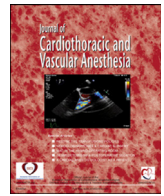




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Special Article

Gender Composition and Trends of *Journal of Cardiothoracic and Vascular Anesthesia* Editorial Board Membership: A 33-Year Analysis, 1987-2019

Paul S. Pagel, MD, PhD^{*,†}, Julie K. Freed, MD, PhD[†],
Cynthia A. Lien, MD[†]

^{*}Anesthesia Service, the Clement J. Zablocki Veterans Affairs Medical Center, Milwaukee, WI

[†]Department of Anesthesiology, the Medical College of Wisconsin, Milwaukee, WI

ABSTRACT

Objective: Gender disparities in editorial board composition exist in the vast majority of specialties including anesthesiology. If a similar lack of gender parity exists in cardiothoracic anesthesiology is unknown. The authors examined the gender composition and trends of the *Journal of Cardiothoracic and Vascular Anesthesia* (JCVA) editorial board from the initial year of its publication (1987) to 2019. The authors tested the hypothesis that the proportion of women serving on the JCVA editorial board has steadily increased over the journal's history, but women are underrepresented compared with the percentage of those currently practicing academic cardiothoracic anesthesia in the United States (US).

Design: Observational study.

Setting: Internet analysis.

Participants: All members of the JCVA editorial board, 1987-2019.

Interventions: The JCVA editor-in-chief, the associate editor-in-chief, associate editors, section editors, and general editors on the board were extracted from the masthead of a single issue from each calendar year. The years were divided into quartiles (1987-1995, 1996-2003, 2004-2011, and 2012-2019) to collect representative samples of editorial board composition for analysis.

Measurements and Main Results: A total of 2,797 members of the JCVA editorial board were positively identified (2,477 [88.6%] men; 310 [11.1%] women); 10 (0.3%) editors could not be identified. Four hundred and fourteen associate and section editors were recorded (men 360 [87.0%], women 54 [13.0%]). There were also 2,353 general editors (2,087 [88.7%] men; 256 [10.9%] women). The total number of JCVA board members, associate and section editors, and general editors progressively increased from 1987 to 1995 to 2012 to 2019. The percentage of women serving on the editorial board increased from 2.5% to 15.8%. Increases in the proportion of female general editors from 2.9% to 16.2% were responsible for this overall increase. A gender gap between the percentage of female first authors (data obtained from a previous publication) and editorial board members was observed in each quartile. Editorial board composition was also different than last author distribution in 1987 to 1995 and 2012 to 2019, but not the other 2 time periods.

Conclusions: The results demonstrate that the proportion of women serving on the JCVA editorial board has steadily increased over the journal's history. Nevertheless, women continue to be underrepresented on the JCVA board compared with the percentage of US female academic cardiothoracic anesthesiologists, and gender gaps between first and last authorship and board composition also persist.

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Key Words: editorial board; gender equality; cardiothoracic anesthesiology; women in academic medicine; leadership

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[†]Address reprint requests to Paul S. Pagel, MD, PhD, Clement J. Zablocki Veterans Affairs Medical Center, Anesthesia Service, 5000 West National Avenue, Milwaukee, WI 53295.

E-mail address: pspagel@mcw.edu (P.S. Pagel).

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GENDER INEQUALITY CONTINUES to persist in academic anesthesiology despite promising, though gradual, trends toward its reversal. Two recent American Society of Anesthesiologists (ASA) surveys showed that women are consistently underrepresented in leadership roles¹ and are less

likely to be single speakers or single moderators of panel discussions at the ASA annual meeting.² The proportion of women holding ASA leadership positions also was less than that in the general medical workforce.¹ The percentage of women who were certified as consultants by the American Board of Anesthesiology (ABA) increased from 1985 to 2015, but those who participated as ABA examiners did not match this trend,³ although gender parity is slowly being achieved more recently (C. A. Lien, personal communication, June 30, 2019). Another analysis of female representation in the ABA further indicated that women hold a disproportionate minority of appointments and have lower quantitative indices of scholarly activity (eg, number of publications and citations, h-index⁴) than their male colleagues.⁵ In contrast to these rather discouraging observations, the percentage of female first authors of scholarly articles now approaches the proportion of women practicing in United States (US) academic anesthesiology departments (35.4% of all faculty appointments).⁶ Similar findings were noted in a recent survey of US female academic cardiothoracic anesthesiologists.⁷ The results of these 2 studies suggest that some modest progress toward gender equality has occurred. Nevertheless, women continue to be substantially underrepresented as last and corresponding authors when compared with the proportion of women in the academic workforce.^{6,7} Women are also less likely to advance in academic rank (associate professors, 28.9%; professors, 18.4%) or hold chair positions (10.4%) than men.⁸ These findings are mirrored by those observed when cardiothoracic anesthesiology is examined. A survey of cardiothoracic anesthesiologists working in US departments with accredited adult cardiothoracic anesthesia fellowships indicated that 29.1% of these faculty members were women,⁷ but only a minority of these individuals have advanced beyond the rank of Assistant Professor or served as adult cardiothoracic anesthesiology fellowship program directors (34.1% and 20.0%, respectively).⁹

Along with national grant-funding agencies, journal editorial boards are largely responsible for shaping the narrative and direction of scientific research and public health policy.¹⁰ Appointment to an editorial board is prestigious, a recognition of an individual's career accomplishments and national or international prominence.^{11,12} The decision to appoint an individual to an editorial board is based on many factors, of which evidence of sustained scholarship, grant support, basic science or clinical research credentials, academic rank, and the promptness and quality of manuscript reviews are among the most important. Editorial board membership is vital to the advancement of women in academic medicine.^{13,14} Greater numbers of women serving on editorial boards may foster more rigorous research standards, improve research quality, draw attention to underrepresented women's health topics, and stimulate female researchers to submit their work to journals with gender parity.¹⁵⁻¹⁸ Considering the underrepresentation of women in anesthesiology leadership roles, however, it should not be entirely surprising that women continue to be underrepresented on editorial boards in anesthesiology,^{12,19,20} as they are in almost all other specialties,^{11-13,19,21-30} despite the 2007 recommendation of the National Academy of Sciences, the National Academy of

Engineering, and the Institute of Medicine to establish "reasonable representation of women on editorial boards."³¹ Indeed, 3 studies showed that women are substantially underrepresented on several anesthesiology editorial boards including *Anesthesiology*, *Anesthesia and Analgesia*, the *British Journal of Anaesthesia*, and the *Canadian Journal of Anesthesia*, among others.^{12,19,20} If similar gender disparity in editorial board composition exists in cardiothoracic anesthesiology is unknown. During its 33-year history, the *Journal of Cardiothoracic and Vascular Anesthesia* (JCVA) has evolved into the preeminent subspecialty journal for publication of cardiothoracic and vascular anesthesia-related topics. Accordingly, the authors examined the gender composition of the JCVA editorial board from the initial year of the journal's publication (1987) to 2019. The authors tested the hypothesis that the proportion of women serving on the JCVA editorial board has steadily increased over the journal's history, but women are underrepresented relative to the percentage of those currently practicing academic adult cardiothoracic anesthesia in the US.

Methods

Data Extraction

Institutional review board approval was not required because this work was based on publicly available data through print or internet sources, and because human subjects did not participate. The editor-in-chief, the associate editor-in-chief, associate editors, section editors, and general editors were extracted from the masthead of a single issue from each calendar year beginning from the journal's first year of publication (1987) to the current date (2019). These data were tabulated using Microsoft Excel for Mac (Version 16.16.2, Microsoft, Redmond, WA). The years were divided into quartiles (1987-1995, 1996-2003, 2004-2011, and 2012-2019) to collect representative samples of editorial board composition for analysis. The masthead for 1987 was unavailable, and masthead information was incomplete for 1993 and 1998. These 3 years were excluded from the analysis. The gender of each author was determined by inspection of the first name. If the definition of gender could not be easily established, the editor's institutional website was examined or an internet search using the Google search engine (Google, Palo Alto, CA) was performed. Authors whose gender could not be definitively identified were excluded from the analysis. The associate editor-in-chief, associate editors, and section editors were combined into a single category (termed "associate and section editors") because the journal has had a single associate editor-in-chief and more than 3 associate editors for only the past 3 years (2017-2019). Percentages of first, last, and corresponding authors in JCVA for 1990 to 1992, 1999 to 2001, 2008 to 2010, and 2015 to 2017 were obtained from the authors' previous publication⁷ and compared with the proportion of women on the JCVA editorial board in each of the corresponding quartiles to determine if the increases observed in women's authorship were matched by increases in female editorial board membership of similar magnitude.

Statistical Analysis

Categorical variables are presented as numbers. Serial Pearson chi-square or Fisher exact probability tests were used to compare data between quartiles as appropriate (StatPlus:mac Pro, AnalystSoft, Walnut, CA). The data distribution for continuous variables was determined to be not normally distributed using the Shapiro–Wilk test. These data were evaluated using Kruskal–Wallis analysis of variance and are presented as median [interquartile range (range)]. The null hypothesis was rejected when $p < 0.05$.

Results

A total of 2,797 members of the JCVA editorial board were positively identified (Table 1), consisting of 2,477 (88.6%) men and 310 (11.1%) women. The authors were unable to identify the gender of 10 (0.3%) general editors (3 from 1987-1995; 7 from 1996-2003). These individuals were excluded. A single male editor-in-chief has served in this capacity since the journal's inception. Four hundred and fourteen associate and section editors were recorded (men 360 [87.0%], women 54 [13.0%]). There were also 2,353 general editors, 2,087 (88.7%) of which were men and 256 (10.9%) were women. The total number of editorial board members progressively increased from 44 [42-65 (40-66)] in the 1987 to 1995 quartile to 138 [126-148 (115-163)] in 2012 to 2019 ($p < 0.0001$). Temporal increases in the number of associate and section editors (from 3 [3-11 (3-13)] to 18 [18-25 (16-27)]; $p = 0.0004$) and general editors (from 40 [38-52 (36-52)] to 117 [109-123 (96-135)]; $p = 0.0005$) were also observed (Table 1). The number of women serving on the editorial board increased (see Table 2 for statistics) from 9 (2.5%) in 1987 to 1995 to 174 (15.8%) in 2012 to 2019 (Table 1; Fig 1). Increases in the proportion of female general editors from 2.9% in 1987 to 1995 to 16.2% in 2012 to 2019 were responsible for this overall increase, as the gender distribution of associate and section editors did not change from 1996 to 2003 to 2012 to 2019 ($p > 0.05$ for each comparison; Table 2; Fig 1). A gender gap between the percentage of female first authors and editorial board members was observed in each

quartile (Table 3). Editorial board gender composition was different than last author distribution in 1987 to 1995 and 2012 to 2019, but was similar in the 1996 to 2004 and 2004 to 2011 quartiles. The gap between the proportion of female editorial board editors and corresponding authors was also similar in 2012 to 2019 compared with the 3 previous quartiles in which differences were observed.

Discussion

The current results indicate that the percentage of women serving on the JCVA editorial board has increased substantially during the journal's history, reaching a high of 15.8% in 2012 to 2019 (Fig 1). Increases in the proportion of female general editors is primarily responsible for this trend, as the percentage of women serving in this capacity has risen steadily from 2.9% during 1987 to 1995 to 16.2% during 2012 to 2019. In contrast, the proportion of women who served as associate or section editors has remained essentially constant since 1996 to 2003. Despite the significant gains, women continue to be underrepresented on the JCVA editorial board relative to the percentage of US female academic cardiothoracic anesthesiologists currently practicing in US academic departments (29.1%).⁷ The current findings extend those of previous studies demonstrating that women are consistently underrepresented on other anesthesiology journal editorial boards. Morton and Sonnad first showed that anesthesiology, among other specialties, had lower proportions of women serving on editorial boards compared with the percentage practicing the specialty.¹² Amrein et al. quantified the percentage of women serving on the top 5 impact factor journals in each of 12 specialties including anesthesiology in 2010 (total of 60 journals).¹⁹ The authors demonstrated that women were consistently underrepresented on the editorial boards of *Anesthesiology*, *Pain*, the *British Journal of Anaesthesia*, the *European Journal of Pain*, and *Anesthesia and Analgesia*, holding an aggregate total of only 17.5% of these positions.¹⁹ The editorial board compositions of these journals were similar to that observed here for JCVA in 2012 to 2019. Similar findings also were reported by Lorello et al. in a temporal survey of the *Canadian Journal of Anesthesia* editorial

Table 1
Summary of *Journal of Cardiothoracic and Vascular Anesthesia* Editorial Board Gender Composition

	1987-95	1996-2003	2004-11	2012-19	Total
All editorial board members	363	538	797	1,099	2,797
All editorial board members/year	44 [42-65 (40-66)]	76 [71-81 (68-91)]	98 [92-107 (89-114)]	138 [126-148 (115-163)]	92 [68-115 (40-163)]
Male	351	492	709	925	2,477
Female	9	39	88	174	310
Associate and section editors	47	80	123	164	414
Associate and section editors/year	3 [3-11 (3-13)]	11 [11-12 (11-12)]	16 [13-17 (13-18)]	18 [18-25 (16-27)]	13 [11-18 (3-27)]
Male	47	73	100	140	360
Female	0	7	23	24	54
General editors	309	451	666	927	2,353
Editors/year	40 [38-52 (36-52)]	64 [58-69 (55-78)]	81 [78-88 (75-97)]	117 [109-123 (96-135)]	78 [55-97 (36-135)]
Male	297	412	601	777	2,087
Female	9	32	65	150	256

Data are median [interquartile range (range)]

Table 2
p Values for Chi-Square or Fisher Exact Probability Test Comparisons

	1987-1995	1996-2003	2004-2011	2012-2019
All editorial board members	—	0.0028	<0.0001	<0.0001
	—	—	0.032	<0.0001
	—	—	—	0.0035
Associate and section editors	—	0.036	0.0033	0.012
	—	—	0.080	0.28
	—	—	—	0.45
General editors	—	0.018	0.00033	<0.0001
	—	—	0.17	<0.0001
	—	—	—	0.00029

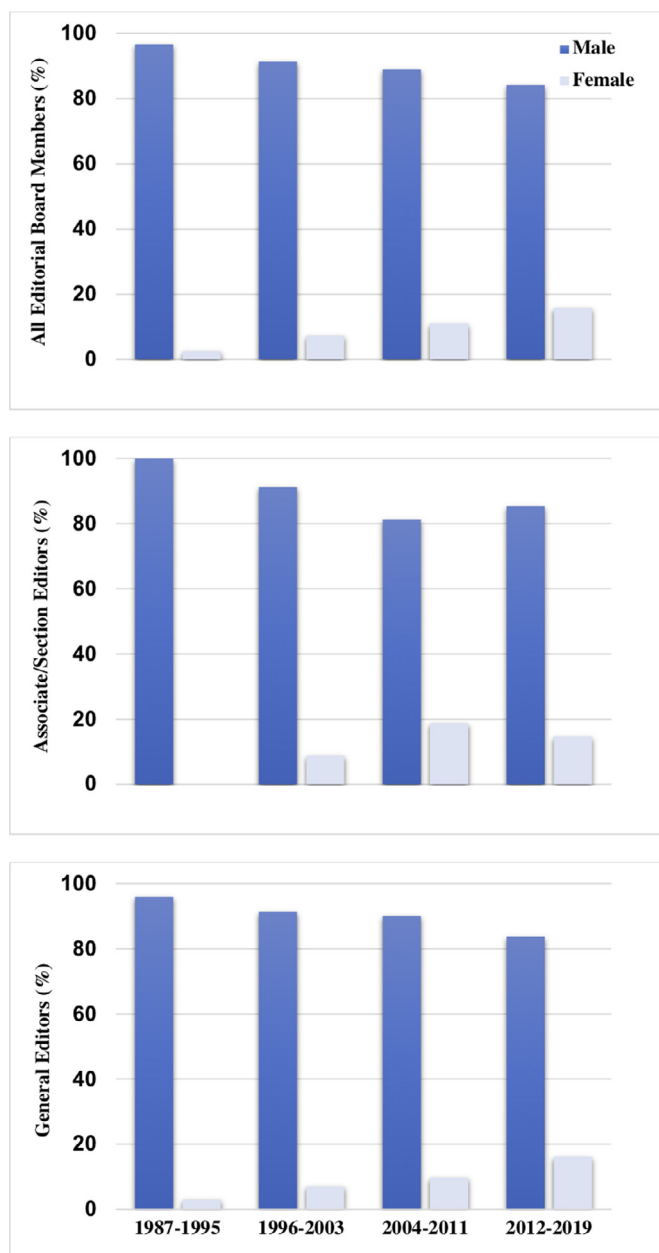


Fig 1. Histograms illustrating the gender composition of all editors (*top panel*), associate and section editors (*middle panel*), and general editors (*bottom panel*) serving on the *Journal of Cardiothoracic and Vascular Anesthesia* editorial board.

board.²⁰ The authors showed that the proportion of women on the editorial board increased during a 54-year span (1954-2018), but the board's composition did not temporally match the greater rise in female anesthesiologists practicing in Canada.²⁰ The current and previous results are consistent with observed gender disparities in editorial board composition that are almost ubiquitous across other specialties.^{11-13,19,21-30}

The results further indicate that the proportion of female JCVA editors is consistently lower than the percentage of women who are first authors of original research articles, case reports, review articles, and editorials in the journal (Table 3).⁷ In contrast, gender parity was present in editorial board composition compared with last author distribution in the 1996 to 2003 and 2004 to 2011 quartiles, although a difference that barely reached the threshold for rejection of the null hypothesis ($p = 0.049$) was observed in 2012 to 2019. A correlation between a lack of women on editorial boards and the relative underrepresentation of women as last authors was previously suggested.^{10,32} In general, the current data support this hypothesis, as both the percentage of female JCVA editorial board members and proportion of those who are last authors of articles published in journals increased over time but still remained substantially below the distribution of women who practice academic cardiothoracic anesthesia. Such gender differences also have been observed in other specialties. For example, Jalilianhasanpour et al. reported a consistent annual gap (ranging between 3% and 14.2%) in editorial board composition and female first and senior (last) authorship from 2002 to 2017 in 9 radiology journals.²⁸ Differences between these variables of similar magnitude were observed in the current study (Table 3). Nevertheless, it is important to note that the traditional distinction between first, last, and corresponding authorship may be less influential in the current era of "team science."^{33,34} Some medical school promotion and tenure committees have already adapted their procedures in response to this change in research strategy.^{35,36} A greater number of coauthors in such team-based anesthesiology research³⁷ also may be a factor that reduces the number of female last authors, thereby artificially widening the gap between editorial board composition and last authorship. This possibility must be considered when interpreting the previous^{12,19,20} and current results. The findings supporting the correlation between the

Table 3
Differences in Percentages of Female First, Last, and Corresponding Authors* Compared With Editorial Board Members

	1987-1995	1996-2003	2004-2011	2012-2019
Female first authors	9.6%	13.4%	17.9%	10.4%
Female last authors	4.5%	4.3%	1.8%	4.0%
Female corresponding authors	6.2%	7.0%	5.4%	0.8%
Chi-square statistics				
First authors versus editors	0.00035	<0.0001	<0.0001	<0.0001
Last authors versus editors	0.015	0.068	0.48	0.049
Corresponding authors versus editors	0.0013	0.0036	0.028	0.72

* Authorship data obtained from Pagel et al.⁷

lack of women on editorial boards and female last authorship^{10,32} should further be qualified because the authors did not record an entire set of all publications by women within each time interval examined here, instead relying on 3 years of data from each quartile to estimate women's scholarly output.

The current study was not designed to identify the possible causes for gender disparities on the JCVA editorial board, which are undoubtedly multifactorial in nature. Editorial board appointment is tied to academic achievements (eg, scholarship, extramural support, academic rank, reputation in the field), which, in turn, are closely related to research productivity.^{11,12} Female physician-scientists may be at a distinct disadvantage when meeting these criteria. Fewer women pursue this dual clinical-research career path than men,²⁷ and those who do often have difficulty finding suitable role models and mentors who are dedicated to advancing their careers.^{38–40} Female physician-scientists are less likely to receive adequate academic support, produce as many high-impact publications, earn independent federal grant funding, or win scholarly awards than men.^{39,41,42} Young women who are physician-researchers spend more hours per week on domestic duties including parenting and are more likely to be absent from work during disruptions of child care than men.⁴³ Female physician-scientists also suffer gender discrimination and sexual harassment more often than their male colleagues.^{44,45} Finally, the availability of clinician-educator or administrator pathways for promotion (in which scholarly activity plays a less important role) may be responsible partially for the relative lack of women who pursue careers with a research emphasis.^{46,47} It appears likely that many of these factors may contribute to the underrepresentation of women on anesthesiology editorial boards including JCVA.

The current results should be interpreted within the constraints of a number of other potential limitations. The authors were unable to establish gender for a small percentage (10; 0.3%) of editors, but it is unlikely that the overall results based on 2,797 editorial board members would be changed substantially by the exclusion of these 10 unidentified individuals. Gender was identified by inspection of first names with or without confirmation using internet resources. Thus, it is certainly possible that a few errors in gender assignment could have inadvertently occurred. However, it is unlikely that incorrect assignment of gender for a few authors would affect these results. The authors also cannot account for binary or alternative gender using the methods described here. The findings are based on the entire history of JCVA since the journal was first published. Nevertheless, there was missing or incomplete editorial board information in 3 of 33 years, and these missing data may have influenced the results. A few members of the JCVA editorial board are cardiothoracic surgeons or perfusionists. The authors did not distinguish between specialties when conducting their analysis of gender composition. A number of editorial board members originate from outside the US, particularly after the journal became affiliated with the Chinese Society of Cardiothoracic and Vascular Anesthesiology⁴⁸ and the European Association of Cardiothoracic Anaesthesiologists.⁴⁹ The authors did not discriminate between US and international members of the JCVA editorial board. Other anesthesiology journals (eg,

Anesthesiology, *Anesthesia and Analgesia*, *British Journal of Anaesthesia*) also have cardiothoracic anesthesiologists on their editorial boards; these individuals were not considered here. In addition, the authors did not examine major general medical journals that occasionally have editorial board members who are cardiothoracic anesthesiologists. As a result, the findings may not reflect the precise number of cardiothoracic anesthesiology editorial board members in the complete peer-reviewed literature. The authors also did not tabulate the number of unique editors for the duration of the journal's existence independent of the duration each editor served on the board. The authors felt that the method used in the current work (which has been applied in many previous studies of editorial board composition) provides a more representative way to evaluate trends in editorial board composition over time than a simple identification of unique editors from 1987 to 2019.

In summary, the results demonstrate that the proportion of women serving on the JCVA editorial board has steadily increased over the journal's history. Nevertheless, women continue to be underrepresented on the JCVA board compared with the percentage of US female academic cardiothoracic anesthesiologists, and gender gaps between first and last authorship and board composition also persist.

Declaration of competing interest

The authors have no conflicts pursuant to the current research.

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