



State of the Journal: Women First Authors, Peer Reviewers, and Editorial Board Members at *Annals of Emergency Medicine*

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INTRODUCTION

Despite the increasing numbers of women working in medicine, the proportion of those promoted to the highest academic leadership positions remains low.¹ Emergency medicine is no exception, despite evidence that women in academic emergency medicine are more likely to be fellowship trained than their male academic emergency medicine colleagues.^{2,3} In addition to there being a systemic gap in research funding for women, they are less likely to publish in peer-reviewed journals.⁴⁻¹⁰ Female first authorship in most high-impact general medical journals (*Annals of Internal Medicine*, *Archives of Internal Medicine*, *BMJ*, *Journal of the American Medical Association*, and *The Lancet*) has increased from 27% in 1994 to 37% in 2014, but it has plateaued and declined in other journals, such as the *New England Journal of Medicine*.¹¹ In the emergency medicine literature, a 2007 report found that only 18% of first and 17% of last authors were women.¹² More recent reports indicate 26% of first authors in emergency medicine publications were women.¹³

Journal editorial board membership is an important component of academic leadership and is a mark of professional achievement. A 2011 review of 60 journals demonstrated that 16% of editors in chief (10 of 63) were women, and less than one fifth (18%; 719/4,112) of all editorial board members were women.¹⁴ Female representation on editorial boards of medical journals does not mirror the gender composition in the corresponding specialties.¹⁵ The reasons for this gender disparity are likely multifaceted. Both implicit and explicit biases, as well as lack of mentorship and female role models, likely

contribute. In their 2007 report *Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering*, the National Academy of Sciences called for a “reasonable representation of women on editorial boards.”¹⁶

We report on the state of *Annals of Emergency Medicine* with respect to the gender distribution among the editorial board and peer reviewer pool, and first authors who are women, overall and by article type. We examined editorial board gender composition as a measure of current gender diversity, and the reviewer pool as a measure of potential future gender diversity, because future editorial board members are commonly selected from the reviewers. Last, we examined the gender of first authors of invited articles in contrast to the gender of first authors of unsolicited articles to determine whether there is bias in the commissioning process.

MATERIALS AND METHODS

Study Design and Population

We performed a cross-sectional study of *Annals* editors, reviewers, and authors. For the editors, we used the *Annals* masthead as of December 2018 to identify journal editors at various levels of editorial responsibility. To identify reviewers, we used Editorial Manager (version 15.1; Aries Systems, Andover, MA), the software used to manage the journal’s editorial process, to identify peer reviewers for the 2017 academic year (*Annals* reviewer pool includes 1,808 reviewers; 517 “core reviewers” perform 80% of the peer reviews). For the authors, we identified all first authors for *Annals* published in the print version of the journal between January 2015 and August 2018.

In 1997, our journal began a resident editor fellowship program. Each year, 1 to 2 emergency medicine residents

are selected to serve a 1-year term on the editorial board. This competitive process identifies individuals with high academic potential who are believed to have great promise to someday join the journal leadership. We report the gender distribution of the resident editor program since its inception to understand whether this process has affected the journal's gender diversity.

Gender Classification

We classified gender according to the names for the 2017 peer reviewers and first authors from January 2015 to August 2018, using the statistical package *genderizeR*,^{17,18} which provides a probability of male or female gender based on a frequently updated database that currently includes greater than 200,000 distinct first names from more than 79 countries and languages.¹⁸

To confirm the accuracy of the gender assignment, we manually confirmed the gender of 399 core reviewers by looking up their academic profile on their affiliated departmental Web site; by conducting a Google search to identify any media report or interview with the reviewer, or a profile on professional Web sites (eg, Doximity, US News Health); or by having personal knowledge of a task force member (eg, former resident, fellow, collaborator). We then calculated the accuracy of the *genderizeR* assignment compared with the human review. For all individuals (reviewers and authors) whom *genderizeR* could not classify, or classified with probabilities less than 0.90, we performed a manual review. We then confirmed, corrected, or deemed unclassifiable these names.

Each first author was classified as writing an author-initiated or editor-invited article, and then was classified by specific article type. Author-initiated article types included the following: Best Available Evidence, Brief Research Report, Case Report, Concepts, Expert Clinical Management, Original Research, Policy Resource and Education Paper, Residents' Perspective, Review Article, Special Contribution, Systematic Review/Meta-analyses, and unsolicited Editorials. Editor-invited article types included the following: CDC Update, Clinical Controversies, Editorial, Brief Commentary, HHS Highlights, Journal Club, NHTSA Notes, and Systematic Review Snapshot.

All statistical analyses were conducted in R (version 3.5.1).¹⁸

RESULTS

Editorial Board

As of December 2018, of the 63 current members of the *Annals* editorial board, 24% (n=15) were women

Table 1. Current editorial board and reviewer composition.

Position	No. of Positions	Female Gender, No. (%)
Senior editorial positions	10	1 (10)
Editor in chief	1	0
Deputy editors	5	0
Senior associate editors	4	1 (25)
Other editorial board members	53	14 (26)
Associate editors	22	5 (23)
Assistant editors	3	1 (33)
Methods/statistics editors	6	2 (33)
Departmental editors	13	4 (31)
Editorial board members	9	2 (22)
Resident fellows*	28	16 (57)
Reviewers†	1,808	520 (29)
Core reviewers	517	161 (31)
General reviewers	1,291	359 (28)

*Overall gender makeup of the 28 resident fellows since program inception in 1997.
†Between the computer and manual reviews, we were able to classify gender for 1,809 reviewers (99%); 5 of the general reviewers could not be categorized with certainty.

(Table 1). Among the 10 highest editorial board positions (editor in chief, deputy editors, and senior associated editors), only 1 was a woman (a senior associate editor). Thirty-one percent of the 517 core peer reviewers are women.

Resident Editor Fellow Position

Data on applications for the resident fellow position were available for 10 of the most recent years. We had 95 applicants (48% women) for 12 selected fellows (58% women). Overall, 16 of 28 (56%) *Annals* resident fellows have been women, a much higher percentage of women (56% since program inception) than that on the general editorial board. Of the 28 members, 10 remained on the editorial board for some period (6 women), and at present, 4 remain on the editorial board (2 women), and the current resident fellow is a woman.

First Authors

We identified 692 articles published during the study period. The *genderizeR* algorithm was able to classify the first-author gender for 676 articles (98%). Overall, 209 (30%) of the first authors were women, and female first authors accounted for 26% to 35% of all articles per year during the study (Table 2). The gender distribution varied across article type (Table 3). Among author-initiated publication categories, the proportion of female first

Table 2. Gender of first authors in *Annals of Emergency Medicine* publications by year.

Year	Women	Men	Gender Not Classified*	Total	Female Gender, % [†]
2015	55	142	0	197	28
2016	39	125	4	168	24
2017	83	142	4	228	37
2018	25	64	0	89	28
Total	202	473	8	683	30

*We were unable to classify the first author's gender for 8 articles.

[†]Denominator includes only individuals who were successfully classified.

authors ranged from 0% to 46%; 28% of original research articles had women as first authors. Women were first authors on 31% of all editor-invited articles (77/248; range 17% to 100%). This includes 21% (18/84) of commissioned editorials and 36% (59/164) of all other editor-invited publications (Δ 15%; 95% confidence interval 3.1% to 26%).

Accuracy of Gender Classification

The genderizeR software classified 394 of 399 reviewers included in the human review of algorithm performance. Sensitivity was 97% (95% confidence interval 91% to 99%) and specificity was 99% (95% confidence interval 98% to 100%).

LIMITATIONS

We limited our analysis to first authors. By not specifically considering second authors, last authors, and all authors, we failed to fully capture changes in women's authorship. Nonetheless, our methods were consistent with those of other investigations, allowing comparison across medical fields.^{12,13,19-21} We may have misclassified gender in some cases, according to the computerized algorithm. However, only a small percentage of cases (<2%) could not be classified by the software or our manual review, we confirmed any classification with less than .90 probability of gender assignment, and the accuracy of the genderizeR assignment when compared with manual review was excellent. *Annals* does not collect personal identifying information about editors, peer reviewers, or authors. Thus, we could not assess diversity in terms of racial or ethnic background or gender-nonconforming sexual identities. Last, we did not evaluate article acceptance rates by gender because we did not have the denominator of all submissions and we did not analyze submissions that were not accepted for publication. Future efforts could examine whether gender differences exist in

Table 3. Article type and first-author gender.

Article Type	Gender			Total	Female Gender, %*
	Women	Men	Not Classified		
Author-initiated submissions	126	301	8	435	30
Original Research	73	184	5	262	28
Brief Research Report	14	30	1	45	32
Systematic Review/Meta-analyses	6	11	0	17	35
Review Article	8	13	0	21	38
Concepts	8	17	1	26	32
Case Report	7	15	0	22	32
Residents' Perspective	6	7	1	14	46
Best Available Evidence	1	4	0	5	20
Expert Clinical Management	2	11	0	13	15
Policy Resource and Education Paper	0	1	0	1	0
Special Contribution	1	7	0	8	13
Unsolicited Editorial	0	1	0	1	0
Editor-invited submissions	77	171	0	248	31
Editorials	18	66	0	84	21
Brief Commentary	1	0	0	1	100
Journal Club [†]	9	10	0	19	47
Systematic Review Snapshot	40	76	0	116	34
Clinical Controversies	1	1	0	2	50
CDC Update	5	12	0	17	29
HHS Highlights	2	1	0	3	67
NHTSA Notes	1	5	0	6	17
Total all submissions	202	473	8	683	30

*The denominator for the percentage of women includes the authors whose gender was successfully classified.

[†]The *Annals of Emergency Medicine* Journal Club feature consists of one article publishing the questions and a separate publication for the answers. For the purpose of this review, we counted the questions and answers as "one" to avoid double counting these submissions.

article acceptance rates, but the issue is confounded by type of submission and quality of the articles, and *Annals* peer-review process is blinded.

DISCUSSION

Although this article focuses on gender diversity, this attention is not meant to distract readers from the importance of race, ethnicity, gender-nonconforming sexual identities, geography, and other forms of diversity for which the disparity is even greater.

The proportion of women as first authors of articles was approximately 30%, with no trend during the study period. Our findings are consistent with those of previous reviews of all emergency medicine journals, which found that the

percentage of female first authors ranged from 9% to 26% and increased over time.^{12,13} Limiting the review to *Annals*, Li et al¹² found that the proportion of first authors was 9% in 1985 and 25% in 2005; in 2005, Tinjun et al¹³ found that 28% of first or second authors were women. Our analysis adds to the available evidence by reviewing more recent publications and using a validated automated approach to assign gender for first authors. Our data show that the proportion of author-initiated submissions with women as first authors was 28%, suggesting a possible ceiling effect. Although the proportion of female first authors was similar between author-initiated and editor-invited submissions (28% versus 31%), only 21% of editorials had women as first authors. Armed with this knowledge, the journal's editors can remedy this disparity through their invitation process.

Editorial board composition remains an area in academic medicine in which gender parity lags. Among a sample of 60 top-ranked journals (by Journal Citation Reports), only 15.9% of editors in chief were women.¹⁴ Among pediatric editorial boards, female representation has been increasing (17.8% in 2001 to 39.8% in 2016).²¹ The *Lancet* group of journals made a commitment to gender parity and has achieved more than 50% female editorial staff and editors in chief.²² *Annals'* editorial board is 24% women. This proportion is lower than would be expected according to the percentage of women among our reviewer (29%) and first-author pools (30%), emergency medicine residency graduates since 2003 (30%), and emergency medicine academicians (33%), especially given that female emergency medicine academicians are more likely to be fellowship trained than their male counterparts (37% versus 31%).^{3,23} Some of this gender disparity could be maturational because there is a lag between graduation and the accumulation of the credentials needed to join the editorial board. However, implicit bias at all levels, including protected time for research faculty, funding agency bias, and internal bias at the journal, may all play a role.

Solutions and Strategies to Improve Gender Diversity and Equity

To address the gender gap at *Annals*, in February 2018 the journal created a diversity task force to identify several strategies to decrease gender disparity. To increase the percentage of female peer reviewers, the task force contacted the Academy for Women in Academic Emergency Medicine, the American Association of Women Emergency Physicians, the Academy for Diversity and Inclusion in Emergency Medicine, and the newly formed American College of Emergency Physicians

(ACEP) Diversity, Inclusion, and Health Equity section, and the message was promoted on the FemInEM digest to solicit applications for peer reviewers. We also posted a message with the Association of Academic Chairs of Emergency Medicine to encourage applications and sponsorship of diverse faculty members to participate with our journal. We also identified past female Society for Academic Emergency Medicine and ACEP research awardees, Emergency Medicine Foundation grantees during the last 3 years, past *Annals* Journal Club authors (of the last 22 female journal club authors, 7 were not currently reviewers, whereas the others were either editors or reviewers), and National Clinician Scholars to identify and invite women not already in our peer reviewer pool.

The task force surveyed the 16 former female *Annals* resident fellows to identify any perceived barriers and suggested opportunities for improvement. Individuals who did not remain as involved with *Annals* cited other professional work and personal life commitments, as well as lack of a perceived role for them at *Annals* other than as a reviewer. All 16 continue as reviewers for the journal. This suggests that mentorship and sponsorship of promising female emergency medicine trainees is an important way to increase gender diversity.

The task force and journal leadership intend to continue to identify and implement programs to decrease implicit bias and increase all forms of diversity.

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