Journal of Cardiothoracic and Vascular Anesthesia 33 (2019) 1811–1818

Contents lists available at ScienceDirect

Journal of Cardiothoracic and Vascular Anesthesia

journal homepage: www.jcvaonline.com

Special Article

Barriers to Achieving Gender Equity

Sasha K. Shillcutt, MD, MS, FASE[*,1], Julie K. Silver, MD[†]

[*]*University of Nebraska Medical Center, Department of Anesthesiology, Omaha, NE*
[†]*Harvard Medical School, Department of Physical Medicine and Rehabilitation, Boston, MA*

Key Words: women in medicine; gender equity; women in Cardiothoracic anesthesiology; gender bias

IN 1849, Elizabeth Blackwell became the first woman to graduate from medical school in the United States; however, leaders at her alma mater declared this experiment in educating a woman physician a "failure" and subsequently instituted a policy excluding women from further admittance.[1] Other institutions followed suit and toward the end of the 19th century there were fewer than 140 women enrolled in medical schools; most were in separate women's colleges.[1] Because it would take nearly a century for many medical schools to lift the ban, the proportion of women among physicians remained quite low well into the 20th century.

After more than a century of explicit (conscious) bias, a marked acceleration in the rate of women entering medical schools occurred in the 1960s in tandem with the women's rights movement and equal rights amendment. Over the course of less than 50 years, the proportion of women graduating from US medical schools ballooned from 6.9% in 1966 to 47.6% in 2012.[2] According to data from the Association of American Medical Colleges (AAMC), in 2015 approximately 33% of active physicians in the United States[3] and 39% of full-time faculty in academic medical centers were women.[4] In the United States, women make up 24.9% of the total workforce in anesthesiology, according to the AAMC Workforce Data Reports in 2015.[5] In the 2012 AAMC report, women represented 34% of academic anesthesiology faculty and only 11% of academic anesthesiology chairs.[6] Today, although most physicians actively renounce explicit bias against women, implicit (unconscious) bias is believed to be pervasive and problematic.[7,8]

In this review, the authors focus on current problems more so than the progress for women in medicine. Why? Because there is an urgent need to address disparities that are affecting a workforce struggling to succeed in a system in which gender was identified in a multivariate analysis to be a predictor of burnout.[9] The authors believe this is important because the medical field currently is in a state in which physicians are needed to meet ongoing healthcare demands and cardiac fields report fewer women physicians than other specialties.[6,10-15]

In a recent study by Adesoye et al. that surveyed more than 6,000 women physician mothers, 180 women anesthesiologists responded. Forty-seven percent of women anesthesiologists reported gender-based workplace discrimination, which was the highest reported discrimination in all specialties surveyed.[16]

There have been recent reports in the literature with regard to work culture in anesthesiology as it pertains to women physicians, subconscious bias, and gender discrimination.[17-19] A recent study by Pearson et al. reported that 94.9% of female anesthesiologists surveyed favored an official statement from specialty leaders supporting parental leave, probing a call to action.[17] Similar reports of grass-roots efforts such as the addition of an ad-hoc Women in Anesthesia committee through the American Society of Anesthesiologists show that women physicians in anesthesiology are organizing efforts to promote gender equity.[18-20]

We determined a report of the status of women physicians was needed because there are little data on the current status of women in cardiac anesthesiology. The Society of Cardiovascular Anesthesiology recently supported the formation of a specialty group, Women in Cardiothoracic Anesthesiology. This

S.K. Shillcutt is the owner of Brave Enough LLC.

[1]*Address reprint requests to* Sasha K. Shillcutt, MD, FASE, Department of Anesthesiology, University of Nebraska Medical Center, 984455 Nebraska Medical Center, Omaha, NE 68198-4455.

E-mail address: sshillcu@unmc.edu (S.K. Shillcutt).

https://doi.org/10.1053/j.jvca.2019.02.007
1053-0770/Published by Elsevier Inc.

primary request was to obtain gender information of society members in order to collect the percentage of women cardiothoracic anesthesiologists in practice, a metric currently unknown. Of note, in this report the authors focused solely on gender-related issues and did not attempt to address problems affecting women with intersectionality, such as those who are underrepresented minorities; are lesbian, gay, bisexual, transgender, or queer; or have disabilities. Notably, in studies in which comparisons are available (most commonly for underrepresented minorities), the data typically demonstrate that disparities are more profound for women with intersectionality.

Gender Equity in Medicine: Room to Improve

There is a tendency to compare the progress of women in medicine with that of women in other fields, particularly those involving science, technology, engineering, and mathematics. However, these comparisons may give a false sense of comfort regarding the advancement of women in medicine, especially when the gains have been modest at best. Most science, technology, engineering, and mathematics fields continue to have smaller proportions of women compared with men than those found in medicine. Moreover, medicine is relatively unique in that a large proportion of women have now been part of the physician workforce for decades. Therefore, and perhaps counterintuitively, one might conclude that medicine is leading the way in gender equity. However, this conclusion must be approached with caution because recent reports have highlighted that despite paradoxically large proportions of women physicians, medicine has made relatively slow progress in achieving gender equity, particularly at the highest levels of executive leadership, academic promotion, and compensation.[2,21-26]

Academic medicine has borne the most scrutiny, and slow or lack of progress has been widely documented in medical journals. Carr et al. followed 1,273 faculty at 24 medical schools in the United States for 17 years to identify predictors of advancement, retention, and leadership for women.[26] They found that gender disparities in rank, retention, and leadership remain across the career trajectories of the faculty cohort. The authors concluded, "Women were less likely to attain senior-level positions than men, even after adjusting for publication-related productivity. Institutions must examine the climate for women to ensure their academic capital is fully utilized and equal opportunity exists for leadership." Moreover, a previous report by Carr et al. found that many US medical schools have no formal programming to address workforce gender disparities.[26] In this report they found that "participants from nearly 40% of the institutions reported no special programs for recruiting, promoting, or retaining women, largely describing such programming as unnecessary." Helitzer et al. highlighted that the "academic structure and culture in particular have proven exceptionally resistant to change with its deeply entrenched faculty values system and ingrained sociocultural norms that impede organizational innovations and leadership diversity."[27] A letter to the editor in *Academic Medicine* by Janet Bickel noted that there is "evidence that more evidence is insufficient in effecting improvements" for women in medicine.[28]

Table 1
Common Disparities Faced by Women in Anesthesiology Compared With Percentage of Women in Medicine[18]

Lower percentage of leadership positions in medical specialty organizations
Lower academic rank (associate professor, full professor, assistant deans, associate deans, deans)
Lower pay (average pay gap between male and female anesthesiologists: $33,000)
Low percentage of department chairs
Low percentage of editorial boards
Lower mentorship
Lower sponsorship
Fewer distinguished award winners
Lower percentage of grants awarded

Common Disparities for Women in Anesthesiology

Disparities also exist in grand rounds, professional society speakers, recognition award lectureships, perspective columns in medical journals, and newsletter inclusion,[29-34] and there is evidence of muting the voices of women physicians.[35] A recent report by Chandrabose and Pearson titled "Organizing Women in Anesthesiology" found that several disparities exist for women in anesthesia (Table 1).[18] Another report by Capdeville et al. describes similar findings of gender disparities for cardiovascular fellowship trainees.[14]

Social Media Communities and Women in Medicine

Social media is becoming a game changer, providing an inclusive environment with a megaphone that simultaneously documents disparities in the medical workforce and disseminates research and advocacy messages that support gender equity, as reported in a recent article in the *New England Journal of Medicine*.[18,36] Doctors gather in virtual communities such as the Facebook page for the Physician Moms Group (approximately 72,000 members) and Twitter's #IlookLikeA-Surgeon (more than 1 billion impressions) to report anecdotal and systemic discrimination. Researchers share gender workforce data and publications, and alternative metric scores have made it easy to see the distribution of each report.[37,38]

Social media also has provided a venue to continuously and effectively document men only panels ("manels") and the exclusion or near exclusion (tokenism) of women physicians as plenary speakers at medical conferences, as journal editors, as award winners, and more. Disparities like these can be captured easily with the click of a cell phone camera and instantaneously shared throughout the world, often creating a loud roar of injustice from doctors of all genders and others who publicly admonish the status quo—including men who use #HeForShe created by United Nations Women, an organization dedicated to accelerating gender equality worldwide.[39] One article published in *The Atlantic*[40] also was widely shared on social media and focused on a mathematician's analysis demonstrating that the odds of an all-male panel being random were astronomically low (<5%) and the underrepresentation of women as conference speakers could not be justified based

on chance alone, even in "the discipline of mathematics [which] still counts a disproportionately small number of women among its practitioners."[41] Social media is being used to clearly document the existence of a kyriarchy (social system built around patriarchal domination) in the midst of an intense struggle for gender equity that is reminiscent of bygone days.

The Workforce Inequity Spectrum in Medicine

Although definitions vary, in the present report the term macroinequities refers to variables in an analysis that document gender inequities that are large or obvious and generally far-reaching, affecting many women.[42] These obvious inequities are the ones that most people agree are important, and controversy around them generally does not center on whether the variable matters but rather on how an analysis was performed or the causality of the results. For example, most physicians would agree that compensation and promotion should be based on performance and eliminating disparities related to gender bias is important, but reasonable people might disagree about how a study was conducted or the causality behind the findings, especially if not specifically addressed.

Definitions in Gender Discrimination

To describe more subtle variables and problems, the term microinequities rather than microaggressions is used. Microaggressions typically are defined as snubs, slights, or insults that devalue people and reinforce stereotypes. However, the current literature on subtle implicit bias may be more accurately reflected by the term microinequities, which include instances of being on the wrong side of favoritism or fairness. Although the existence and consequences of microaggressions should not be ignored, the authors believe that use of a more neutral term (inequity *v* aggression) might help prevent defensive reactions that can be a barrier to gender equity progress.

Using these definitions, the authors developed the "workforce inequity spectrum in medicine" as a model to help explain the range of gender equity information reported—from anecdotal evidence provided by one woman to published studies in peer-reviewed medical journals. The spectrum includes the following 3 distinct categories of information: (1) an anecdotal experience of a microinequity or macroinequity involving 1 woman, (2) an observable pattern of microinequities and/or macroinequities that involves more than 1 woman, (3) documented microinequities published in peer-reviewed journals, and (4) documented macroinequities published in peer-reviewed journals. The focus of the present report is on the latter 2 categories—the evidence-based literature that includes macroinequities in categories such as compensation and promotions and a small but evolving body of literature on gender workforce microinequities such as the representation and verbal introductions of women physicians among speakers at medical conferences or grand rounds.

Although the authors focused on the evidence-based literature to document the problems currently faced by women physicians, readers are encouraged to consider how an anecdote or pattern of reports may provide leaders with keen insights that can be used to solve problems at an early stage that may require less time and fewer resources than later. A proactive approach is similar to clinical medicine. For example, when a patient has one measured episode of high blood pressure, the next step is to look for a pattern of hypertension; if one exists, the patient is treated with the intent to avoid more serious sequelae in the future.

Macroinequities

Macroinequities in various career metrics, such as rank, compensation, academic productivity, recognition awards, and speakerships, are well-documented in the literature.[3,4,24,31,34,43-45] Although most studies have focused on academic medicine, the present report includes literature from the private sector where available. Causality often is not studied and many reports contain only theories, some of which may be true and others that likely are not and may feed gender stereotypes.

Carnes et al. explained that the traditional justification for the absence of women physicians in academic leadership rests on the following 3 main premises: (1) women have not been in the field long enough (pipeline argument), (2) women do not compete for leadership positions owing to family reasons, and (3) women lack leadership skills. The authors provided evidence-based counterarguments, stating that "[C]onsiderable evidence suggests that the failure of academic medical centers to advance women is in large measure owing to the systematic disadvantage women experience daily and at each evaluation point in an academic career."[8] Although this report was published nearly a decade ago and despite a body of evidence that has continued to demonstrate that these traditional justifications usually are myths, critical thinking errors are common and tackling them will require considerable education (Table 2). For example, a commonly suggested solution for almost any gender disparity problem is "women need more mentoring." Mentoring is important, but it is not always the right approach to advancing careers because it can be time-consuming and not as effective as sponsorship, especially for mid- or late-career women who already are highly qualified.[30] Moreover, regardless of the career stage, mentoring women against a closed gate to advancement is discouraging and perhaps even unethical[46] because an individual woman may erroneously believe that she is not good enough even when the data actually demonstrate evidence of an "inexorable zero"—no women or very low numbers of women have received a particular award, grant, promotion, or other career accomplishment. Notably, US courts have used the inexorable zero as a prima facie (on its face) inference of discrimination.[31]

Therefore, caution is warranted when advocating for gender equity solutions that involve more time and effort on the part of women physicians (solutions focused on "fixing the women"). A more sophisticated strategy involves understanding and acknowledging the differences between approaches aimed at individuals and those aimed at processes or organizations ("fixing the organization") and implementing them

Table 2
Critical Thinking Errors That May Support Gender Inequities

Critical Thinking Error	Examples	Why This Is a Problem	A Path Forward
Promoting myths	"There are not enough qualified women physicians to _____."	Even though pipeline is a historically accurate concern, in many cases it still is assumed to be true despite being inconsistent with objective data.	Check the data and ensure that conclusions about the pipeline are supported. If not supported by the data, consider reasons other than "there are not enough women physicians."
	"Women are not as _____ as men."	There are so many women physicians in medicine that nearly any statement like this simply promotes a stereotype that women physicians are not as ambitious or that they lack training, skills, and desire to succeed at the highest levels.	Stereotypes are learned attitudes, and it is believed that they can be unlearned through specific educational initiatives. Medical schools and healthcare institutions should focus on (1) reducing the microinequity environment that promotes stereotypes and (2) actively educate medical students and physicians about how stereotypes may influence their decision making.
Blaming the group that is discriminated against	"Women need more _____."	Comments such as women need more mentoring tend to lay blame on the group that is discriminated against rather than recognizing that there are plenty of qualified women who would benefit more from equitable opportunities than further mentoring.	Mentoring all physicians is essential, but an emphasis should be placed on sponsorship (a related but more actionable concept) for women physicians if there are inequities. Moreover, there should be equal attention paid to educating current and future leaders about how the "in group" (leaders regardless of gender) has the most power to drive meaningful change and avoid implying that the "out group" is to blame for slow or nonexistent progress.
	"Women should address this by_____."	This comment reflects an inaccurate description of how physicians are nominated for awards, sponsored for grants, and/or promoted in their institutions. Typically, leaders such as chairs and program directors are charged with supporting the careers of individuals beneath them on the "org chart." Therefore, it is likely that deserving women are being overlooked for promotion, awards, and other career advancement opportunities.	Change this statement to, "Leaders (ie, the in group) should address this by_____."
Being blind to bias	"I can't believe she's complaining about_____."	Microinequities often fall into the category of unconscious (implicit) bias and may be dismissed as misunderstandings or being "overly sensitive." This may be because they are presented as single anecdotes rather than documented patterns. For example, a medical society selecting all male plenary speakers may be easily dismissed, but a pattern over the years of choosing more men as plenary speakers than women combined with underrecognizing women for awards and featuring mostly men in newsletters more clearly show a pattern of bias.	Educate all physicians, especially leaders, to avoid dismissing anecdotes and instead use them to help inform the process of looking for documentable patterns.
	"I don't believe the results, because gender research is biased."	This type of statement—dismissing all investigations and/or results of such investigations—is akin to being "willfully blind" and is a form of conscious (explicit) bias against women physicians.	Recognize that there are leaders in medicine who are consciously biased against women (and other groups of people as well). Explicit bias has no place in medicine and should not be tolerated in any form.

NOTE. The following 3 categories of critical thinking errors may help to perpetuate gender stereotypes and inequities: (1) promoting "myths" that are inconsistent with data and evidence-based medicine; (2) "blaming" women physicians for a lack of talent, skills, dedication, or effort; and (3) being genuinely or willfully "blind" to the problem(s).

appropriately in an evidence-based manner. Even though both are important, the latter may be the more critical factor in accelerating gender equity progress. For instance, Lillemoe noted in his presidential address to the American Surgical Association that only one woman physician had been the president of the organization in its 137-year history and said, "The number of outstanding, qualified female candidates is more than adequate to fill every open surgical leadership position in America today. The problem is not the pipeline—it is the process."[7]

Compensation

Women physicians in both academic medicine and community practices earn less than their male counterparts even after adjusting for covariates such as specialty, academic rank, clinical and research productivity, age, experience, part-time status, or leave taken.[24,43,44] Gaps in salary between physician men and women that could not be accounted for after adjusting for the previously mentioned variables ranged from $16,982[24] to $19,878 annually.[43] Gaps in salary were present in both early career (hiring salaries) and senior positions. In a study by Jena et al. of 10,241 physicians, surgeons practicing subspecialties were found to have the largest adjusted gaps in salary between men and women—$43,728 annually and ranging from $22,272 to $65,184.[43] Assuming a 35-year career, this amounts to a $1.2 million to $1.5 million deficit for women even after accounting for leave and part-time status. Recent studies demonstrating superior clinical outcomes for women physicians[47,48] have led to the publishing of articles with the theme of "less pay for better work" by many news outlets. In response to long-standing and ongoing gender compensation inequities, organizations such as the Association of Women Surgeons have published statements both supporting and proposing means by which to achieve gender equity in compensation.[49]

Promotion and Leadership

Macroinequities in academic promotion and hospital leadership increase as women physicians ascend the ladder. From faculty rank to positions in the executive suite, the number of women who advance to the top has remained proportionately low for more than 4 decades.[21,23,50] Even though the proportion of women among all faculty at the rank of full-time full professor in US medical schools increased from 14% to 21% from 2003 to 2013,[21] the proportion of women who hold positions as full professors compared with other faculty positions has not increased since 1980.[21,51,52] Women make up only 15% of decanal positions in the United States and occupy more lower-ranked positions such as public image–focused deans and educational roles compared with men.[22] Decanal positions of finance, strategy, research, and clinical services are more often held by men.[22] Both among leaders at National Cancer Institute-designated cancer centers and at the highest level executive positions in academic medicine, the proportion of women has remained "shockingly low at 12%."[50]

Grants

Studies of grant funding through the National Institutes of Health (NIH) have demonstrated some gender-related differences in application and funding rates.[53,54] After accounting for variables such as age, experience, and type of research (human *v* non-human), there were no gender-related differences in first-time RO1 (grant submission) submission funding rates; however, men were more likely to apply for and be awarded renewal funding than women once they became experienced NIH investigators.[53] Moreover, in cases of multiple concurrent RO1 awards, investigators were more often men.[53] These trends have continued for more than 15 years despite formation of the NIH Office of Research on Women's Health in 1990—the purpose of which was to support women's careers, understand the role of disparities in funding, and improve women's health initiatives[55]—and a change in the NIH review process in 2009 that increased the scoring scale from 5 to 9 points and introduced separate criterion scores.[54] Indeed, recent research also found that "Reviewers assigned significantly worse priority, approach, and significance scores to female than male [principal investigator's] PIs' Type 2 applications, despite using standout adjectives (eg, 'outstanding,' 'excellent') and making references to ability in more critiques ($p < 0.05$ for all comparisons)."[54]

Academic Work and Recognition Awards

The National Faculty Survey, which measured gender differences in a cohort of 1,244 medical school faculties in both number of publications and citation impact (*h*-index), demonstrated that women have a statistically significant lower rate of publication and h-index compared with men after adjusting for factors such as race, specialty, years of practice, and rank.[45] In a review of more than 35 years of academic literature, Jagsi et al. demonstrated that in 2004, only 11.4% of authors of guest editorials in the *New England Journal of Medicine* and 18.8% of those in the *Journal of the American Medical Association* were written by women, meaning that less than 20% of the expert perspectives published in the leading medical journals were written by women.[56] Even in pediatrics, where more than half of the physicians in the specialty are women, the percentage of women as first authors has not reached equitable levels,[57] and junior women also were found to be less likely to publish with senior men, suggesting future consequences in academic advancement.[57] Moreover, Amrein et al. found that 18% of the members of the top-ranked medical journal editorial boards were women; 16% of the positions as editors-in-chief were held by women; and "in 5 of the 12 studied categories (critical care, anesthesiology, orthopedics, ophthalmology and radiology, nuclear medicine and medical imaging)," no woman held the position of editor-in-chief.[58]

Silver et al. also found macroinequities in the representation of women among recipients of physician recognition awards [29-32] and zero or near-zero levels of representation of women among physician recognition award recipients from 11 medical specialty societies representing 7 different surgical and

nonsurgical medical specialties.[30] As a result, the authors described a 6-step strategy for societies to identify and improve disparities.[30]

Microinequities

A thriving microinequity culture likely contributes to macroinequities. There is a substantial body of literature from a variety of fields that has focused on what often is called "subtle sexism." Many of these studies fall into the categories of microinequities or microaggressions; however, aside from the psychology literature, examples in medicine have been sparse. Interestingly, although the authors of the present report have not conducted a formal analysis, they found through their review of the literature that there appears to be a recent increase in the number of published reports.

Language and Speech Examples

The following are examples and are not intended to be an exhaustive list. Letters of recommendation are needed throughout one's training and career and have been documented to put women at a disadvantage with regard to length and content.[59] Language used in medical student[60] and resident evaluations[61] also may demonstrate gender bias. Autonomy in the operating room for surgical residents may be subject to gender bias.[62] Women may be underrepresented as speakers at grand rounds[34] and professional society conferences.[63] Moreover, Files et al. found gender bias in how grand rounds speakers were introduced by analyzing recordings[64] and then described how challenging it was to get their research published.[64] King et al. discovered that men are more likely to self-cite their research.[65]

The Path to Gender Equity in the Medical Workforce

There is an urgent need to build and support the strongest possible physician workforce capable of providing the best care to the growing patient population. Improving gender equity could have a far-reaching effect on healthcare issues such as physician burnout and attrition, ability to achieve advances in research, and the delivery of high-quality patient care. Moreover, as the Be Ethical Campaign describes, discrimination is antithetical to professionalism, and the equitable treatment of women in medicine is an ethical imperative.[33]

With its large proportion of highly educated and qualified women physicians, medicine should be leading the way in gender workforce equity. However, there is evidence to suggest that this is likely not the case. In recognizing that gender myths and stereotypes are pervasive, leaders must develop their own core competency in evidence-based and best practices equity, diversity, and inclusion. They must actively work to develop a genuinely inclusive environment at every level and ensure that gender equity is ranked as a top priority in strategic planning, committing the necessary resources to identify and address problems.

Effective Strategies Moving Forward

The most effective strategies likely will be a combination of addressing organizational issues and actively supporting women physicians by sponsoring and promoting them to the highest levels, providing many more opportunities for them to share their knowledge and viewpoints at every level, and compensating them fairly. As leaders, an intense effort should be placed on identifying and documenting process- or institutional-based issues that are supporting inequities, often through implicit bias. The authors suggest a recent white paper by Silver as a guide for leaders to begin to evaluate bias within their own divisions.[33]

Once barriers to gender equity are identified, a call to action to direct resources is encouraged and should focus on metrics-driven solutions using a complete dataset and longitudinal analysis. Specifically, research efforts should emphasize both microinequities and macroinequities and funding agencies should support studies that focus on solutions to accelerate gender equity. At the local level, department leaders should evaluate and focus on the metrics in Table 2 as a start to move the needle toward eliminating bias and ensuring a focus on gender parity.

Women physicians are becoming more organized and strategic in their efforts to achieve a level playing field by leveraging the following 3 important tools: reports in medical journals, conventional media, and social media. Decision-makers, regardless of gender, have a unique opportunity to act now and ensure that medicine takes its rightful place as a leader in workforce gender equity. Being on the right side of history, by supporting women physicians and their allies, makes sense not only for doctors but for our patients.

Conflict of interest: COI: Dr Shillcutt owns Brave Enough LLC, a personal blog and resource site for women.

References

1 Fee E, Brown TM, Lazarus J, et al. Medical education for women, 1870. Am J Public Health 2002;92:363.
2 Jolliff L, Leadley J, Elizabeth Coakley E, et al. Women in U.S. academic medicine and science: Statistics and benchmarking report 2011–2012. Washington, DC: Association of American Medical Colleges; 2012.
3 Center for Workforce Studies. 2015 state physician workforce data book. Washington, DC: Association of American Medical Colleges; 2015.
4 American Association of Medical Colleges. Table 3: Distribution of full-time faculty by department, rank, and gender, 2015. Available at: https://www.aamc.org/download/481182/data/2015table3.pdf. Accessed February 18, 2019.
5 Association of American Medical Colleges. Active physicians by sex and specialty, 2017. Available at: https://www.aamc.org/data/workforce/reports/492560/1-3-chart.html. Accessed February 18, 2019.
6 Jolliff L, Leadley J, Coakley E, et al. Women in U.S. academic medicine and science: Statistics and benchmarking report 2011-2012. Available at: https://www.aamc.org/download/415556/data/2011-2012wimsstatsreport.pdf. Accessed February 18, 2019.
7 Lillemoe KD. Surgical mentorship: A great tradition, but can we do better for the next generation? Ann Surg 2017;266:401–10.

8 Carnes M, Morrissey C, Geller SE. Women's health and women's leadership in academic medicine: Hitting the same glass ceiling? J Womens Health (Larchmt) 2008;17:1453–62.
9 Shanafelt TD, Hasan O, Dyrbye LN, et al. Changes in burnout and satisfaction with work-life balance in physicians and the general US working population between 2011 and 2014, supplemental Table 2. Mayo Clin Proc 2015;90:1600–13.
10 Prasad M. Gender in cardiology: Work yet to be done. J Am Coll Cardiol 2016;67:3016–9.
11 Hlatky MA, Shaw LJ. Women in cardiology: Very few, different work, different pay. J Am Coll Cardiol 2016;67:542–4.
12 Vautrin E, Marliere S, Bellemain-Appaix A, et al. Women in interventional cardiology: The French experience. Ann Cardiol Angeiol (Paris) 2016;65:468–71.
13 Burgess S, Shaw E, Ellenberger K, et al. Women in medicine: Addressing the gender gap in interventional cardiology. J Am Coll Cardiol 2018;72:2663–7.
14 Capdeville M. Gender disparities in cardiovascular fellowship training among 3 specialties from 2007 to 2017. J Cardiothorac Vasc Anesth 2018;33:604–20.
15 Capdeville M, Hargrave J, Foshee C, et al. Mentoring aspiring program directors in adult cardiothoracic anesthesiology-perspectives from program directors around the United States. J Cardiothorac Vasc Anesth 2018;32:2381–94.
16 Adesoye T, Mangurian C, Choo EK, et al. Perceived discrimination experienced by physician mothers and desired workplace changes: A cross-sectional survey. JAMA Intern Med 2017;177:1033–6.
17 Pearson ACS, Dodd SE, Kraus MB, et al. Pilot survey of female anesthesiologists' childbearing and parental leave experiences. Anesth Analg 2018 Sept 27;[E-pub ahead of print].
18 Chandrabose RK, Pearson ACS. Organizing women in anesthesiology. Int Anesthesiol Clin 2018;56:21–43.
19 Wong CA, Stock MC. The status of women in academic anesthesiology: A progress report. Anesth Analg 2008;107:178–84.
20 Shillcutt S, Peterson-Layne C. More than the money: Work culture challenges for women anesthesiologists. Int Anesthesiol Clin 2018;56:44–58.
21 Lautenberger DM, Dandar VM, Raezer CL, et al. The state of women in academic medicine: The pipeline and pathways to leadership. Washington, DC: Association of American Medical Colleges; 2014.
22 Schor NF. The decanal divide: Women in decanal roles at U.S. medical schools. Acad Med 2017;93:237–40.
23 Helitzer DL, Newbill SL, Cardinali G, et al. Changing the culture of academic medicine: Critical mass or critical actors? J Womens Health (Larchmt) 2017;26:540–8.
24 Freund KM, Raj A, Kaplan SE, et al. Inequities in academic compensation by gender: A follow-up to the National Faculty Survey cohort study. Acad Med 2016;91:1068–73.
25 Grisham S. Medscape physician compensation report 2017. Available at: https://www.medscape.com/slideshow/compensation-2017-overview-6008547. Accessed February 18, 2019.
26 Carr PL, Raj A, Kaplan SE, et al. Gender differences in academic medicine: Retention, rank, and leadership comparisons from the National Faculty Survey. Acad Med 2018;93:1694–9.
27 Helitzer DL, Newbill SL, Cardinali G, et al. Narratives of participants in national career development programs for women in academic medicine: Identifying the opportunities for strategic investment. J Womens Health (Larchmt) 2016;25:360–70.
28 Bickel J. Women in medicine: Evidence that more evidence is insufficient in effecting improvements. Acad Med 2017;92:274.
29 Silver JK, Cuccurullo SJ, Ambrose AF, et al. Association of Academic Physiatrists Women's Task Force report. Am J Phys Med Rehabil 2018;97:680–90.
30 Silver JK. Diversity and inclusion are core leadership competencies: A primer for busy leaders. Available at: https://www.beckershospitalreview.com/hospital-management-administration/diversity-and-inclusion-are-core-leadership-competencies-a-primer-for-busy-leaders.html. Accessed Febuary 18, 2019.
31 Silver JK, Bhatnagar S, Blauwet CA, et al. Female physicians are underrepresented in recognition awards from the American Academy of Physical Medicine and Rehabilitation. PM R 2017;9:976–84.
32 Silver JK, Poorman JA, Reilly JM, et al. Assessment of women physicians among authors of perspective-type articles in high-impact pediatric journals. JAMA Netw Open 2018;1:e180802.
33 Silver JK. Be ethical: A call to healthcare leaders ending gender workforce disparities is an ethical imperative. Available at: http://sheleadshealthcare.com/wp-content/uploads/2018/09/Be-Ethical-Campaign.pdf. Accessed March 19, 2019.
34 Boiko JR, Anderson AJM, Gordon RA. Representation of women among academic grand rounds speakers. JAMA Intern Med 2017;177:722–4.
35 Silver JK. Invisible women: Female doctors and health care leaders are being hidden in plain sight. Available at: https://www.statnews.com/2016/10/24/female-doctors-invisible-women. Accessed February 18, 2019.
36 Shillcutt SK, Silver JK. Social media and advancement of women physicians. N Engl J Med 2018;378:2342–5.
37 Knowlton SE, Paganoni S, Niehaus W, et al. Measuring the impact of research using conventional and alternative metrics. Am J Phys Med Rehabil 2018 Oct 8;[E-pub ahead of print].
38 Niehaus WN, Silver JK, Katz MS. The PM&R Journal implements a social media strategy to disseminate research and track alternative metrics in physical medicine and rehabilitation. PM R 2018;10:538–43.
39 United Nations. HeForShe. Available at: https://www.heforshe.org/en. Accessed February 18, 2019.
40 Bacon L. The odds that a panel would 'randomly' be all men are astronomical. Washington, DC: The Atlantic Monthly Group; 2015.
41 Martin G. Addressing the underrepresentation of women in mathematics conferences: arXiv.org. Ithaca, NY: Cornell University Library; 2015.
42 Silver JK, Rowe M, Sinha MS, et al. Micro-inequities in medicine. PM R 2018;10:1106–14.
43 Jena AB, Olenski AR, Blumenthal DM. Sex differences in physician salary in US public medical schools. JAMA Intern Med 2016;176:1294–304.
44 Ly DP, Seabury SA, Jena AB. Differences in incomes of physicians in the United States by race and sex: Observational study. BMJ 2016;353:i2923.
45 Raj A, Carr PL, Kaplan SE, et al. Longitudinal analysis of gender differences in academic productivity among medical faculty across 24 medical schools in the United States. Acad Med 2016;91:1074–9.
46 Silver JK, Blauwet CA, Bhatnagar S, et al. Women physicians are underrepresented in recognition awards from the Association of Academic Physiatrists. Am J Phys Med Rehabil 2018;97:34–40.
47 Tsugawa Y, Jena AB, Figueroa JF, et al. Comparison of hospital mortality and readmission rates for Medicare patients treated by male vs female physicians. JAMA Intern Med 2017;177:206–13.
48 Wallis CJ, Ravi B, Coburn N, et al. Comparison of postoperative outcomes among patients treated by male and female surgeons: A population based matched cohort study. BMJ 2017;359:j4366.
49 Sanfey H, Crandall M, Shaughnessy E, et al. Strategies for identifying and closing the gender salary gap in surgery. J Am Coll Surg 2017;225:333–8.
50 Travis EL, Doty L, Helitzer DL. Sponsorship: A path to the academic medicine C-suite for women faculty? Acad Med 2013;88:1414–7.
51 Jena AB, Khullar D, Ho O, et al. Sex differences in academic rank in US medical schools in 2014. JAMA 2015;314:114958.
52 Nonnemaker L. Women physicians in academic medicine: New insights from cohort studies. N Engl J Med 2000;342:399–405.
53 Pohlhaus JR, Jiang H, Wagner RM, et al. Sex differences in application, success, and funding rates for NIH extramural programs. Acad Med 2011;86:759–67.
54 Kaatz A, Lee YG, Potvien A, et al. Analysis of National Institutes of Health R01 application critiques, impact, and criteria scores: Does the sex of the principal investigator make a difference? Acad Med 2016;91:1080–8.
55 Plank-Bazinet JL, Bunker Whittington K, Cassidy SK, et al. Programmatic efforts at the National Institutes of Health to promote and support the careers of women in biomedical science. Acad Med 2016;91:1057–64.
56 Jagsi R, Guancial EA, Worobey CC, et al. The "gender gap" in authorship of academic medical literature—a 35-year perspective. N Engl J Med 2006;355:281–7.

57 Fishman M, Williams WA 2nd, Goodman DM, et al. Gender differences in the authorship of original research in pediatric journals, 2001-2016. J Pediatr 2017;191:244–9;e1.
58 Amrein K, Langmann A, Fahrleitner-Pammer A, et al. Women underrepresented on editorial boards of 60 major medical journals. Gend Med 2011;8:378–87.
59 Trix F, Psenka C. Exploring the color of glass: Letters of recommendation for female and male medical faculty. Discourse Soc 2003;14:191–220.
60 Ross DA, Boatright D, Nunez-Smith M, et al. Differences in words used to describe racial and gender groups in medical student performance evaluations. PLoS One 2017;12:e0181659.
61 Choo EK. Damned if you do, damned if you don't: Bias in evaluations of female resident physicians. J Grad Med Educ 2017;9:586–7.
62 Meyerson SL, Sternbach JM, Zwischenberger JB, et al. The effect of gender on resident autonomy in the operating room. J Surg Educ 2017;74:e111–8.
63 Klein RS, Voskuhl R, Segal BM, et al. Speaking out about gender imbalance in invited speakers improves diversity. Nat Immunol 2017;18:475–8.
64 Files JA, Mayer AP, Ko MG, et al. Speaker introductions at internal medicine grand rounds: Forms of address reveal gender bias. J Womens Health (Larchmt) 2017;26:413–9.
65 King MM, Bergstrom CT, Correll SJ, et al. Men set their own cites high: Gender and self-citation across fields and over time: arXiv.org. Ithaca, NY: Cornell University Library; 2016.