those who die after 80 years of age, and those who reside in nursing homes.

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Diversity in Graduate Medical Education in the United States by Race, Ethnicity, and Sex, 2012

Diversification of the physician workforce in the United States remains an ongoing goal,1,2 yet assessments of graduate medical education (GME) diversity, overall and across specialties are lacking. We assessed GME diversity by race, ethnicity, and sex in 2012.

Methods | Our study used publicly reported data to assess differences in representation by female and historically underrepresented minority groups in medicine (URMs) for the total GME pool3 compared with the US population,4 US practicing physicians,5 medical school graduates,6 and 20 largest residency training specialties4 (excluding transitional year). Categories evaluated were race (non-Hispanic ethnicity, and sex, defined as consistent with the US Census.4 American Indians, Alaska Natives, Native Hawaiians, and Pacific Islanders (AI/AN/NH/PI) were grouped together. The University of Pennsylvania granted

Figure 1. Distribution in the 2010 US Population, 2012 Medical School Graduates, 2012 Practicing Physicians, and the 2012 Graduate Medical Education (GME) Trainee Pool

When comparing the total GME percentage representation for each demographic with the other groups, representation was significantly different for all groups (P < .001 for all comparisons, except for the Hispanic medical school graduates and trainees [P = .82]). Not shown are the male sex, non-Hispanic ethnicity, “other” race, and white race categories. AI indicates American Indian; AN, Alaska Native, NH, Native Hawaiian; PI, Pacific Islander; URM, underrepresented minorities in medicine (non-URM category is not shown).
institutional review board evaluation and exemption for the study because primary data were obtained from public sources with no identifiable private or protected information.

The URM s included blacks, Hispanics, and AI s/ANs/NHs/PIs. We used binomial tests to investigate significant differences in racial, ethnic, and sex distribution in the 2012 total GME trainee pool compared with (1) 2010 US Census, (2) 2012 medical school graduates from US schools, (3) 2012 US practicing physicians, and (4) 2012 trainees from each of the 20 largest residency training specialties. A 1-sided test was used for the US population comparison; 2-sided tests were used for 2 distinct samples. Adjusting for multiple comparisons, \( P < .001 \) was considered statistically significant.

### Results

In 2012, there were 16 835 medical school graduates; 48.3% were female, and 15.3% were of URM s, including 7.4% who were Hispanic and 6.8% who were black (Figure 1). There were 115 111 trainees in GME; 46.1% were female and 13.8% were of URM s, including 7.5% who were Hispanic and 5.8% who were black (Figure 1). There were 688 468 practicing physicians; 30.1% were female and 9.2% were of URM s, including 5.2% who were Hispanic and 3.8% who were black. These groups were all underrepresented as trainees compared with the US population and medical school graduates (\( P < .001 \) for all comparisons), excluding Hispanic medical school graduates who were similarly represented to Hispanic GME trainees (\( P = .85 \)).
Among specialties in 2012, the percentage of female trainees was lowest for orthopedics (13.8%) and highest for pediatrics (73.5%) and obstetrics and gynecology (82.4%) (Figure 2A). Women also accounted for more than 50% of GME trainees in 5 other specialties: dermatology (64.4%), internal medicine/pediatrics (58.2%), family medicine (55.2%), pathology (54.6%), and psychiatry (54.5%). The percentage of black trainees was lowest for otolaryngology (2.2%) and highest for family medicine (7.5%) and obstetrics and gynecology (10.3%) (Figure 2B); and the percentage of Hispanic trainees was lowest for ophthalmology (3.6%) and highest for psychiatry (9.3%), family medicine (9.0%), obstetrics and gynecology, and pediatrics (each 8.7%) (Figure 2C).

Discussion | In 2012, women accounted for the majority of GME trainees in 7 specialties. In no specialties, however, were the percentages of black or Hispanic trainees comparable with the representation of these groups in the US population. The percentages of black and Hispanic trainees varied widely between specialties, with obstetrics and gynecology noteworthy for having 10.3% of trainees who were black and 8.7% who were Hispanic. Radiology, orthopedic surgery, and otolaryngology were the only specialties with representation significantly decreased for women, blacks, and Hispanics. Continued efforts are needed to increase the diversity of the physician workforce in the United States, particularly in the specialties with the lowest representations of women, blacks, or Hispanics.

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Correction: The labels of the x-axes of Figure 2 were corrected online September 4, 2015.

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Invited Commentary

Ensuring a Diverse Physician Workforce: Progress but More to Be Done

In their study of the diversity of graduate medical education in the United States, Deville and colleagues call attention yet again to the continued underrepresentation of women and minority groups in medicine compared with the population as a whole. Among the many interesting findings, I was most struck that among all specialties, obstetrics and gynecology had the greatest proportion of women trainees in 2012 (82.4%), the highest percentage of black trainees (10.3%), and one of the highest percentages of Hispanic trainees (8.7%). All these percentages reflect substantial increases over the past 3 decades. The proportion of practicing female obstetrician-gynecologists has steadily increased from around 20% in the early 1990s to nearly half by 2010. As a black woman and a specialist in maternal fetal medicine, I am thankful that growing numbers of physicians from underrepresented minority groups are being trained in women’s health care, a field in which health disparities are important public health issues. Maternal mortality, although low overall in the United States, is increasing. Black women have a 3 times greater risk of death in pregnancy than non-Hispanic white women; in addition, black women have higher rates of hypertension, obesity, and diabetes mellitus in pregnancy than non-Hispanic whites. Black infants are more likely to die in the first year of life, often because of extreme prematurity. In 2013, 16.3% of live births to black women were preterm (born before 37 weeks gestation) compared with 11.3% of births to Hispanic women and 10.2% of births to non-Hispanic white women. Racial and ethnic disparities have been documented in other obstetrical outcomes, such as rates of prenatal care, cesarean delivery, and vaginal lacerations. Although numerous factors specific to the patient, the health care system, and the societal environment likely account for some of these differences, factors related to physicians have been implicated as well. Providing culturally competent care is as important in obstetrics and gynecology—when women interact with the health care system at one of the

most vulnerable times in their lives—as in any other specialty. Not only are minority physicians more likely to work in underserved areas when their training is complete, but the quality of health care may be better when clinicians and patients are of the same race or ethnicity.\(^5\)\(^6\)

The findings also raise questions, however. For example, it is not clear what makes obstetrics and gynecology so attractive to black and Hispanic trainees. I am unaware of any organized program to attract students or retain trainees who are underrepresented minorities. Data from the Association of American Medical Colleges show that between 1980 and 2012, the number of black women graduates of US medical schools increased 4-fold while the number of black men graduating declined.\(^7\) Most of the gains for underrepresented minorities in obstetrics and gynecology are likely among black women, partly owing to the high percentage of women entering the specialty.

We lack data on the number of black and Hispanic trainees who complete the 4-year obstetrics and gynecology residency or further subspecialty training in urogynecology, maternal fetal medicine, gynecologic oncology, reproductive endocrinology, and infertility or family planning. These subspecialists account for the majority of researchers and medical school leadership and health care systems, and underrepresented minorities do not advance. Ensuring a diverse physician workforce, the quality of postgraduate training, and the advancement of women, blacks, and Hispanics to senior and administrative positions are among priorities targeting underuse compared with overuse.\(^5\)\(^6\)

Similarly, the number of women in leadership positions within academic institutions is low when compared with the increasing number of women in obstetrics and gynecology and other specialties.

It is important to learn what factors contributed to the increase in numbers of women, blacks, and Hispanics in obstetrics and gynecology and whether those factors could improve representation in other specialties. It is also important, however, for obstetrics and gynecology and other specialties in which diversity is improving to monitor their workforce, the quality of postgraduate training, and the advancement of women, blacks, and Hispanics to senior and leadership roles. Progress will stall if women or underrepresented minorities do not advance. Ensuring a diverse physician workforce will require the continuing attention of medical school leadership and health care systems, and interventions to provide opportunities for diverse physicians to join the leadership ranks. Increasing physician diversity is yet another opportunity to improve the quality of care for all of our patients, particularly the most disadvantaged and those with a disproportionate burden of disease.

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