Letters

RESEARCH LETTER

The Gender Gap in Surgical Residencies

Despite efforts to address systemic inequities, surgical residencies lag behind nonsurgical programs in attracting women.[1] This gender gap is critical given impending surgical workforce shortages,[2] but to our knowledge, little is known about the rate at which the gap is closing. This report identifies specialties with the greatest gender inequities among resident physicians and uses observed trends to predict how long it will take for the proportion of women in these specialties to reach parity with the overall resident and US populations.

Methods | After receiving an institutional review board and informed consent waiver at Partners Healthcare because this was a secondary analysis of publicly available, deidentified, aggregate data, the National Graduate Medical Education Census from academic years (AYs) 2007 to 2018 was reviewed.[1] This public census includes all Accreditation Council for General Medical Education–accredited programs. The 20 specialties with the most residents for AY 2007 were identified. Female resident proportions were calculated for each specialty by AY and an aggregated data logistic regression was used to examine the bottom quartile. To project the years for a specialty to reach a level of female representation comparable with that of the overall trainee population or the US population, ordinary least squares regressions were fitted and Newey-West standard errors were used. Prediction models assumed linear trends continuing as identified and the proportion of women in the US and resident physician populations remaining stable. Odds ratios and 99% confidence intervals provide the projected annual increase (PAN) for each successive year. Given multiple testing, the α was reduced (1%) and the CI increased. The mark to reach comparable female representation with that of the AY 2017 trainee population was 45.4%. The mark to reach comparable female representation with that of 2018 US Census population estimates was 50.8%.[3] Analyses were completed using Stata, version 15 (StataCorp).

Results | Of the 20 largest specialty training programs (**Table**), women were underrepresented compared with the overall AY 2017 female trainee population in 13 (65%). The lowest quartile of representation was in otolaryngology, plastic surgery, urology, orthopedic surgery, and neurosurgery. After AY 2017, it is projected to take plastic surgery (PAN, 1.73%; 99% CI, 1.59%-1.87%) 4 and 7 years to reach levels of female representation comparable with that of the overall trainee population and US population, respectively (**Figure**). To reach gender parity with the trainee and US populations, otolaryngology will require 11 years and 19 years (PAN, 0.74%; 99% CI, 0.30%-1.19%), neurosurgery will require 39 years and 47 years (PAN, 0.68%; 99% CI, 0.50%-0.86%), urology will require 56 years

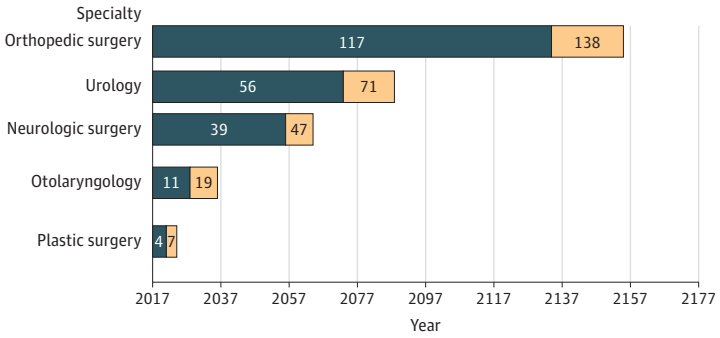
Table. Representation of Women in 20 ACGME-Accredited Specialties in Academic Years 2007 to 2008 and 2017 to 2018

Specialty	2007-2008		2017-2018		Overall change, female, %
	Total No. of residents	Women, %	Total No. of residents	Women, %	
Obstetrics and gynecology	4770	76.67	5346	82.79	6.12
Pediatrics	8052	72.83	8858	71.88	−0.95
Dermatology	1072	63.81	1389	63.86	0.05
Internal medicine/pediatrics	1444	54.64	1475	57.76	3.12
Family medicine	9330	54.42	11 381	53.69	−0.72
Psychiatry	4653	54.31	5701	50.11	−4.20
Pathology, anatomic and clinical	2283	52.12	2267	49.80	−2.32
Neurology	1590	44.34	2610	44.56	0.22
Internal medicine	22 026	43.90	26 228	41.92	−1.98
Ophthalmology	1232	41.96	1331	40.95	−1.02
Physical medicine and rehabilitation	1184	38.85	1285	39.84	0.99
Emergency medicine	4479	38.62	7136	35.47	−3.16
Anesthesiology	4993	34.89	5939	34.27	−0.62
Surgery, general	7680	30.72	8811	40.02	9.30
Radiology, diagnostic	4405	27.72	4492	26.25	−1.47
Otolaryngology	1329	27.46	1584	35.86	8.39
Plastic surgery[a]	648	22.38	1080	38.89	16.51
Urology	1008	21.73	1317	25.59	3.86
Orthopedic surgery	3210	12.43	3889	15.40	2.97
Neurosurgery	915	11.15	1420	17.82	6.67

Abbreviation: ACGME, Accreditation Council for General Medical Education.

[a] Starting in 2009 to 2010, plastic surgery represents plastic surgery and plastic surgery–integrated pathways.

Figure. Five Specialties Found to Have the Least Female Representation and Demonstration of Projected Time Before These Specialties Reach the Female Representation Seen Among Accreditation Council for General Medical Education Trainees Overall and Recent US Population Estimates



The x-axis lists actual years and numbers embedded within the graph represent how many years from the 2017 to 2018 academic year.

and 71 years (PAN, 0.36%; 99% CI, 0.20%-0.52%), and orthopedic surgery will require 117 years and 138 years (PAN, 0.26%; 99% CI, 0.19%- 0.32%), respectively.

Discussion | Among the largest resident specialties in the US, 5 surgical specialties comprise the lowest quartile of female representation. Most demonstrate a less than 1% increase in women trainees per year. The specialties with the lowest proportions of female faculty (urology, neurosurgery, and orthopedic surgery)[4,5] exhibited the slowest growth in the proportion of female residents and require thoughtful approaches to support mentorship opportunities. Several strategies may improve female student recruitment. First, female surgical faculty tend to incur disproportionate mentorship responsibilities[6] and these should be recognized and rewarded. This builds a stronger network of mentors and aligns institutional incentives with diversity-focused values. Second, early outreach programs, such as summer research internships for medical students, provide early exposure and should be used to foster interest and recruitment. Third, gender diversity in the residency selection process may be optimized through implicit bias training for the selection committee, holistic applicant reviews, and increased female faculty visibility. Diversity in medicine builds high-performing teams that promote better health outcomes, innovation, performance, and morale. At the current pace, gender parity among many surgical specialties is still decades away. These data call for concerted efforts to increase the pipeline for female surgical residents.

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