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

Sigrid Dierickx, MSc
Luc Deliens, PhD
Joachim Cohen, PhD
Kenneth Chambaere, PhD

Author Affiliations: End-of-Life Care Research Group, Vrije Universiteit Brussel and Ghent University, Belgium (Dierickx, Deliens, Cohen, Chambaere); Department of Medical Oncology, Ghent University Hospital, Ghent, Belgium (Deliens).

Corresponding Author: Sigrid Dierickx, MSc, End-of-Life Care Research Group, Vrije Universiteit Brussel and Ghent University; Brecht Haex, MSc, Agency for Care and Health; Jef Deyaert, MSc, and Lenzo Robijn, MSc, End-of-Life Care Research Group, Vrije Universiteit Brussel, Ghent, Belgium, and VU University Medical Centre Amsterdam in the Netherlands. Kenneth Chambaere and Joachim Cohen are Postdoctoral Fellows of the Research Foundation Flanders.


Author Contributions: Ms Dierickx had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Drs Cohen and Chambaere contributed equally as last author. Study concept and design: All authors. Acquisition, analysis, or interpretation of data: All authors. Drafting of the manuscript: Dierickx, Cohen, Chambaere. Critical revision of the manuscript for important intellectual content: All authors. Statistical analysis: Dierickx, Chambaere. Obtained funding: Deliens, Cohen. Administrative, technical, or material support: Deliens. Study supervision: Deliens, Cohen, Chambaere.

Conflict of Interest Disclosures: None reported.

Funding/Support: This study was supported by Strategic Basic Research (Strategisch Basis Onderzoek) grant 100036 from the Agency for Innovation by Science and Technology ( Agentschap voor Innovatie door Wetenschap en Technologie).

Role of the Funder/Sponsor: The funding source had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; and preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Additional Information: This study is part of the Flemish Study to Improve End-of-Life Care and Evaluation Tools (FLIECET) project, a collaboration between the Vrije Universiteit Brussel, Ghent University, and the Katholieke Universiteit Leuven in Belgium, and VU University Medical Centre Amsterdam in the Netherlands. Kenneth Chambaere and Joachim Cohen are Postdoctoral Fellows of the Research Foundation Flanders.

Additional Contributions: The Flemish Agency for Care and Health; Jef Deyaert, MSc, and Lenzo Robijn, MSc, End-of-Life Care Research Group, Vrije Universiteit Brussel and Ghent University; Brecht Haex, MSc, Agency for Care and Health; and Wim De Brock, LL.M, an independent attorney, contributed to the data collection. The Belgian Medical Disciplinary Board recommended the study to the investigators. Jane Ruthven, PhD, End-of-Life Care Research Group, provided critical and language review of the manuscript. We are also deeply indebted to the thousands of Flemish physicians participating in the survey. Messrs Haex and De Brock and Ms Ruthven received financial compensation for their contributions.


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

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 = .83). 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).

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

<table>
<thead>
<tr>
<th>Representation (%)</th>
<th>US Census</th>
<th>Medical school graduates</th>
<th>Total GME pool</th>
<th>Total physicians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>URM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demographic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AI/AN/NH/PI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Invited Commentary page 1708
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 URMs included blacks, Hispanics, and AlS/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 URMs, 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 URMs, 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 URMs, 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.

Curtiland Deville, MD
Wei-Ting Hwang, PhD
Ramon Burgos, AB
Christina H. Chapman, MD
Stefan Both, PhD
Charles R. Thomas Jr, MD

Author Affiliations: Department of Radiation Oncology and Molecular Radiation Sciences, Johns Hopkins University, Baltimore, Maryland (Deville); Department of Biostatistics and Epidemiology, University of Pennsylvania, Philadelphia (hwang); Department of Radiation Oncology, University of Pennsylvania, Philadelphia (Burgos, Both); Department of Radiation Oncology, University of Michigan, Ann Arbor (Chapman); Department of Radiation Medicine, Knight Cancer Institute, Oregon Health & Science University, Portland (Thomas).

Corresponding Author: Curtiland Deville, MD, Department of Radiation Oncology and Molecular Radiation Sciences, Johns Hopkins University, The Sidney Kimmel Comprehensive Cancer Center, 5255 Loughboro Rd NW, Washington, DC 20016 (cdeville@jhmi.edu).


Conflict of Interest Disclosures: None reported.

Funding/Support: This work was supported in part by the University of Pennsylvania Abramson Cancer Center Core grant (P30CA0166520) to Dr Hwang.

Role of the Funder/Sponsor: The funding source had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Previous Presentation: This study was presented in part at the 10th Annual Association of American Medical Colleges Health Workforce Research Conference; May 1, 2014; Washington, DC.

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


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 obstetriciangynecologists 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
likely to be funded by the National Institutes of Health. 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. 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 faculty and care for many underserved women with complex medical needs. Not only are black and Hispanic physicians underrepresented among medical school faculty, but they are less likely to be promoted, less likely to hold senior faculty and administrative positions, and less likely to be funded by the National Institutes of Health. 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.

Laura E. Riley, MD

Author Affiliation: Department of Obstetrics and Gynecology, Massachusetts General Hospital, Boston.

Corresponding Author: Laura E. Riley, MD, Department of Obstetrics and Gynecology, Massachusetts General Hospital, 32 Fruit St, Boston, MA 02114 (riley@mgh.harvard.edu).


Conflict of Interest Disclosures: None reported.


Undermeasuring Overuse—An Examination of National Clinical Performance Measures

Clinical performance measures, designed both to evaluate and motivate clinician and institutional performance, have assumed a central role in efforts to improve the quality of US health care. Concerns have been raised, however, about the collective power of such measures to influence practice on a large scale. In particular, some worry that if measures predominantly target underuse of care—and incentives tend to reward clinicians for doing more—this could inadvertently contribute to the problem of overuse. We sought to determine whether and to what extent outpatient process measures preferentially target underuse compared with overuse.

Box. Examples of Clinical Performance Measures, by Target Issue

Measures targeting underuse: “Has too little care been provided?”
- The percentage of patients for whom a lipid panel is ordered within 3 months after being prescribed lipid-lowering medication (goal: high percentage)
- The percentage of patients with deep vein thrombosis prescribed anticoagulation for at least 3 months after the diagnosis (goal: high percentage)

Measures targeting overuse: “Has too much care been provided?”
- The percentage of patients undergoing back imaging within 28 days of a visit for new low back pain (goal: low percentage)
- The percentage of patients dispensed an antibiotic within 3 days of diagnosis with bronchitis (goal: low percentage)

Measures targeting misuse: “Has care been provided incorrectly?”
- The median time from emergency department arrival to time of transfer to another facility for acute coronary intervention (goal: shorter time)
- The percentage of patients 18 years or older with pneumonia who receive their first dose of antibiotics within 6 hours after arrival at the hospital (goal: high percentage)