patient populations.<sup>31</sup> We also know that biases—such

as racism, sexism, homophobia, as well as various ethnic and religious biases—ingrained in the physician’s subconscious can have an impact on the quality of health care provided.<sup>32</sup>

Additionally, we want to make recommendations on how to address this issue both at our institution and at the national level. A granular approach to improve underrepresented physician recruitment is for institutions to engage students and promote the surgical field at the undergraduate and high school levels. This can be done through internships, scholarships, shadowing, and mentoring opportunities. The reality is that a significant number of minorities are first to graduate from college or medical school in their families and often lack that mentor or role models to guide them. Engaging them early helps address this issue and unlock that initial bottleneck of making it to medical school in the first place. It is certainly not difficult to imagine that if the numbers remain low at the medical school level, they will inevitably be even lower in the surgical fields, as not everyone will go into surgery.

We think it is imperative that academic institutions in particular establish clear policies to promote diversity in surgery and medicine in general. Although we have described our case within a rural setting, the AAMC numbers along with the multiple studies previously cited show that this is an issue at the national level and that the picture does not necessarily look different in a more urban academic medical center setting. Our recommendation is that they design training programs to address cultural competency and awareness among faculty and residents alike. One area of particular importance and of tremendous potential impact is of that of hiring. We think it is vital that department heads show concrete commitment to diversity by hiring a more diverse faculty body. We also suggest cultural sensitivity training for all faculty members to help improve knowledge and attitudes among surgeons<sup>33</sup> (and other health care providers). Surgery residency programs across the country must also increase their efforts to recruit and retain a diverse resident body not only for the educational benefit of the residents themselves but perhaps more importantly to achieve a higher level of care for all. Ultimately, we must all actively continue to work to close the gender and ethnicity gap that have been a staple of surgical training programs in the United States for far too long.

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