

RAPID SCOPING REVIEW



Nursing & Health Sciences Research Journal

Journal Access: <https://scholarlycommons.baptisthealth.net/nhsrj/>

A Rapid Scoping Review of Gender Inequities in the Medical Profession

Ana M. Viamonte Ros, MD, MPH; Sanford M. Markham, FCOG, FACS; Diane Wu, MD, MPH, CCFP;
Patrice K. Nicholas, DNSc, DHL (Hon.), MPH, RN, NP-C, FAAN, MGH

ABSTRACT

Introduction: There continue to be large inequities in the representation of women at progressive levels of training and seniority in both academic and community practice settings. Gender inequity in medicine is not only problematic in its own right but has the potential to deliver inequitable outcomes, including the neglect of important research and care that continues to disadvantage women patients. As significant evidence is emerging on gender inequities in the medical profession, it is an opportune time to review the current evidence on the persisting gaps, potential causes, and possible solutions.

Methods: A rapid scoping review was conducted for articles on the topic of gender inequity and the medical profession in PubMed and Google Scholar. The search was limited to articles published from 1990 to the search date (June 1, 2017), and included only papers published in English.

Results: An initial 1055 articles were screened according to established inclusion and exclusion criteria. After initial and full-text review, supplemented by a hand search through the article references, 45 articles were included in the review. Articles were classified as a) evidence for gender inequities, b) causes of inequities, and c) solutions for inequities. Only 13% of articles found (6 studies) addressed possible interventions to reduce inequities. Significant gaps exist in the literature, particularly around part-time work options, parental and family leave options, and addressing implicit biases to reduce sexism in professional settings.

Discussion: The evidence highlights substantial inequities in the representation of women in the medical profession, in both the academic and community settings, in medical literature, and in leadership positions. This review also highlighted substantial gaps in the literature on understanding what can be done to reduce these gaps. More research is needed in the area of gender inequities in medicine to improve the representation of women in medicine.

Keywords: Gender inequity, Gender inequality, Physician workforce, Trends

INTRODUCTION

Increasing women's representation in the medical profession is an important goal for healthcare systems. Gender equity, or equal opportunity for men and women, is an important goal in itself. Improving gender equity in medicine cannot only benefit women doctors themselves, but can have a significant impact on care quality and outcomes for patients of all genders (Tsugawa, Jena, Orav, & Jha, 2017). Evidence suggests that female physicians are more likely to offer preventive care counseling and follow guidelines, practice habits that are likely to improve both cost-effectiveness and patient outcomes (Baumhakel, Muller, & Bohm 2009; Berthold, Gouni-Berthold, Bestehorn, Bohm, & Krone,

2008; Lurie et al., 1993)

While evidence for professional inequities in medicine has existed for some time, the discourse has until recently been limited to quantifying the proportion of women in various specialties, practice settings, or level of training. More recent evidence shines new light on the problem by exploring the causes and dynamics of the problem: for example, Kerr, Armstrong, and Cade (2016) explored the barriers facing women surgeons in their careers, and Patton et al. (2017) unpacked the role of sponsorship in the advancement of physicians in academic careers. There is also new evidence on the impact that these inequities can have on patient outcomes (Tsugawa et al., 2017), as well as evidence on the impact on physicians themselves, particularly on

income (Jena, Olenski, & Blumenthal, 2016). It is therefore timely to review key professional barriers to women physicians and how to address them.

The objective of this article is to review and summarize the current evidence on gender inequities in the medical profession. A rapid review of the evidence for inequities, the possible causes of these inequities, and the solutions discussed in the literature is presented. Finally, the possible future directions of the literature to fill the existing gaps is discussed and highlighted.

METHODS

The initial literature search was conducted on June 1, 2017 in PubMed, using the search [("sexism" OR "gender differences" OR "bias") AND ("Mentors" OR "career choice" OR "career mobility" OR "schools, medical" OR "medical staff, hospital" OR "students, medical")]. This was supplemented by a search through Google Scholar with the search terms ("inequality" OR "inequity" OR "sexism" OR "gender differences") AND ("academic medicine" OR "medical school" OR "mentors" OR "patient care outcomes"). The search was limited to articles published from 1990 to the search date (June 1, 2017), and included only papers published in English as this was the working language of the authors. Search results were downloaded to EndNote for full-text screening and removal of duplicates. Articles were initially screened by title, and abstract where available. The full texts of those articles passing initial title and abstract screening were retrieved for study. The search protocol was supplemented by a hand search through the references of the articles resulting from the initial search.

Articles were included if they were primary research studies that provided evidence on gender inequities in the medical profession, including case reports, or were review articles that synthesized available evidence to the study date. Editorials and commentaries were excluded. The search protocol resulted in a total of 45 articles included in the study. Articles were classified into themes and sub-themes developed in an inductive approach during the full text scanning and discussed amongst the authors to reach agreement on the themes and sub-themes (Figure 1).

RESULTS

The articles were distributed among the three themes of Evidence, Causes, and Solutions. The frequency of articles amongst the themes was Evidence (16 articles or 35%), Causes (23 articles or 51%), and Solutions (6 articles or 13%).

Evidence for Gender Inequities

Under-representation and under-promotion.

Overall, women make up 50.9% of the US population, but only 30% of physicians (Deville et al., 2015). Among physicians, female physicians are more often

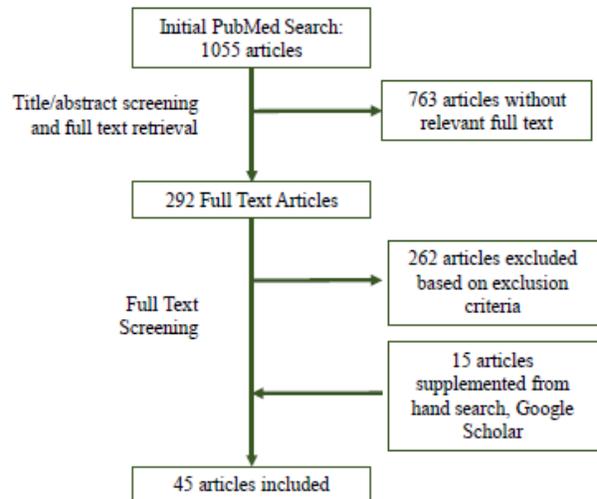


Figure 1. Literature search flow chart

found in primary care, and women in medical specialties are found predominantly within specialties that are on average less well-compensated (Deville et al., 2015). Women are also under-represented in academic medical settings, making up 38% of medical school faculty (Figure 2) (Lautenberger, Dandar, Raezer, & Sloane, 2014). While female physicians are more likely than male physicians to hold a faculty position at some point in their careers (Nonnemaker, 2000), they face progressive attrition at each level of professional advancement. Only 38% of full-time faculty, 21% of full professors, and 16% of deans were women in 2013 (Lautenberger et al., 2014). Among those in deanship positions, women are more represented in roles focused on education and mentoring than those involving corporate decision-making, clinical research, or general leadership (Schor, 2018).

The evidence indicates that women in academic medicine are less likely to be promoted. Female faculty members have been less than half as likely as men to have achieved the rank of full professor, and the gap persists adjusting for years of experience and research productivity (Blumenthal, 2017; Jena, Khullar, Ho, Olenski, & Blumenthal, 2015). International studies demonstrate that under-representation in academic medicine and medical leadership are a global issue, not limited to the United States (Bismark et al., 2015; Kuhlmann et al., 2017).

Medical journals are an important venue for professional discourse. Women are under-represented as contributing and senior authors in articles in leading American medical journals, and account for less than 30% of the reviewers in these journals (Erren, Grosß, Shaw, & Selle, 2014; Jagsi et al., 2006). The under-representation of women as contributors to, and reviewers for, medical journals, is particularly concerning given the journals' role in providing an opportunity

Attrition of women at each level of academic medicine

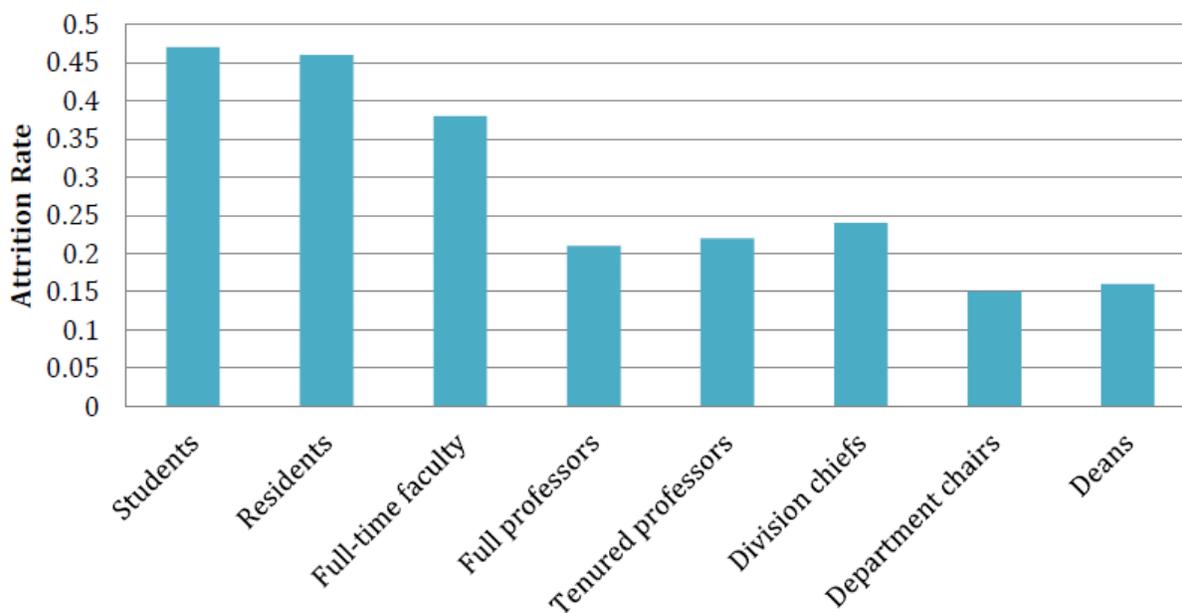


Figure 2. Progressive attrition of women at each level of academic medicine 2013-2014 (Data from the Association of American Medical Colleges (Lautenberger, Dandar, Raezer, & Sloane, 2014).

for professionals to contribute to the body of clinical evidence and their influence on clinical practice.

Under-compensation.

A number of studies demonstrate that women physicians earn less than men. Seabury et al. found that the overall gender gap was \$56,019 (a 25% gap) using 2006-2010 survey data (Seabury, Chandra, & Jena, 2013). Other more recent self-reported survey data from large national surveys in 2016 have reported similar gaps (Doximity, 2017; Peckham, 2017). A recent study in academic medicine also found a \$51,315 (24.8%) gap (Jena et al., 2016). The unadjusted gender earnings gap is less within primary care than within specialties, with as high as a 37% difference in earnings between male and female physicians in the same practice area (Commins, 2017; Peckham, 2017).

Many studies have attempted to outline the factors that can explain the gender gap in pay, such as hours worked, specialty, and practice setting. Studies that adjust for these factors find that the gender gap is reduced but not eliminated (Jagsi et al., 2012). The adjusted earnings gap exists from the first job after residency and persists throughout the stages of professional advancement (Freund et al., 2016; Jena et al., 2016; Lo Sasso, Richards, Chou, & Gerber, 2011; Nonemaker, 2000). Despite significant public discourse on gender inequities and inequalities over the last 30

years, the gender earnings gap in medicine seems to be persisting or increasing over time (Seabury et al., 2013).

Causes of Inequity

Many complex factors contribute to gender inequity in the physician workforce. Some factors relate to internalized norms and implied expectations that result in women making choices that lead to inequities. Others can be due to extrinsic factors, such as social dynamics with implied biases that prevent advancement, promotion, and pay.

Intrinsic factors.

Women and men are highly divided in their approach to specialty selection, and evidence suggests that women self-select out of more competitive and higher-paying specialties. Female medical students predominantly choose specialties like pediatrics, obstetrics and family medicine, while male medical students tend to apply to and enter surgical specialties (Alers, van Leerdam, Dielissen, & Lagro-Janssen, 2014). McNally (2008) and colleagues demonstrated that female medical students tended to apply for specialties that had higher overall acceptance rates, despite objectively having higher odds of being selected for more selective specialties.

Implicit gender norms may play a role in specialty choice and limit career ambitions (Hill & Vaughan, 2013; Kerr et al., 2016). In a qualitative study of a medical school in Taiwan, an online discourse between medical students was highly saturated with traditional gender stereotypes, including those that can have an effect on the thought process and choice of specialty (Cheng & Yang, 2015). Another study in Sweden demonstrated similar gender-stereotyped differences in expectations during medical school training (Kristoffersson, Andersson, Bengs, & Hamberg, 2016).

Extrinsic factors.

Internal motivation and behavior are highly linked to influences in the external professional environment. Both “push” factors like institutional incentives and “pull” factors like mentorship can have a significant impact on the professional advancement of women. The authors organized extrinsic factors into three main categories: Mentorship; Prejudice, Discrimination, and Harassment; and “Second Shift” at Home.

Mentorship.

Mentorship is variably defined, but traditionally involves the regular one-to-one, face-to-face meeting of a senior with a junior colleague to improve or develop the career of the junior colleague (Sambunjak, Straus, & Marusic, 2010). The characteristics of a successful mentoring relationship are often relationship-dependent, but effective mentorship is widely regarded as important for specialty choice, and particularly in academic medicine, important for academic productivity, retention, and professional advancement (Sambunjak, Straus, & Marusic, 2006).

Overall, women seem to experience less mentorship than male colleagues. DeCastro and colleagues reported that women clinician-scientists report more difficulty than male counterparts at finding a mentor whose career can be a model for their own (DeCastro, Griffith, Ubel, Stewart, & Jagsi, 2014). Junior academic high-potential female clinicians are also less likely to experience advocacy from senior colleagues, reducing their opportunities for advancement compared to men (Patton et al., 2017). While effective mentors can be from dissimilar backgrounds to those of mentees, many female residents prefer mentors of the same gender and perceive male mentors as being unable to give effective guidance on aspects related to the specific experience of women, particularly in relation to those with or intending to have children (Barry et al., 2016; Sambunjak et al., 2010). Specialties that have fewer women may, therefore, have a structural disadvantage in providing mentors or role models who can encourage women to enter those specialties. This same disadvantage exists up the career ladder, as fewer women are represented at more senior levels of leadership.

Prejudice, discrimination, and harassment.

Many articles reported on the role that prejudice or discrimination based on sex or gender can play in limiting women’s careers overall. They can also have a serious negative impact on the psychological well-being of female professionals (Hill & Vaughan, 2013; Kerr et al., 2016). Senior healthcare leaders have discussed the prevalence of internalized biases that can prevent consideration of their more junior female colleagues for advancement, such as perceived differences in capability, motivation, or capacity due to gender (Bismark et al., 2015).

In its most overt forms, sexism presents itself as verbal, physical, or emotional harassment. A meta-analysis of the experiences of medical students and residents in training found a high prevalence of gender discrimination (53.6%) and sexual harassment (33.1%), with female trainees more likely than male trainees to experience this harassment (Fnais et al., 2014). Sexual harassment often manifests in more serious forms; a 2014 national study of sexual harassment among female academic medical faculty found that 30% reported having personally experienced sexual harassment, with 40% of those reporting harassment having experienced the more serious forms of harassment like threats to engage in sexual behavior or coercive advances (Jagsi et al., 2016). Female medical students, residents, and physicians often experience more sexism and sexual harassment within specialties that have less female representation, such as surgical specialties (Cochran et al., 2013; Fnais et al., 2014). Prolonged exposure to negative experiences can be strong deterrents to specialty choice, career setting, and retention.

“Second shift” at home.

Female doctors, like women in the vast majority of other professions, face competing tensions of work and home responsibilities to a greater degree than their male colleagues (Doyle, Pederson, & Meltzer-Brody, 2016), and arrange work schedules around childcare responsibilities more often than their male colleagues (Smith, Bethune, & Hurley, 2018; Sobecks et al., 1999). An older study, but one that likely still reflects current gender dynamics, found that among married physicians with children, 82% of male physicians had spouses who performed most household duties, compared with only 5% of the female physicians’ spouses (Warde, Moonesinghe, Allen, & Gelberg, 1999). These additional pressures are likely to manifest in the form of career compromises, which therefore affect women more often than men.

One way this dual burden manifests is through part-time work. More than twice the number of women physicians (22%) work part-time compared with male physicians (9%) (McMurray et al., 2005). When women work part-time, they are more likely to cite competing work and family responsibilities, as opposed to male physicians, who predominantly cite the desire to

balance competing professional responsibilities (Pollart et al., 2015). In academic medicine (Carr, Gunn, Kaplan, Raj, & Freund, 2015), women hold the majority of part-time faculty positions, often perceived to have less advancement potential (Pollart et al., 2015).

Another critical consideration is maternity and paternity leave. These pose difficult tradeoffs to both the professional, often in training or at the critical early years of professional development, and the institution, which must consider the administrative and training burden associated with leave. None of the articles included spoke about the difficulties in addressing this professional challenge.

Solutions for Bridging the Gender Gap

Institutional leadership.

Model recognition and respect for female leaders.

Ultimately, leaders who model and signal importance for gender equity will have a significant impact on their institutional culture. One article showed that demonstrating recognition and respect for female leaders can be effective for integrating gender equity into routine discourse (Bismark et al., 2015). The impact of modeling has not been studied by other articles found for this review (Table 1).

Promote women to leadership positions.

Increasing representation of women in leadership positions also has the potential to improve the representation of women physicians overall. While evidence in medicine is limited, healthcare start-ups that have women on the boards have twice as many women on their staff as those that do not (Steiner, 2017). In the global health context, policies that improved the representation of women in political leadership in India had a significant impact on the educational attainment and aspirations of girls in the village and reduced their household chore burden (Beaman, Duflo, Pande, & Topalova, 2012).

Policies.

Measure gender inequities.

The old adage of “what gets measured gets done” rings true when addressing gender inequities. In one intervention, an American college of medicine reviewed pay gaps among its male and female faculty members, identifying instances of pay gaps after adjusting for rank, track, specialty and years at that rank, and made salary adjustments to 8 female faculty members that were able to close the gender gap (Wright et al., 2007). Transparency and accountability is therefore an important step towards equity (Bismark et al., 2015).

Provide support for part-time and flexible work.

Policies that allow for parental leave and part-time or flexible work can also be important to reduce barriers towards professional advancement (Jagsi, Tarbell, & Weinstein, 2007). At the same time, part-time physicians have been shown to provide equivalent outcomes to full-time physicians in diabetes management, cancer screening, and patient satisfaction (Parkerton, Wagner, Smith, & Straley, 2003). Physicians working part-time report greater satisfaction with their lives and lower rates of burnout, likely leading to higher rates of retention (Carr, Gareis, & Barnett, 2003). Support for flexible work policies can make a difference: at the University of Basel in Switzerland, residents and junior academic faculty working on a part-time basis could enroll in a 2-year support program which featured regular career meetings with the head of the department. Of the seven who entered the program, five received promotions, published academic papers, and received grants (Lerch-Pieper et al., 2017). Progressive retention programs can improve the responsiveness of institutions to new work-life demands.

While the establishment of flexible work and family policies is important, it is likely not sufficient to address retention. A study by Shauman, Howell, Pateriniti, Beckett, and Villablanca (2018) at the University

Table 1

Summary of Potential Solutions

Institutional Leadership	<ul style="list-style-type: none"> • Model recognition and respect for female leaders • Promote women to leadership positions
Policies	<ul style="list-style-type: none"> • Measure gender inequities • Provide support for part-time and flexible work
Programs	<ul style="list-style-type: none"> • Promote effective mentoring • Support women and men during periods of increased family responsibilities • Provide training on unconscious bias Improve transparency on promotion criteria and opportunities

of California, Davis demonstrated that strong cultural and interpersonal barriers in the workplace, such as unsupportive superiors or a perceived stigma against such policies, can prevent faculty from taking advantage of such policies when they do exist. It is, therefore, important for leadership to model the acceptance and integration of such policies into the cultural fabric of their institutions.

Programs.

Promote effective mentoring.

Mentoring is routinely cited as a top factor in career development for both female and male physicians. In academic medicine, mentoring can have a positive influence on research productivity and can play an important role in women's promotion to senior academic ranks. The Mayo Clinic Department of Medicine conducted a 12-month peer mentoring program for early career female faculty members and found increased satisfaction with academic achievement and confidence in academic skills at the end of the program (Varkey et al., 2012).

In the United Kingdom, Imperial College adopted a British national charter promoting gender equity in science, technology, engineering, medicine, and mathematics, and took action to establish a multifaceted program that targeted institutional gender equity. One prominent action taken was the establishment of a formal mentorship program that connected new female faculty members with other academic female faculty soon after arrival to the institution. As a result of these interventions, male and female faculty reported feeling that they had fair and equal access to training and development (Athanasidou et al., 2016).

Support women and men during periods of increased family responsibilities.

Signaling respect for childcare and family care demands, and promoting a workplace culture that does the same, can have an important impact on retention and satisfaction. One academic medical institution created an award scheme providing two years of financial support to junior female faculty members who had increased childcare responsibilities (Jagsi, Butterton, Starr, & Tarbell, 2007). This resulted in a high retention rate of awardees with more than half receiving promotions within the following few years.

Provide training on unconscious bias.

Institutional training on the unconscious factors that influence decision-making can have a significant impact on decisions regarding hiring, promotion, or pay (Issac, Lee, & Carnes, 2009). While the evidence is limited in the setting of gender and promotion in hospital or healthcare institutions, unconscious bias training in other settings, particularly around racial bias in clinical decision-making, has proven to have an effect on decision-making and lead to more equitable decisions (Burgess, van Ryn, Dovidio, & Saha, 2007).

Similar interventions on gender bias have the potential to have a positive effect on gender inequities (Bismark et al., 2015).

Improve transparency on promotion criteria and opportunities.

Women physicians often report a lack of knowledge about the criteria required for promotion, and at a higher rate than their male colleagues (Shauman et al., 2018; Silva, Preminger, Slezak, Phillips, & Johnson, 2016). This could be remedied by improving transparency and formalizing institutional policies on hiring criteria and by being transparent in announcements for new postings and positions.

DISCUSSION

Representation of women at all levels and fields of medicine is important for a variety of reasons. First, leadership that represents the diversity of the medical workforce can be more responsive to the needs of the workforce and can avoid perpetuating cultural or ideological divides that may harm sub-groups in the workforce. Next, women in positions of influence can often better advocate for female patients and their needs. There is strong evidence that bias exists in research and clinical practice that has resulted in an underinvestment in research related to the health of women far beyond reproductive health (National Institutes of Health Office of Research on Women's Health, n.d.). Given this bias, a more gender-balanced workforce could go far in improving health outcomes for women across all aspects of medical care.

Overall, the topic of gender inequities in the medical profession remains an under-studied area and significant gaps exist in the literature. First, a comprehensive theoretical framework to understand gender inequities in the medical profession is yet to be made. This will help future research to better map and to identify more comprehensively where gaps exist. In addition, while more studies look at the dynamics behind gender inequities, only six articles, or 13%, looked at possible solutions. This reflects the urgent need for more discourse on interventions that can help remedy inequities.

A point mentioned in several studies but not explored in depth was institutional support for working professionals who have care responsibilities for family members. Only one study looked at the dynamics around part-time medical practice, and no studies have looked at or reported the support that practices, professional groups, or institutions have made to support working physicians in their parental leave and family care responsibilities. Furthermore, no studies found in this review addressed the complex area of physician retention and the intention to leave, or the act of permanently leaving clinical practice.

There is a common argument that female doctors make personal choices that lead to lower-paying, less

ambitious career paths, although it is difficult to ascertain the influence of cultural, societal, and structural factors on these choices. While the review found studies that began to explore the complex dynamics that affect career choices, and particularly for specific medical specialties or sub-specialties, this remains an understudied area.

The role of sexism in training may be contributing significantly to specialty choice, career progression, and career longevity. Studies in medical schools in Sweden and Taiwan have shown that un-spoken gender differences, embedded within the “hidden curriculum,” may exist, which could be major contributors to critical career decisions. This highlights a significant research gap that could be important for future investigation and intervention.

This study was conducted under time limitations to provide a rapid overview of the state of the evidence on gender inequities in medicine. Therefore, there are a few limitations to consider. First, given the working language of the authors, the articles included were in English only. However, the majority of the articles found were in English, which mitigates this concern. Second, the evolving state of the literature suggests that new literature is appearing quickly and providing more detailed analyses of themes and sub-themes proposed within this review. A series of more rigorous systematic reviews addressing each of the proposed subtopics would be therefore opportune to delve into each of the subtopics in more depth.

CONCLUSION

Significant gaps exist in the literature on gender equity in the medical profession. In particular, detailed syntheses of the evidence on specific areas of gender inequity in medicine are needed, particularly on flexible work time, sexism, and on potential interventions that can effectively reduce inequities. Prioritizing research in this area can help to improve the advancement of women physicians and their role as lead actors in patient care.

ACKNOWLEDGMENT

The authors would like to thank the reviewers for providing thoughtful feedback on earlier versions of this paper.

DECLARATION OF INTEREST

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

AUTHORS

Ana M. Viamonte Ros, MD, MPH

Baptist Health South Florida, Herbert Wertheim College of Medicine, Florida International University,

Miami, FL., US. Correspondence regarding this paper can be directed at AnaVR@baptisthealth.net
Sanford M. Markham, FACOG, FACS,
 Emeritus Executive Dean for Student Affairs, Emeritus Professor of Obstetrics and Gynecology Herbert Wertheim College of Medicine, Florida International University, Miami, FL

Diane Wu, MD, MPH, CCFP

Family Physician, Vancouver, BC, Canada

Patrice K. Nicholas, DNSc, DHL (Hon.), MPH, RN, NP-C, FAAN, MGH, Institute of Health Professions at Massachusetts General Hospital, Boston, MA

REFERENCES

- Alers, M., van Leerdam, L., Dielissen, P., & Lagro-Janssen, A. (2014). Gendered specialities during medical education: a literature review. *Perspectives on Medical Education*, 3(3), 163-178. doi:10.1007/s40037-014-0132-1
- Athanasiou, T., Patel, V., Garas, G., Ashrafian, H., Hull, L., Sevdalis, N., . . . Paroutis, S. (2016). Mentoring perception, scientific collaboration and research performance: is there a 'gender gap' in academic medicine? An Academic Health Science Centre perspective. *Postgraduate Medical Journal*, 92(1092), 581-586. doi:10.1136/postgradmedj-2016-134313
- Barry, P. N., Miller, K. H., Ziegler, C., Hertz, R., Hanna, N., & Dragan, A. E. (2016). Factors Affecting Gender-based Experiences for Residents in Radiation Oncology. *International Journal of Radiation Oncology, Biology, Physics*, 95(3), 1009-1016. doi:10.1016/j.ijrobp.2016.02.007
- Baumhakel, M., Muller, U., & Bohm, M. (2009). Influence of gender of physicians and patients on guideline-recommended treatment of chronic heart failure in a cross-sectional study. *European Journal of Heart Failure*, 11(3), 299-303. doi:10.1093/eurjhf/hfn041
- Beaman, L., Duflo, E., Pande, R., & Topalova, P. (2012). Female leadership raises aspirations and educational attainment for girls: a policy experiment in India. *Science (New York, N.Y.)*, 335(6068), 582-586. doi:10.1126/science.1212382
- Berthold, H. K., Gouni-Berthold, I., Bestehorn, K. P., Bohm, M., & Krone, W. (2008). Physician gender is associated with the quality of type 2 diabetes care. *Journal of Internal Medicine*, 264(4), 340-350. doi:10.1111/j.1365-2796.2008.01967.x

- Bismark, M., Morris, J., Thomas, L., Loh, E., Phelps, G., & Dickinson, H. (2015). Reasons and remedies for under-representation of women in medical leadership roles: a qualitative study from Australia. *BMJ Open*, *5*(11), e009384. doi:10.1136/bmjopen-2015-009384
- Blumenthal, D. M., Olenski, A. R., Yeh, R. W., DeFaria Yeh, D., Sarma, A., Stefanescu Schmidt, A. C., . . . Jena, A. B. (2017). Sex Differences in Faculty Rank Among Academic Cardiologists in the United States. *Circulation*, *135*(6), 506-517. doi:10.1161/circulationaha.116.023520
- Burgess, D., van Ryn, M., Dovidio, J., & Saha, S. (2007). Reducing racial bias among health care providers: lessons from social-cognitive psychology. *Journal of General Internal Medicine*, *22*(6), 882-887. doi:10.1007/s11606-007-0160-1
- Carr, P. L., Gareis, K. C., & Barnett, R. C. (2003). Characteristics and outcomes for women physicians who work reduced hours. *Journal of Women's Health* (2002), *12*(4), 399-405. doi:10.1089/154099903765448916
- Carr, P. L., Gunn, C. M., Kaplan, S. A., Raj, A., & Freund, K. M. (2015). Inadequate progress for women in academic medicine: findings from the National Faculty Study. *Journal of Women's Health* (2002), *24*(3), 190-199. doi:10.1089/jwh.2014.4848
- Cheng, L. F., & Yang, H. C. (2015). Learning about gender on campus: an analysis of the hidden curriculum for medical students. *Medical Education*, *49*(3), 321-331. doi:10.1111/medu.12628
- Cochran, A., Hauschild, T., Elder, W. B., Neumayer, L. A., Brasel, K. J., & Crandall, M. L. (2013). Perceived gender-based barriers to careers in academic surgery. *American Journal of Surgery*, *206*(2), 263-268. doi:10.1016/j.amjsurg.2012.07.044
- Commins J. (2017). Large Gender Gap Seen in Physician Compensation. Retrieved from <https://www.healthleadersmedia.com/strategy/large-gender-gap-seen-physician-compensation>
- DeCastro, R., Griffith, K. A., Ubel, P. A., Stewart, A., & Jagsi, R. (2014). Mentoring and the career satisfaction of male and female academic medical faculty. *Academic Medicine : Journal of the Association of American Medical Colleges*, *89*(2), 301-311. doi:10.1097/acm.000000000000109
- Deville, C., Hwang, W. T., Burgos, R., Chapman, C. H., Both, S., & Thomas, C. R., Jr. (2015). Diversity in Graduate Medical Education in the United States by Race, Ethnicity, and Sex, 2012. *JAMA Internal Medicine*, *175*(10), 1706-1708. doi:10.1001/jamainternmed.2015.4324
- Doyle, M., Pederson, A., & Meltzer-Brody, S. (2016). Demographic and Personal Characteristics of Male and Female Chairs in Academic Psychiatry. *Academic Psychiatry : the Journal of the American Association of Directors of Psychiatric Residency Training and the Association for Academic Psychiatry*, *40*(3), 402-409. doi:10.1007/s40596-015-0408-8
- Doximity. (2017). First Annual Physician Compensation Report. Retrieved from https://s3.amazonaws.com/s3.doximity.com/ca-reers/2017_physician_compensation_report.pdf
- Erren, T. C., Groß, J. V., Shaw, D. M., & Selle, B. (2014). Representation of women as authors, reviewers, editors in chief, and editorial board members at 6 general medical journals in 2010 and 2011. *JAMA Internal Medicine*, *174*(4), 633-635. doi:10.1001/jamainternmed.2013.14760
- Fnaiss, N., Soobiah, C., Chen, M. H., Lillie, E., Perrier, L., Tashkhandi, M., . . . Tricco, A. C. (2014). Harassment and discrimination in medical training: a systematic review and meta-analysis. *Academic Medicine : Journal of the Association of American Medical Colleges*, *89*(5), 817-827. doi:10.1097/acm.0000000000000200
- Freund, K. M., Raj, A., Kaplan, S. E., Terrin, N., Breeze, J. L., Urech, T. H., & Carr, P. L. (2016). Inequities in Academic Compensation by Gender: A Follow-up to the National Faculty Survey Cohort Study. *Academic Medicine : Journal of the Association of American Medical Colleges*, *91*(8), 1068-1073. doi:10.1097/acm.0000000000001250
- Hill, E., & Vaughan, S. (2013). The only girl in the room: how paradigmatic trajectories deter female students from surgical careers. *Medical Education*, *47*(6), 547-556. doi:10.1111/medu.12134
- Isaac, C., Lee, B., & Carnes, M. (2009). Interventions that affect gender bias in hiring: a systematic review. *Academic Medicine : Journal of the Association of American Medical Colleges*, *84*(10), 1440-1446. doi:10.1097/ACM.0b013e3181b6ba00
- Jagsi, R., Butterson, J. R., Starr, R., & Tarbell, N. J. (2007). A targeted intervention for the career

- development of women in academic medicine. *Archives of Internal Medicine*, 167(4), 343-345. doi:10.1001/archinte.167.4.343
- Jagsi, R., Griffith, K. A., Jones, R., Perumalswami, C. R., Ubel, P., & Stewart, A. (2016). Sexual Harassment and Discrimination Experiences of Academic Medical Faculty. *JAMA*, 315(19), 2120-2121. doi:10.1001/jama.2016.2188
- Jagsi, R., Griffith, K. A., Stewart, A., Sambuco, D., DeCastro, R., & Ubel, P. A. (2012). Gender differences in the salaries of physician researchers. *JAMA*, 307(22), 2410-2417. doi:10.1001/jama.2012.6183
- Jagsi, R., Guancial, E. A., Worobey, C. C., Henault, L. E., Chang, Y., Starr, R., . . . Hylek, E. M. (2006). The "gender gap" in authorship of academic medical literature--a 35-year perspective. *The New England Journal of Medicine*, 355(3), 281-287. doi:10.1056/NEJMs053910
- Jagsi, R., Tarbell, N. J., & Weinstein, D. F. (2007). Becoming a doctor, starting a family--leaves of absence from graduate medical education. *The New England Journal of Medicine*, 357(19), 1889-1891. doi:10.1056/NEJMp078163
- Jena, A. B., Khullar, D., Ho, O., Olenski, A. R., & Blumenthal, D. M. (2015). Sex Differences in Academic Rank in US Medical Schools in 2014. *JAMA*, 314(11), 1149-1158. doi:10.1001/jama.2015.10680
- Jena, A. B., Olenski, A. R., & Blumenthal, D. M. (2016). Sex Differences in Physician Salary in US Public Medical Schools. *JAMA Internal Medicine*, 176(9), 1294-1304. doi:10.1001/jamainternmed.2016.3284
- Kerr, H. L., Armstrong, L. A., & Cade, J. E. (2016). Barriers to becoming a female surgeon and the influence of female surgical role models. *Postgraduate Medical Journal*, 92(1092), 576-580. doi:10.1136/postgradmedj-2015-133273
- Kristofferson, E., Andersson, J., Bengs, C., & Hamberg, K. (2016). Experiences of the gender climate in clinical training - a focus group study among Swedish medical students. *BMC Medical Education*, 16(1), 283. doi:10.1186/s12909-016-0803-1
- Kuhlmann, E., Ovseiko, P. V., Kurmeyer, C., Gutierrez-Lobos, K., Steinbock, S., von Knorring, M., . . . Brommels, M. (2017). Closing the gender leadership gap: a multi-centre cross-country comparison of women in management and leadership in academic health centres in the European Union. *Human Resources for Health*, 15(1), 2. doi:10.1186/s12960-016-0175-y
- Lautenberger, D. M., Dandar, V. M., Raezer, C. L., & Sloane, R. A. (2014). *The State of Women in Academic Medicine: The Pipeline and Pathways to Leadership, 2013-2014*. Washington, DC: Association of American Medical Colleges.
- Lerck-Pieper, N., Brander, S., Valarino, I., Zurbriggen, C., Maurer, E., Herr, W., . . . Beck-Schimmer, B. (2017). Challenging the "leaky pipeline" in faculties of medicine. Retrieved from <https://smw.ch/en/op-eds/post/challenging-the-leaky-pipeline-in-faculties-of-medicine/>
- Lo Sasso, A. T., Richards, M. R., Chou, C. F., & Gerber, S. E. (2011). The \$16,819 pay gap for newly trained physicians: the unexplained trend of men earning more than women. *Health Affairs (Project Hope)*, 30(2), 193-201. doi:10.1377/hlthaff.2010.0597
- Lurie, N., Slater, J., McGovern, P., Ekstrum, J., Quam, L., & Margolis, K. (1993). Preventive care for women. Does the sex of the physician matter? *The New England Journal of Medicine*, 329(7), 478-482. doi:10.1056/nejm199308123290707
- McMurray, J. E., Heiligers, P. J., Shugerman, R. P., Douglas, J. A., Gangnon, R. E., Voss, C., . . . Linzer, M. (2005). Part-time medical practice: where is it headed? *The American Journal of Medicine*, 118(1), 87-92. doi:10.1016/j.amjmed.2004.11.005
- McNally, S. A. (2008). Competition ratios for different specialties and the effect of gender and immigration status. *Journal of the Royal Society of Medicine*, 101(10), 489-492. doi:10.1258/jrsm.2008.070284
- National Institutes of Health Office of Research on Women's Health. (n.d.) How Sex/Gender Influence Health & Disease (A-Z). Retrieved from <https://orwh.od.nih.gov/sex-gender/sexgender-influences-health-and-disease/how-sexgender-influence-health-disease-z>
- Nonnemaker, L. (2000). Women physicians in academic medicine: new insights from cohort studies. *The New England Journal of Medicine*, 342(6), 399-405. doi:10.1056/nejm200002103420606
- Parkerton, P. H., Wagner, E. H., Smith, D. G., & Straley, H. L. (2003). Effect of part-time practice on patient outcomes. *Journal of General Internal Medicine*, 18(9), 717-724.