CLINICAL STUDY

Underrepresentation of Women and Minorities in the United States IR Academic Physician Workforce

Mikhail C.S.S. Higgins, MD, MPH, Wei-Ting Hwang, PhD, Chase Richard, BA, Christina H. Chapman, MD, Angelique Laporte, BS, Stefan Both, PhD, Charles R. Thomas, Jr, MD, and Curtiland Deville, MD

ABSTRACT

Purpose: To assess the United States interventional radiology (IR) academic physician workforce diversity and comparative specialties.

Methods: Public registries were used to assess demographic differences among 2012 IR faculty and fellows, diagnostic radiology (DR) faculty and residents, DR subspecialty fellows (pediatric, abdominal, neuroradiology, and musculoskeletal), vascular surgery and interventional cardiology trainees, and 2010 US medical school graduates and US Census using binomial tests with .001 significance level (Bonferroni adjustment for multiple comparisons). Significant trends in IR physician representation were evaluated from 1992 to 2012.

Results: Women (15.4%), blacks (2.0%), and Hispanics (6.2%) were significantly underrepresented as IR fellows compared with the US population. Women were underrepresented as IR (7.3%) versus DR (27.8%) faculty and IR fellows (15.4%) versus medical school graduates (48.3%), DR residents (27.8%), pediatric radiology fellows (49.4%), and vascular surgery trainees (27.7%) (all $P < .001$). IR ranked last in female representation among radiologic subspecialty fellows. Blacks (1.8%, 2.1%, respectively, for IR faculty and fellows); Hispanics (1.8%, 6.2%); and combined American Indians, Alaska Natives, Native Hawaiians, and Pacific Islanders (1.8%, 0) showed no significant differences in representation as IR fellows compared with IR faculty, DR residents, other DR fellows, or interventional cardiology or vascular surgery trainees. Over 20 years, there was no significant increase in female or black representation as IR fellows or faculty.

Conclusions: Women, blacks, and Hispanics are underrepresented in the IR academic physician workforce relative to the US population. Given prevalent health care disparities and an increasingly diverse society, research and training efforts should address IR physician workforce diversity.

ABBREVIATIONS

AAMC = Association of American Medical Colleges, AI/AN/NH/PI = American Indians, Alaska Natives, Native Hawaiian, and Pacific Islanders, URM = underrepresented minorities in medicine

In 2003, the US Congress tasked the Institute of Medicine and the Sullivan Commission on Diversity in the Healthcare Workforce with providing an evidenced-based statement addressing health disparities. Increasing the diversity of health professionals was identified as a strategy to eliminate health disparities with the expectation that academic centers

From the Division of Vascular and Interventional Radiology (M.C.S.S.H.), Department of Radiology, University of Virginia, Charlottesville, Virginia; Department of Biostatistics and Epidemiology (W.-T.H.) and Perelman School of Medicine (C.R.), University of Pennsylvania, Philadelphia, Pennsylvania; Department of Radiation Oncology (C.H.C.), University of Michigan, Ann Arbor, Michigan; Department of Sterilization (A.L.), Musculoskeletal Transplant Foundation, Jessup, Pennsylvania; Department of Medical Physics (S.B.), Memorial Sloan Kettering Cancer Center, New York, New York; Department of Radiation Medicine (C.R.T.), Knight Cancer Institute, Oregon Health & Science University, Portland, Oregon; and Department of Radiation Oncology and Molecular Radiation Sciences (C.D.), Johns Hopkins University, The Sidney Kimmel Cancer Center, 401 North Broadway, Weinberg Suite 1440, Baltimore, MD 21231. Received March 14, 2016; final revision received June 12, 2016; accepted June 13, 2016. Address correspondence to C.D.; E-mail: cdeville@jhmi.edu

Table E1 and Figure E1 are available online at www.jvir.org.

From the SIR 2015 Annual Meeting.

None of the authors have identified a conflict of interest.

J Vasc Interv Radiol 2016; XX:■■■–■■■

http://dx.doi.org/10.1016/j.jvir.2016.06.011

would lead such efforts (1,2). Diversity among health professionals has been shown to improve access to care for underserved populations, patient satisfaction with their treatment and communication with their provider, and medical student confidence in interactions with patients of varying cultures (3–6). With minority groups comprising nearly 35% of the population and projected to become a majority by 2042 (7), ensuring a diverse workforce is increasingly relevant. Minority physicians continue to provide a disproportionate share of care to underserved populations, serving 54% of minority patients and 70% of non–English-speaking patients (8). Increasing attention has been devoted to assessing diversity in the radiology workforce, finding that women and underrepresented minorities in medicine (URM) are underrepresented relative to other medical specialties (9–11). Meanwhile, limited attention has been devoted to radiologic subspecialties. A previous study found greater representation of women as fellows in pediatric radiology (50.7%) compared with radiology residents (27.8%) but less in interventional radiology (IR) (12.2%) (9). Given the importance of diversity in medicine, the purpose of this study was to assess the diversity of the IR academic physician workforce and comparative specialties.

MATERIALS AND METHODS

Measures

Variables evaluated were race, ethnicity, and sex. US Census Bureau definitions of race, ethnicity, and sex were used (12,13). All original data sources reported sex as male or female; however, within our analysis, "female" may be used interchangeably with "woman," and "gender" may be used interchangeably with "sex." Racial groups assessed were (*a*) white; (*b*) black or African American, referred to as black; (*c*) Asian or Asian American, referred to as Asian; (*d*) American Indians, Alaska Natives, Native Hawaiian, and Pacific Islanders (AI/AN/NH/PI), grouped as 1 category; and (*e*) other, defined in this study as any person with unknown racial information and/or not classifiable by any previous category. Ethnic groups included Hispanic and non-Hispanic. The term "URM" was used as defined by the Association of American Medical Colleges (AAMC) (14) to describe minorities underrepresented relative to their numbers in the general population, specifically blacks, Hispanics, and AI/AN/NH/PI. Certain Asian subgroups (Vietnamese, Hmong, and Cambodian) have historically been included in the URM designation but were not included in this analysis.

Data Sources

Institutional review board exemption was granted, as primary data were obtained from publicly available registries with no identifiable private or protected information. US population data were obtained from the US Census. Medical school graduate numbers reflect AAMC class of 2010 data (15). Faculty data were obtained from the AAMC FAMOUS database (16). Data on IR and other residency and fellowship training programs were obtained from annual *JAMA* supplements (17). Of the 8 Accreditation Council for Graduate Medical Education radiology subspecialty training programs, 5 have > 20 fellows and were included in this analysis—musculoskeletal radiology ($n = 23$), abdominal radiology ($n = 32$), pediatric radiology ($n = 85$), IR ($n = 195$), and neuroradiology ($n = 232$). Cardiothoracic radiology, endovascular surgical neuroradiology, and nuclear radiology have < 20 fellows and were not included. **Figure E1** (available online at *www.jvir.org*) depicts these specialties in relation to each other. For race and ethnicity measures, unduplicated totals were provided for US Census, medical school graduates, and residents/fellows for race and ethnicity separately. For other data sources, Hispanics were included in the "other" racial category, as no breakdown by race was provided.

Statistical Analysis

As race was the only variable with > 2 categories, an omnibus test using Pearson χ^2 test with 40 degrees of freedom was performed for the 5 racial categories (white, black, AI/AN/NH/PI, Asian, and other) and all comparison groups and found to be statistically significant with $P < .0001$. Binomial tests were used to investigate significant differences in the representation of 4 demographic groups: female, Hispanic, black, and AI/AN/NH/PI. IR faculty and fellows individually were compared with the US population and subsequently with each other (12 comparisons). IR faculty was compared with radiology faculty (4 comparisons). IR fellows were compared with (*a*) medical school graduates (4 comparisons), (*b*) radiology residents (4 comparisons), (*c*) other radiology subspecialty fellows (musculoskeletal radiology, abdominal radiology, pediatric radiology, and neuroradiology) (16 comparisons), (*d*) all total radiology subspecialty fellows combined (4 comparisons), and (*e*) neighboring specialty trainees (vascular surgery and interventional cardiology) (8 comparisons). There were 52 comparisons. One-sample binomial test was used for comparison with the US population statistics, and 2-sample tests were used for 2 distinct samples. Owing to 52 statistical tests performed, a Bonferroni adjustment was made, with P value set at $< .0096$ to denote statistical significance for each test, while maintaining an overall type I error rate of 0.05. Raw P values with 3 significant digits are presented, unless $< .001$. To assess changes in percentages by different race, ethnicity, and sex in IR residents over the past 20 available academic years (1992–1993 to 2012–2013), the slope and the associated 95% confidence intervals for each group were estimated using a simple linear regression model where year was used as an independent variable. With 20 years of data and the most conservative estimate of the