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ORIGINAL RESEARCH

Speaker Gender Representation for Anesthesiology Grand Rounds at a Large Academic Medical Center

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INTRODUCTION

Invited speakerships, such as speaking at grand rounds, are part of the pathway to promotion in academic medicine. The proportion of women anesthesiology residents has risen modestly over time, from 25% in 1999 to 34% in 2018.^{1,2} The Association of American Medical Colleges (AAMC) reported that anesthesiology ranked among the top 10 clinical specialties with the highest proportion of women faculty and residents.³ Despite this, the distribution of women in higher academic ranks has remained stagnant as women are less likely to hold positions of leadership including full professor and department chair.⁴ With decades now of women in anesthesiology, this is clearly not a pipeline issue.⁵

Grand rounds are regularly held events, typically weekly, when a leader or expert speaks on a topic related to a given field of medicine. An invitation to speak at grand rounds at another academic institution is generally regarded as an honor and acknowledges the speaker's prominence in their field. It can provide an opportunity to disseminate their research and may enhance their national reputation. This also is an opportunity for the speaker to share ideas, network, and may improve citations of the speakers' published work.⁶ In addition, visiting professors are viewed as role models for medical students, residents, and junior faculty, and exposure to a diverse array of speakers and topics may contribute to retention of women and

underrepresented minorities in academic medicine.

Prior studies⁷⁻¹⁰ have found discrepancies in the proportion of men and women as invited speakers and presenters at conferences in several specialties, including anesthesiology. Moeschler et al¹¹ recently reported a significant underrepresentation of women as speakers at the American Society of Anesthesiologists' (ASA) annual meetings. A disparity in grand rounds speakers has been reported in several specialties.^{6,12,13} This study sought to evaluate gender distribution of external invited speakers to the Department of Anesthesiology Grand Rounds at a large academic medical center.

MATERIALS AND METHODS

This was a retrospective observational study of external invited speakers for the Department of Anesthesiology and Perioperative Medicine Grand Rounds presentations at Mayo Clinic in Rochester, Minnesota. The study was deemed exempt by the Mayo Clinic Institutional Review Board. We obtained archived lists of speakers from 2007 through 2018. An external speaker was defined as one who is not affiliated with Mayo Clinic. The gender of each speaker was confirmed for the majority of the speakers using Google and Doximity; the remaining were confirmed by an author who knew the speaker. Academic rank was provided by the invited speaker to our department at the time of their presentation. As a surrogate, the expected

percentage of women speakers used for our analyses was based on data from the AAMC that summarizes the representation of women and men in a national sample of academic medical centers among different medical specialties.¹⁴

The number and percentage of women anesthesiology attendings, new hire attendings, and first year anesthesiology residents in the department were collected during the same study period. In addition, the gender distribution of the departmental Grand Rounds Planning Committee and committee chair were also obtained for each year of the study. External invited speakers are proposed by members of the department and are approved by the committee members. The gender of the individual who invited the speaker was obtained through departmental records.

Percentage of women speakers was summarized overall and by year as a percentage, with Clopper-Pearson 95% confidence intervals. The first aim was to assess whether the proportion of speakers that were women increased over time, assessed with a Cochran-Armitage trend test. Next, one sample proportion tests were conducted to assess if the proportion of women speakers is significantly less than the national proportion of women anesthesiologists from the earliest known years AAMC, ASA, and American Board of Anesthesiology (ABA) reported data on gender, which were in 2007, 2011, and

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2011, respectively.

We also sought to assess whether the proportion of women speakers differed from the proportion of new residents that were women at Mayo Clinic using binomial tests of proportions. The proportion of women residents was defined as the proportion of women in the incoming class from the previous fall. For example, the first academic year 2006-2007 was considered the proportion of new women residents for 2007. Trends in proportion women among residents were assessed with Cochran-Armitage trend tests. Logistic regression models were used to compare resident versus speaker gender to assess whether potential disparities in representation of women speakers was growing or shrinking over time using an interaction between gender and year. When interactions were not significant, overall disparities were adjusted for year and compared. A similar analysis was conducted using gender data for new hire attendings.

The distribution of invited speakers' gender was compared by the gender of the attending staff member using a binomial test of proportions. Academic ranks of men and women invited speakers were compared by Wilcoxon rank-sum test.

The women to men proportion of new residents, speakers at the Anesthesiology Grand Rounds, and the proportions for AAMC, ASA, and ABA were plotted for each year between 2007 and 2018. All analyses were performed using R statistical package version 4.0 (R Foundation for Statistical Computing, Vienna, Austria). Two-sided *P* values less than .05 were considered statistically significant.

RESULTS

From January 2007 until December 2018, there were 122 unique external speakers, of which 28 (23%) were women (Table 1). There was no statistically significant evidence that the proportion of external, invited women grand rounds speakers increased over time (*P* = .29). Overall, women speakers comprised a lower proportion of external invited speakers compared to the proportion of women in the academic anesthesia workforce;

however, this difference was not statistically significant from national membership rates: AAMC (31%, *P* = .07), ASA (24%, *P* = .87), or ABA (26%, *P* = .57; Figure 1).

Between 2007 and 2018, there were a total of 217 new anesthesiology residents, and 90 of those were women (41%). The percentage of new residents that were women increased over this time period (*P* = .001). Comparing speakers and residents, there was evidence to suggest that, on average, women are more represented among residents than among speakers (odds ratio = 2.63; 95% confidence interval = 1.59, 4.45; *P* < .001). In logistic regression models, there was not evidence of interaction between resident versus speaker role and year (interaction *P* = .40) suggesting insufficient data to conclude disparities in representation of women speakers compared to women resident proportions decreased over time. Between 2007 and 2018, there were a total of 118 new hire attendings, and 41 of those were women (35%). There was insufficient data to suggest the percentage increased over this time period (*P* = .52). While the percentage women of new hire attendings was higher than that of speakers, there was insufficient evidence to conclude differences based on this sample size (odds ratio = 1.73; 95% confidence interval = 0.98, 3.08; *P* = .060). There was no evidence to suggest changes over time (interaction *P* = .70).

During all the years included in this study, the chair of the Grand Rounds Committee was a man. There were no women on the Grand Rounds Committee from 2007 through 2013, and in 2015. In 2014, 2016, 2017, and 2018, there was 1 of 5 (20%), 1 of 5 (20%), 2 of 7 (28.6%), and 3 of 9 (33.3%) women on the committee, respectively. Men invited 104 (85.2%) total speakers, of which 21 were women speakers (20.2%), whereas women invited 18 total speakers, of which 7 (38.9%) were women (*P* = .08 for difference).

Academic rank was available for 64 (68.1%) and 24 (85.7%) of the men and women invited speakers, respectively. Of the men speakers, 10 (15.6%) were assistant professors, 23 (35.9%) were associate professors, and 31 (48.4%) were professors. Six (25%) of the women speakers were assistant professors, 9 (37.5%) were

associate professors, and 9 (37.5%) were professors. Among those with rank available, there was insufficient evidence (*P* = .28) to suggest men speakers tended to have higher academic ranks compared to women speakers.

DISCUSSION

At our large academic institution, the percentage of invited women speakers for anesthesiology grand rounds did not statistically significantly increase over time, while the percentage of women residents in medicine and specifically anesthesiology increased. Women speakers comprised a lower proportion of external invited speakers compared with the academic workforce except in 2014 and 2015, although this association was not statistically significant. Women invited a greater proportion of women speakers compared to men, but it was not statistically significant.

The lower proportion of women speakers in our study is consistent with prior studies. Boiko et al⁶ evaluated grand rounds speakers of 9 different specialties over 1 year from various academic medical institutions in the United States and found that women speakers were significantly underrepresented than expected relative to the workforce in all specialties except obstetrics and gynecology and surgery. Buell et al¹³ evaluated speakers at internal medicine grand rounds at major academic hospitals in Canada and found 17% more men speakers than women speakers. Sharpe et al¹² reported that in 18 departments evaluated, the representation of women speakers was lower or significantly lower than expected in 14 departments. Our study is unique in that we were able to look at speaker gender representation over a decade rather than just a short epoch of time as has been previously described. In addition, we were able to report more detailed information such as academic rank of speakers, gender of the person inviting the speaker, and gender of the grand rounds committee members. Although the proportion of women anesthesiologists has increased over time nationally and within the department, the proportion of women external invited speakers did not increase.

The disproportionately low number of

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women speakers as invited speakers for grand rounds may be because of unconscious bias or other factors experienced by women in academic medicine. Women invited a greater proportion of women than men did, but this difference was not statistically significant. Implicit bias can propagate inequalities and can affect both men and women. Evidence of bias toward women in medicine has been well documented in relation to pay,^{15,16} academic promotion,^{17,18} recognition awards,¹⁹ National Institutes of Health funding,^{18,20,21} and not being introduced by the title of *Doctor* at speaking engagements.²² Furthermore, women are underrepresented in professional society leadership, which may deter women from being actively engaged or even having membership in medical societies altogether. It is possible that the proportion of women in AAMC, ABA, and ASA may not be representative of academic anesthesiologists.²³

At the current time, men likely make up a larger portion of the national pool of anesthesia experts, especially given that grand rounds speakers typically hold the academic rank of associate or full professor.¹⁸ In 2015, the percentage of women in anesthesiology who were full professors was 7.4% compared with 17.3% of men (difference, -9.9%; 95% confidence interval of the difference, -8.5%, -11.3%; $P < .001$).⁴ Our study did not find a difference in academic rank when men speakers were compared to women invited speakers. The underrepresentation of women at higher ranks in academia may result, in part, to the phenomenon of the *leaky pipeline*, which recognizes that although women have made up a significant proportion of medical students for decades, they are leaving academic medicine at multiple time points resulting in gender disparities at these higher academic ranks. However, there is still a substantial number of qualified women who could be invited to present at grand rounds to achieve gender parity or at the very least proportional representation.²⁴

Furthermore, gender inequities can cultivate a vicious cycle in that to be invited to grand rounds, a speaker must be reputable and a well-known expert in

their field; however, this reputation often develops through research publications and speaking engagements. Moreover, speaking engagements at grand rounds as a visiting professor help to advance individuals in academic rank to associate professor and full professor. It also provides greater visibility for the individual and often leads to further opportunities. The absence of diversity in speakers sends a clear, possibly unconscious, message to attendees, as to what a leader or successful professional looks like and how they behave. Since these educational venues are designed to educate medical students, residents, and junior faculty, the absence of diversity further perpetuates social norms portraying leaders and experts as men.¹² With the number of women increasing in both academic faculty and anesthesiology residents, it is imperative to provide them with strong women role models to inspire and encourage them.

A conscious effort must be made to ensure gender parity in invitations for speaking engagements in academic settings. One way to achieve the goal of equitable representation of women and minorities as speakers is for departments and institutions to include this as an accountable metric and regularly track and evaluate it. Evidence shows that women do not decline speaking invitations more often than men.²⁵ However, when women do decline an invitation, every effort should be made to identify another woman to invite as a speaker. Departments should articulate a deliberate goal of *overrepresentation* of women speakers in these prestigious venues. This is especially important where women have been historically underrepresented as speakers or in cases where the specialty and/or the inviting department have fewer women faculty.²⁶

In addition, women should be represented on grand rounds planning committees. Men invited the majority of speakers in our study. When women are included on a planning committee for scientific symposia, the proportion of women speakers has been shown to increase.²⁷ Lithgow et al²⁸ found an average increase of 3% in the proportion of women speakers for every 10% increase in the proportion of women on the planning committee. Including women in grand rounds planning may lead

to a greater diversity of speakers. While the representation of women on our grand rounds committee increased over time, the number of invited female speakers did not increase. We have increased the current representation of women on our departmental grand rounds committee to 70% (7/10). Critical mass theory for gender equity predicts that when the proportion of women rises above 30% to 35%, the impact on culture would be evident. However, Helitzer et al²⁹ found that despite achieving critical mass throughout academic health centers, culture transformation has not occurred. They argue that critical actors, specific men and women who initiate cultural transformation and sponsor others to advance gender equity, not critical mass is needed to make change.²⁹

A limitation of this study is only gender was assessed. It is likely that other minority groups are also underrepresented, and a truly diverse speaker group would need to include racial, ethnic, and gender minorities. Future research needs to assess these factors, and grand rounds committees should collect data about invited speakers such as gender, race, and ethnicity. We were unable to obtain information about nonbinary gender using our methods, and the gender was assigned by the investigator based on information publicly available and was not self-identified; this may introduce bias. The sample by year of speakers is small, with several years having less than 10 invited speakers. Also, this is the experience of one specialty at a single institution and may not be representative of other organizations and specialties; however, our findings are consistent with prior studies.

In conclusion, this study provides evidence of gender disparities in the representation of women as invited grand rounds speakers. Although the percentage of women residents and faculty are increasing, the percentage of external, invited women speakers for grand rounds did not increase over time at our large academic institution. Academic institutions should make it a priority to have a diverse and representative group of grand rounds speakers. There must be a deliberate effort as well as specific benchmarks to ensure gender parity in

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grand rounds and other academic forums.

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Abstract

Background: Invited speakerships, such as speaking at grand rounds, are part of the pathway to promotion in academic medicine. This project sought to evaluate if the gender of invited grand rounds speakers at a major academic institution were distributed as expected based on the specialty workforce.

Materials and Methods: Archived lists of speakers for grand rounds for the Mayo Clinic Department of Anesthesiology were obtained from 2007 through 2018. The Cochran-Armitage test and logistic regression models were used to analyze the change in proportion of invited women speakers over time. One-sample proportion tests were conducted to compare the proportion of women speakers to the expected percentage of available women speakers based on gender data from national organizations.

Results: Of the 122 invited external speakers, 28 (23%) were women. Men invited 104/122 (85.2%) of all the speakers, of which 21 (20.2%) were women speakers. There was not significant evidence the proportion of women speakers increased over time ($P = .29$). Women speakers comprised a lower proportion of external invited speakers compared to the proportion of women in the academic anesthesia workforce; however, this association was not statistically significant ($P = .07$). The percentage of new residents that were female increased over this time period ($P = .001$).

Discussion: The percentage of women invited to be grand rounds speakers did not increase over the study period. Intentional measures should be instituted to increase the proportion of women grand rounds speakers.

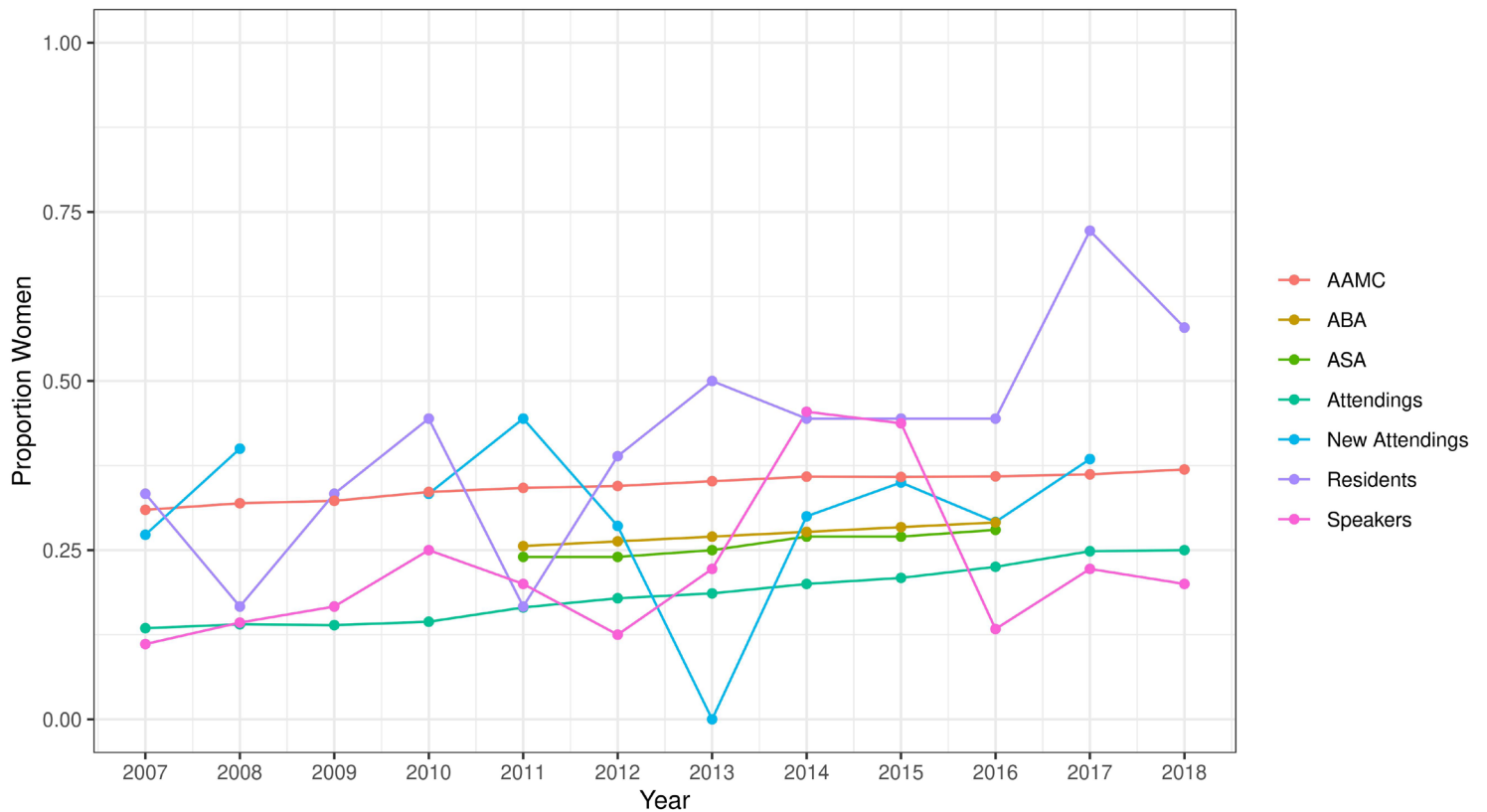
Keywords: Medical education, diversity, gender bias, implicit bias

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Figure

Figure 1. Proportion of women over time. Proportion of anesthesiology attendings, new-hire anesthesiologists, residents, and invited grand rounds speakers compared with the membership of the AAMC, ABA, and ASA from 2007 through 2018. Abbreviations: AAMC, Association of American Medical Colleges; ABA, American Board of Anesthesiology; ASA, American Society of Anesthesiologists.



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Table

Table 1. Gender Composition of Anesthesiology External Grand Rounds Speakers by Year

Year	Total Speakers	Women Speakers		Expected, % ^a
		n	% (95% confidence interval)	
2007	9	1	11 (0, 48)	31
2008	7	1	14 (0, 58)	32
2009	6	1	17 (0, 64)	32
2010	4	1	25 (1, 81)	34
2011	10	2	20 (3, 56)	34
2012	16	2	12 (2, 38)	34
2013	9	2	22 (3, 60)	35
2014	11	5	45 (17, 77)	36
2015	16	7	44 (20, 70)	36
2016	15	2	13 (2, 40)	36
2017	9	2	22 (3, 60)	36
2018	10	2	20 (3, 56)	37
Overall	122	28	23 (16, 31)	

^a Expected percentage of women speakers. Source: Association of American Medical Colleges.