


Sex Differences in Faculty Positions Among Top-Ranked US Otolaryngology Departments

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Nicola M. Pereira, BA¹ , and Ashutosh Kacker, MD¹

Abstract

Objective. This study aims to characterize the top-ranked departments in otolaryngology to provide an indicator of the state of diversity within otolaryngology and to draw a comparison with other medical and surgical fields.

Study Design. This cross-sectional study examined the 20 highest-ranked otolaryngology programs according to the *US News & World Report* ranking of best hospitals for ear, nose and throat.

Setting. Academic otolaryngology departments in the United States.

Methods. Faculty demographic and biographical data were collected from departmental websites. The Web of Science *h*-index was used as a surrogate for academic productivity. Descriptive statistics and chi-square analysis were used to characterize the cohort and compare otolaryngology with other fields.

Results. Of 562 otolaryngologists on faculty at the 20 highest-ranked programs, 413 (73.5%) were men and 149 (26.5%) were women. Among the faculty in the cohort, 174 (31.0%) were professors, 145 (25.8%) were associate professors, and 183 (32.6%) were assistant professors. Across faculty appointments, the proportion of women grew smaller as academic rank increased. When compared with all faculty across US medical schools, the departments in this study had significantly lower proportions of female professors ($P = .0047$), associate professors ($P = .0009$), and assistant professors ($P = .0005$). Male faculty members had higher *h*-indices than their female counterparts among professors ($P = .004$), associate professors ($P = .008$), assistant professors ($P = .0002$), and clinical assistant professors ($P = .0009$).

Conclusion. Women are underrepresented across all academic ranks in top-ranked otolaryngology programs. The current state of diversity in otolaryngology yields many opportunities to advance representation for women in the field.

Keywords

faculty, academic medicine, diversity

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Significant disparities in sex representation across surgical specialties in the United States still exist despite advances in recent years. While female residents made up 45.6% of total US residents in 2018, the percentage of women in surgical residencies was significantly lower across all surgical specialties, with the exception of obstetrics and gynecology programs.¹ Among surgical residencies, 36% of otolaryngology residents were female, as compared with 41% in general surgery, 41% in integrated plastic surgery programs, 18% in neurosurgery, and 15% in orthopedic surgery.¹ Within otolaryngology, these disparities are seen at higher levels of academic medicine as well, with women accounting for 36.3% of full-time faculty members and only 3.5% of department chairs.^{1,2} Similar disparities exist in minority representation in otolaryngology. According to a study based on data from 2016, Hispanics account for just 2.9% of faculty members in the specialty, despite making up 17.3% of the US population, while African Americans account for 2.4% of otolaryngology faculty but 12.6% of the US population.³

Appropriate representation of women and minorities in otolaryngology is imperative to meet the needs of an increasingly diverse population. Departments with demographics that reflect the needs of their communities are better equipped to address racial disparities in health care and result in increased access to and improved quality of care for disadvantaged populations.^{4,5} Furthermore, diverse otolaryngology departments can serve to foster increased representation in subsequent generations of medical trainees. Women and non-White applicants into otolaryngology residency programs have been shown to place importance on gender and racially diverse departments during the match process.⁶

¹Department of Otolaryngology–Head and Neck Surgery, Weill Cornell Medicine, New York, New York, USA

Corresponding Author:

Ashutosh Kacker MD, Weill Cornell Medicine, 1305 York Ave. NY, NY 10021, USA.

Email: ask9001@med.cornell.edu



Previous studies have analyzed sex representation in otolaryngology departments across the country. Analysis of the top-ranked departments in the specialty, however, provides an opportunity to gauge the trajectory of diversity in otolaryngology, as top-ranked programs are typically standard setters for their field. The goal of this study was to characterize the top-ranked departments in otolaryngology and enhance the existing literature by providing a bellwether for the state of diversity within the specialty and comparing it with other medical and surgical fields.

Methods

This study was approved as exempt by the Weill Cornell Medicine Institutional Review Board.

The 2020-2021 *US News & World Report* ranking of best hospitals for ear, nose, and throat was used to identify programs for the study.⁷ The 20 highest-ranked departments on this list were selected for analysis.

Faculty members were identified through an internet-based search of departmental websites conducted from April 10 to May 10, 2021. Faculty members were included if they held an active primary appointment in otolaryngology–head and neck surgery. Appointments that had the “clinical” prefix were considered separately. Adjunct, visiting, and emeritus appointments, as well as instructor or lecturer positions, were not included in this study.

For each faculty member identified, the following demographic and biographical information was recorded: first name, last name, sex, academic degrees, academic rank, medical school attended, and country of medical school attendance. When this information was not readily available on departmental websites, additional internet-based searches of faculty professional profiles on Doximity and LinkedIn were used to supplement or confirm the information. Sex was determined by study investigators’ review of photographs available on department websites. As ethnicity is a characteristic that is neither readily apparent from photographic depictions nor recorded on departmental or professional profiles, data on ethnicity were not included in the study. The Web of Science *h*-index was used as a surrogate for academic productivity. The *h*-index is a metric for the scholarly impact of an author over the course of one’s career. It is defined as the highest number, *h*, such that an author has published *h* papers that have been cited at least *h* times.

Descriptive statistics were calculated for demographic and biographical variables to characterize the cohort in its entirety and by academic rank. The chi-square test or Fisher exact test was then used to compare the proportion of men and women within the entire cohort and within each academic rank. Comparison per the chi-square test was also made between the 20 departments in the study and the set of all US otolaryngology departments, by using external data from the 2020 calendar year provided by the Association of American Medical Colleges.² These data were used to compare otolaryngology departments with faculty in general surgery and across all departments in US medical schools. As the data provided by the Association of American Medical Colleges are reported in

Table 1. Academic Rank Distribution by Sex.

Faculty appointment	Faculty members, No. (%)		
	Total	Male	Female
Professor	174	144 (82.8)	30 (17.2)
Associate professor	145	107 (73.8)	38 (26.2)
Assistant professor	183	119 (65.0)	64 (35.0)
Clinical professor	6	6 (100.0)	0 (0.0)
Clinical associate professor	25	18 (72.0)	7 (28.0)
Clinical assistant professor	29	19 (65.5)	10 (34.5)

aggregate, it was not possible to utilize this data set to gather departmental data for the top 20 programs, thus necessitating the described manual review.

Similarly, descriptive statistics were calculated for *h*-indices for the entire cohort and within individual departments. This analysis was also stratified by sex and academic rank. The chi-square test or Fisher exact test was then used to compare average *h*-indices within the entire cohort and within each sex and academic rank stratification.

All *P* values were 2-sided with statistical significance evaluated at the 0.05 alpha level. All analyses were performed in Stata Version 16.0 (StataCorp).

Results

This study identified 562 otolaryngologists on faculty at the 20 highest-ranked programs on the *US News & World Report* list of best hospitals for ear, nose, and throat. Of these, 413 (73.5%) were men and 149 (26.5%) were women. Foreign medical graduates accounted for 54 (9.6%) of the study group.

Regarding academic rank, 174 (31.0%) were professors, 145 (25.8%) were associate professors, and 183 (32.6%) were assistant professors. For purely clinical appointments, 6 (1.1%) were clinical professors, 25 (4.5%) were clinical associate professors, and 29 (5.2%) were clinical assistant professors. **Table 1** shows the breakdown of male vs female faculty members by academic rank. Across all faculty appointments, research and clinical, the proportion of women grew smaller as academic rank increased.

There was no significant difference in the percentage of female professors ($P = .800$), associate professors ($P = .513$), or assistant professors ($P = .245$) between the 20 departments in this study and the aggregate of all US otolaryngology departments. There was also no significant difference in the percentage of female professors ($P = .154$), associate professors ($P = .735$), or assistant professors ($P = .167$) between the departments in this study and general surgery departments across the United States. When compared with faculty across all departments in US medical schools, however, the departments in this study had significantly lower proportions of female professors (26.7%, $P = .0047$), associate professors (39.7%, $P = .0009$), and assistant professors (47.7%, $P = .0005$).

Faculty member *h*-indices were then averaged within individual departments to yield an average department-wide

Table 2. Mean *h*-index by Sex and Academic Rank.

Faculty appointment	Mean <i>h</i> -index		<i>P</i> value
	Male	Female	
Professor	33.97	26.00	.0043
Associate professor	16.21	12.34	.0080
Assistant professor	10.58	7.58	.0002
Clinical professor	21.33	—	—
Clinical associate professor	12.17	8.86	.2350
Clinical assistant professor	9.79	3.10	.0009

h-index. The average department-wide *h*-index across the 20 programs was 18.99. The maximum department-wide *h*-index was 40.69 and the minimum was 10.92. **Table 2** shows the average *h*-index of male vs female faculty members when compared by academic rank. Male faculty members had higher *h*-indices than their female counterparts among professors ($P = .004$), associate professors ($P = .008$), assistant professors ($P = .0002$), and clinical assistant professors ($P = .0009$).

Discussion

This study demonstrates that the lack of female representation in otolaryngology extends throughout the specialty, including the 20 most highly ranked departments. While existing data previously characterized a lack of female representation in the specialty as a whole, this study is unique in that it specifically describes the top 20 programs in otolaryngology and thus provides a barometer for the state of diversity in the specialty.^{1,2} The discrepancy in female representation was observed across all academic ranks and grew larger with increasing rank. This increase in disparity with increasing rank could be expected due to the historically slow growth of female representation in otolaryngology. While pioneering women in otolaryngology have made considerable contributions to the field, especially since the late 19th century when women first began receiving admission to US medical schools, the results of this study serve as a barometer for the magnitude of inequality that has yet to be overcome.⁸ While this underrepresentation is also reflected in general surgery departments in the United States, female representation among the programs in this study lags significantly behind the aggregate of all departments across US medical schools.

Regarding research productivity, male faculty members had significantly higher *h*-indices than their female counterparts at every academic rank. As these findings do not account for duration of tenure on faculty, however, it is difficult to identify the causative factors driving this phenomenon.

Identifying discrepancies in representation among the top programs in our specialty can serve as a barometer for the state of diversity within otolaryngology. Consistent with the findings presented in this study, a recent study showed that, in the 2017-2018 academic year, female faculty members were similarly underrepresented in positions of residency and fellowship directorships and chair positions in otolaryngology

programs.⁹ These imbalances are important to address and correct because they may subsequently affect the composition of otolaryngology resident cohorts and perpetuate a cycle of underrepresentation that could persist for generations. That otolaryngology residency programs have among the lowest female and minority representation across surgical specialties shows that a significant amount of work remains to be done.^{3,10}

Part of this work can begin with fostering an interest in otolaryngology among underrepresented medical trainees early in their careers. Discussion of disparities present in otolaryngology must include an acknowledgment of upstream factors that result in diminished representation, such as the structural barriers faced by women and minority applicants to medical school and surgical residencies. Various factors contribute to these lasting effects: discouragement of female and minority participation in STEM, inadequate opportunities for early career exposure, and a lack of holistic medical school and residency application review processes.¹¹ Though the proportion of female otolaryngology residents increased significantly from 2008 to 2018, racial minorities did not see a similar increase in representation in the field.⁸ Whereas Black Americans account for 13% of the US population, they make up only 7.1% of US medical students and 2.3% of otolaryngology residents.¹¹ For Latinx populations, those numbers are 18%, 6.4%, and 6.2%, respectively.¹¹

Programs aimed directly at mentorship of underrepresented minority medical students have been shown to increase these students' interest in applying to an otolaryngology residency.¹² Additionally, program emphases on recruiting diverse residents—specifically via department-level diversity and inclusion initiatives, as well as diversity and inclusion language on departmental websites—are proven examples of successful strategies to increase female representation within residency programs and may, in part, contribute to the narrowing of the gap in female representation that has been observed in recent years.^{8,13}

This study has several limitations. First, as faculty demographic and biographical data were collected from department websites, the presence of out-of-date information on these pages could jeopardize the accuracy of our findings. Department websites also do not typically explicitly state faculty members' gender identities; thus, our methodological practice of determining sex based on gender presentation in faculty photographs may not accurately reflect the nuances of gender representation in the specialty. Additionally, the Web of Science *h*-index is affected by a degree of inherent bias that detracts from its use as a direct measure of a researcher's academic productivity.¹⁴ It is difficult to incorporate the impact of additional factors, such as broader sociocultural norms and potential funding disparities, that may detract from women's scientific productivity but are not accounted for in the *h*-index. Additionally, because the *h*-index accounts for the number of times that each article has been cited, it is important to note that a lower *h*-index can result from publishing in a lower-impact and thus less commonly cited journal rather than from producing a smaller quantity of publications.

Furthermore, the *h*-index is algorithmically generated and occasionally misattributes publications to certain authors. These incorrect attributions, in addition to publications that may have been excluded due to algorithmic errors, may have resulted in faculty members with *h*-indices that do not accurately reflect their research productivity. Additionally, because our analysis does not account for the duration of time on faculty, there are limitations to the conclusions that can be drawn from comparing *h*-indices at face value between male and female faculty members. Finally, the lack of available information on faculty members' age, number of postgraduate years, and length of time in active practice hinders this study's ability to draw conclusions regarding the practical significance of sex disparities according to academic rank.

In conclusion, the current state of diversity in otolaryngology yields many opportunities to advance representation for women and minorities in the field. To demonstrate commitment to increasing representation, suggested strategies for departments include creating diversity committees with departmental leadership and promoting these values among trainees via diversity-oriented programming and departmental mission statements.¹¹ Dedicated investment in these efforts now will result in increasingly representative otolaryngology programs that more accurately reflect the changing US population and are better able to care for a diverse set of patients.

Author Contributions

Nicola M. Pereira, participated in the design, conduct, and analysis of this research along with creating the final version of this manuscript; **Ashutosh Kacker**, participated in the design, conduct, and analysis of this research along with creating the final version of this manuscript.


Disclosures

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ORCID iD

Nicola M. Pereira  <https://orcid.org/0000-0001-9347-3699>

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