



# Diversity in Orthopaedic Surgery Operative Techniques in Orthopaedic Surgery

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Diversity can be defined as differences in people based on race, sex, culture, spoken language, perspectives, and experiences. While diversity in the medical field has continued to increase, the gains have not been shared equally across all medical specialties. It is well established that diversity in orthopaedic surgery is far behind other specialties. Oper Tech Orthop 32:100967 © 2022 Elsevier Inc. All rights reserved.

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While females comprise more than 50% of medical school graduates, they represent only 14% of orthopaedic surgery residents. African Americans and Hispanics make up 13.3% and 17.6% of the U.S. population, but only 4.1% and 2.7% of orthopaedic trainees, respectively.<sup>1</sup> According to a 2010 study, there were 6.3 male applicants for every female, 13.5 white applicants for every African American, and 14.1 white applicants for every Latino applying to orthopaedic surgery residency.<sup>2</sup> There is a well-documented paucity of diversity in gender, race, and ethnicity that exist in many surgical subspecialties and is magnified in orthopaedics.

The 2018 American Academy of Orthopaedic Surgeons (AAOS) Census reports that practicing orthopaedic surgeons were 84.7% Caucasian, 6.7% Asian, 2.2% Hispanic and/or Latino, 1.9% African Americans, 0.4% Native American, and 7.6% women. This AAOS census data only includes the orthopaedic surgeons who responded to the survey. Although the representation of females and underrepresented minorities (URMs) in orthopaedics has been gradually increasing, it is occurring at a much slower rate when compared to the increase in medical school representation. In an analysis of data from the American Association of Medical Colleges from 1970 to 2001, Blakemore et al found that the

percentage of women in medical school increased from 11.1% in 1970 to 47.8% in 2001 while the percentage of women in orthopaedics has increased from 0.6% in 1970 to 9.0% in 2001.<sup>3</sup>

Despite the barriers broken in 1932 by Ruth Jackson, the first female member of AAOS, gender, racial and ethnic diversity continues to be lacking. Orthopaedic surgery continues to have the lowest percentage of women in practice and in training compared with all primary surgical and non-surgical specialties. Data on practicing physicians from the Association of American Medical Colleges (AAMC) in 2019 shows that women represent 5.8% of orthopaedic surgeons, 22% of general surgeons, 9.3% of neurosurgeons, 26.7% of ophthalmologists, 17.2% of plastic surgeons, 9.5% of urologists, and 14.6% of vascular surgeons. The AAMC 2019 data on physicians in residency and fellowship training also displays the low percentage of women in orthopaedic training, with women representing 16% of orthopaedic surgeons, 43.1% of general surgeons, 19.5% of neurosurgeons, 41.2% of ophthalmologists, 40.9% of plastic surgeons, 27.6% of urologists, and 13.3% of vascular surgeons and/or interventional radiologists.<sup>4</sup>

Compared to other surgical subspecialties, between the 2005 and 2006, and 2016-2017 academic years, neurosurgery and thoracic surgery had 56.8% and 111.2% increases in female representation, respectively, whereas orthopaedic surgery demonstrated a 27.3% increase.<sup>5</sup> From 2007 to 2019, the proportion of minority applicants increased by 26%, while the proportion of female applicants increased by 64%. Female representation increased 24% among orthopaedic residents, but minority representation decreased 10%.<sup>6</sup>

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In July 2021, the Accreditation Council for Graduate Medical Education (ACGME) formally announced ACGME Equity Matters, a new initiative that introduces a framework for continuous learning and process improvement in the areas of diversity, equity, and inclusion (DEI) and anti-racism practices. This initiative aims to drive change within graduate medical education (GME) by increasing physician workforce diversity, building safe and inclusive learning environments, and promoting health equity by addressing racial inequities in health care and population health. The goal is to produce a comprehensive set of ideas, models, practices, and data to support interventions that address structural barriers to developing a diverse physician workforce that will improve care for diverse patient populations.

Within medicine, physician diversity provides well-documented benefits to patient care. Underrepresented minority physicians are more likely to serve uninsured patients and practice in underserved areas, leading to improved patient satisfaction and access to care for underserved groups. Additionally, patients are more satisfied with their treatment and their ability to communicate with their provider when they are managed by a physician from their own culture.<sup>7</sup>

The low representation of women and URMs in orthopaedic surgery has been linked to several factors: lack of representation, limited early exposure to orthopaedics, insufficient mentors, fear of inability to maintain work and/or life balance, a historically poor culture, too competitive, and high residency application costs.<sup>8</sup>

Orthopaedic surgery has demonstrated some of the most substantial gaps in racial and gender representation at the academic levels and has lagged behind other surgical and nonsurgical specialties. This underrepresentation can lead to limited early exposure and “like” mentorship for women and URMs who may be interested in pursuing a career in orthopaedics. In the early 2000s, the AAOS and the American Orthopaedic Association (AOA) made commitments to improve leadership diversity through various initiatives. The representation in leadership may naturally improve over time as the early stages of the pipeline diversify. However, a recently published study in JBJS observed minimal progress in the diversity of orthopaedic leadership from 2007 to 2019. From 2007 to 2019, orthopaedic surgery experienced no significant change in minority representation among faculty or chairpersons. There was no also a significant increase in female representation among faculty, but there was a significant increase in female department chairs, from 0.0% (0 of 102) to 4.1% (5 of 122).<sup>9</sup>

Orthopaedic surgery has historically had a poor culture. The AAOS distributed a survey in 2020 to a subset of AAOS members to assess the climate of workplace safety and overall workplace culture. Women and URMs AAOS members and an equal number of randomly selected non-URM men were invited to participate in the survey. Sixty-six percent of respondents reported experiencing discrimination, bullying, sexual harassment, and harassment behavior with specific exposures in 81% of women, 76% of African Americans, 61% of Asians, and 65% of Hispanic and Latinos.<sup>10</sup>

Orthopaedic surgery is one of the most competitive residencies for applicants who participate in the National Residency Matching Programs (NRMP). Because the number of applicants continues to outpace the number of available positions, medical students typically apply to a large number of programs in order to get a position. The cost of the application and interview process can be a deterrent for students, specifically URMs who may not have early exposure, mentors, and necessary networks. A survey done at Loyola University found that medical students applying for orthopaedic residency applied to a median of 65 orthopaedic programs and interviewed at 15 programs. The average cost of an interview was \$450, with the cost estimate for all interviews to be about \$7119. Seventy-two percent borrowed money to finance their interview costs and 28% canceled interviews for financial reasons.<sup>11</sup>

There have been targeted efforts within the national orthopaedic societies and academic programs to address these issues listed above and to help facilitate change. Several programs have been developed to promote diversity in orthopaedics by improving the perception of orthopaedics, offering mentorship, early exposure, and a variety of research and clinical opportunities. The following programs have been instrumental in supporting and encouraging diversity in the field.

The Ruth Jackson Orthopaedic Society (RJOS) was founded in 1983 as a support and networking group for female orthopaedic surgeons. Dr Jackson is known as the first practicing female orthopaedic surgeon in the United States. She obtained her medical degree from Baylor College of Medicine in 1928, as 1 of 4 women in her class of 164 students. In training, females were not allowed to examine men and had to score 10 points higher to graduate with “equal standing.”<sup>12</sup> After her graduation, Dr Arthur Steindler invited Dr Jackson to the University of Iowa to train in orthopaedics. She finished her residency at Worcester Massachusetts Memorial Hospital in 1932, was board certified in 1937, and then became the first female member of the AAOS. She practiced orthopaedic surgery for over 50 years.<sup>13</sup>

RJOS has grown into a professional society of over 600 members devoted to advancing females in orthopaedic surgery. Opportunities such as mentorship, scholarships, research grants, and awards, educational projects, an endowment with the Orthopaedic Research and Education Foundation (OREF), and a traveling fellowship program are offered through the society. The mission of the RJOS is to “promote professional development of and for women in orthopaedics throughout all stages of their careers.”

Nth Dimensions was founded in 2004 by orthopaedic surgeons working collaboratively with academic institutions, community surgeons, and industry to address the shortage of women and URMs in orthopaedic surgery. Their overarching goal is to address and eliminate healthcare disparities for all communities, with the primary mission to provide resources, expertise, and experience, through developing and implementing strategic pipeline initiatives. Nth Dimensions provides pre-medical and medical students with early exposure to orthopaedic surgery along with hands-on experience,

clinical and research opportunities, and mentoring and professional development. This program has increased the odds of females applying to orthopaedic surgery residency.<sup>14</sup>

The Perry Initiative is an outreach program that was founded in 2009 with the commitment to inspire young women in high school, college, and medical school to pursue careers in orthopaedic surgery and engineering. Named for Dr Jacqueline Perry, one of the earliest female orthopaedic surgeons, the Initiative offers a hands-on curriculum and lectures that are designed to help the participants gain early exposure and mentorship in engineering and orthopaedics. The medical student program produced a match rate of 31% (5 of 16) in the first class and 28% (20 of 72) in the second class of participants.<sup>15</sup>

The J. Robert Gladden Orthopaedic Society was founded in 1998 with the mission to increase diversity in orthopaedics and eliminate discrepancies in musculoskeletal care. The society has over 450 members and is named after Dr J. Robert Gladden, who became the first African American, a board-certified orthopaedic surgeon in 1950. Initiatives of the society include mock oral exams, research grants, scholarships, and traveling fellowships. Through their research, education, and advocacy efforts, the society promotes excellent musculoskeletal care for all patients along with the elimination of healthcare disparities in patients with musculoskeletal disorders.<sup>2</sup>

The Women Orthopaedist Global Outreach was founded in 2006 by five female orthopaedic surgeons, with a mission of providing free orthopaedic surgery to underserved communities, with a specific focus on women, worldwide. The focus on women is due to the barriers that they often have in receiving treatment along with their significant burden of life and work in rural communities. Previous mission trips have included Nepal, Guatemala, Tanzania, Republic of Congo, and Cuba. As part of the program, local orthopaedic surgeons and healthcare professionals are trained in orthopaedic skills and technologies to improve the health of their communities. Mentorship to the young volunteers and diverse populations is also provided on these mission trips.<sup>2</sup>

These programs have the common goal of promoting diversity in orthopaedics, as a workforce exhibiting a variety of backgrounds and skillsets produces a more complete, well-rounded approach to healthcare. Stated simply, diversity "increases the overall collective intelligence of the team."<sup>16</sup>

With the increasing heterogeneity of our society, diversity in healthcare is of paramount importance. Research has shown that there are clear advantages of a diverse workplace, not only in medicine and patient care but in the commercial industry as well. Research in the business and commercial industry has shown that diversity in the workplace broadens consumer markets and stimulates economic growth.<sup>2</sup> Bickel et al. found that there are many benefits to recruiting female leaders, including improved marketing efforts for the institution, additional healthcare provider options for patients, an increased number of role models for students and residents, enhanced institutional creativity, and an enriched institutional culture.<sup>17</sup>

We need to continue addressing the barriers that are limiting the number of women and URMs who are applying and getting accepted into orthopaedic residency programs. These barriers include underrepresentation of female and/or URM faculty, limited early exposure to orthopaedics, lack of mentorship, limited resources, and poor overall culture. This is a grassroots effort and will require change at all levels. The orthopaedic societies and academic programs need to promote diversity in orthopaedics by improving the culture, offering mentorship, early exposure, and a variety of research and clinical opportunities.

## Disclosure

The author reports no potential conflicts of interest.

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