Received: 6 October 2020 | Revised: 31 December 2020 | Accepted: 20 January 2021

DOI: 10.1111/trf.16306

BRIEF REPORT

TRANSFUSION

The impact of COVID-19 on academic productivity by female physicians and researchers in transfusion medicine

Tina S. Ipe[1]† | Ruchika Goel[2,3]† | Lydia Howes[4] | Sara Bakhtary[5]

[1]Department of Pathology and Laboratory Medicine, University of Arkansas for Medical Sciences, Little Rock, Arkansas, USA

[2]Division of Hematology, Oncology, Department of Internal Medicine, Southern Illinois University School of Medicine, Springfield, Illinois, USA

[3]Division of Transfusion Medicine, Department of Pathology, Johns Hopkins University, Baltimore, Maryland, USA

[4]Medical Library, Southern Illinois University School of Medicine, Springfield, Illinois, USA

[5]Department of Laboratory Medicine, University of California, San Francisco, San Francisco, California, USA

Correspondence
Tina S. Ipe, Department of Pathology and Laboratory Medicine, University of Arkansas for Medical Sciences, 4301 W. Markham St., Slot 503, Little Rock, AR 72205.
Email: tipe@uams.edu

Abstract

Background: Several studies have highlighted the disparities in gender equity that exist in different medical specialties. The COVID-19 pandemic has further heightened the inequity faced by female physicians as they are challenged by increasing household and childcare duties in addition to their professional responsibilities. Given these hurdles, fewer women than men have published in various medical disciplines. In this brief report, we wanted to determine the impact of the COVID-19 pandemic on the academic output of female physicians and researchers in transfusion medicine.

Study Design and Methods: We compared all articles in four transfusion medicine journals published from January 1 to July 31, 2019 with the same time period in 2020. Overall, 1024 articles were reviewed for whether they included women as first or senior authors.

Results: Overall, women were first authors in 45.9% (n = 458) of all publications and senior authors in 35% (n = 356) of all publications. There was a statistically significant decrease in the percentage of women as first authors between 2019 (49.1%) and 2020 (42.7%) ($p = .04$). There was no significant change in the percentage of women as senior authors between 2019 (35.4%) and 2020 (35.5%) ($p = 0.99$).

Conclusions: Similar to other medical specialties, the COVID-19 pandemic has further increased the disparities faced by female researchers in transfusion medicine as evidenced by a decrease in publications with women as first authors.

KEYWORDS

administration, transfusion service operations, transfusion practices (adult)

1 | INTRODUCTION

An increasing number of women have entered medicine since the 1970s. According to data published by the Association of American Medical Colleges, enrollment of women was nearly equal to men at the matriculation of medical school in 2019.[1] Despite achieving equal proportionality at medical school enrollment and matriculation, female physicians are underrepresented in leadership positions such as department chairs or deans. For example, only 18% of department chairs and 16% of medical school deans in the United States are women.[1] One reason for this gender disparity in leadership is that women in academic medicine shoulder more of the burden of domestic responsibilities than their male counterparts. A study in 2014 on gender differences reported that

† Tina S. Ipe and Ruchika Goel share joint first authorship.

female physician-researchers spent approximately 8.5 more hours each week on childcare than male physician-researchers.[2] The study also showed that a majority of female physician-researchers were part of dual-employed relationships: about 85.6% of women, compared to 44.9% of men, had full-time employed partners or spouses.[2] Given this, when childcare arrangements were interrupted, female physician-researchers were more likely to take vacation coverage to care for their children.

The COVID-19 pandemic has further heightened the existing gender inequities by disproportionately impacting the productivity of female physicians. Because the pandemic impeded access to childcare and schools, many recent publications noted that women were publishing less than men in various disciplines.[3] For example, Viglione reported that the number of preprints submitted to bioRxiv and arXiv grew faster for male than female authors in 2020 (6.4% and 2.7%, respectively).[3] Manuscript submissions by women in 2020 also decreased in specialties such as surgery, where there was a 4% decrease in female first authors and an absolute decrease of 6% in female senior authors compared to 2019.[4] Given that academic productivity is often measured by the number and quality of published manuscripts, we wanted to determine if women in transfusion medicine had published less in 2020 than in 2019, similar to trends noted in other medical specialties.

2 | STUDY DESIGN AND METHOD

We reviewed all manuscripts published between January 1 and July 31 in 2019 and 2020 in four journals that focus on transfusion medicine (*Transfusion*, *Transfusion Medicine*, *Transfusion Medicine Reviews*, and *Vox Sanguinis*). Articles were identified by searching for each journal in the "Publication Title" field of the Web of Science Core Collection. All searches were run on August 31, 2020. Results were filtered to those published in 2019 and 2020, and the search results ("full record") were exported as an Excel file. In the Excel file, articles were further filtered to those with publication or "ahead of print" dates of January 1 to July 31, 2019 or January 1 to July 31, 2020. Information for articles published ahead of print during July 2020 but not yet indexed in Web of Science was identified from individual journal websites and added to the spreadsheet manually.

Using Excel TEXT functions, the first and senior authors' full names were extracted from the "author full name" field, and their publication countries were extracted from the "addresses" field. Using a web-based gender determination tool, Gender API, we determined the gender of the first and senior authors' names.[5] Any gender classification with <80% perceived accuracy was reviewed manually to verify gender classification. If gender classification was not possible, records were classified as "Non Reconcilable" and excluded from the respective analyses. Using the gender determination tool, we estimated 91% of first and senior authors' genders reliably. The accuracy of gender determination improved when the country of publication was provided; it was most difficult to determine the gender of individuals from Sweden and China.

The data were analyzed using statistical analysis tools (Stata, StataCorp LLC). We compared the number of first or senior authors who were women to those who were men. Descriptive analyses of gender and publications were also performed with Fisher's exact test.

3 | RESULTS

A total of 1024 studies were included in the analysis. Between January and July 2019, 518 manuscripts were published in the four notable transfusion medicine journals. During the same timeframe in 2020, 506 manuscripts were published. Overall, 66.8% (684) were in *Transfusion*, 18.0% (184/1024) were in *Vox Sanguinis*, 10.3% (105) were in *Transfusion Medicine*, and 5% (51) were in *Transfusion Medicine Reviews* (Figure 1).

Women in Transfusion Medicine (TM) were first authors in 45.9% (n = 458) and senior authors in 35% (n = 356) of publications when 2019 and 2020 were combined. There was a statistically significant decrease in the percentage of women listed as first authors between 2019 (49.1%) and 2020 (42.7%) ($p = .04$), while the percentage of women as senior authors remained stable at 35.4% in 2019 and 35.5% in 2020 ($p = 0.99$) (Figure 2). Analyzing the results by specific journal, the gender discrepancy in

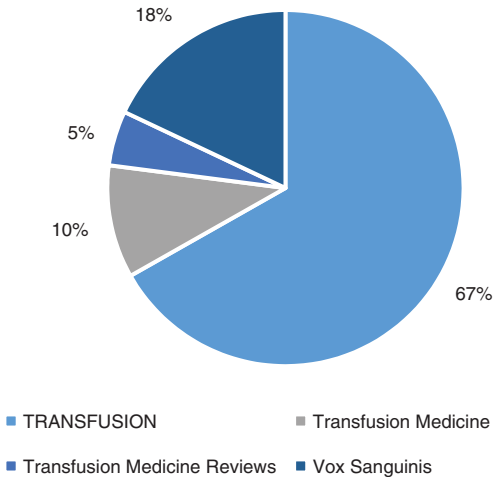

FIGURE 1 Breakdown of publications by journal (n = 1024 publications) [Color figure can be viewed at wileyonlinelibrary.com]

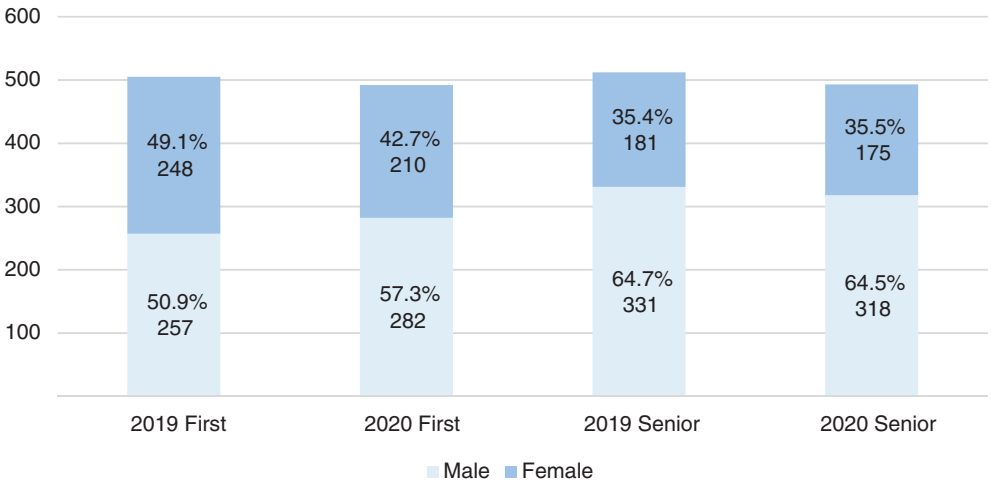

FIGURE 2 Gender year-over-year comparison for first and senior authorship [Color figure can be viewed at wileyonlinelibrary.com]

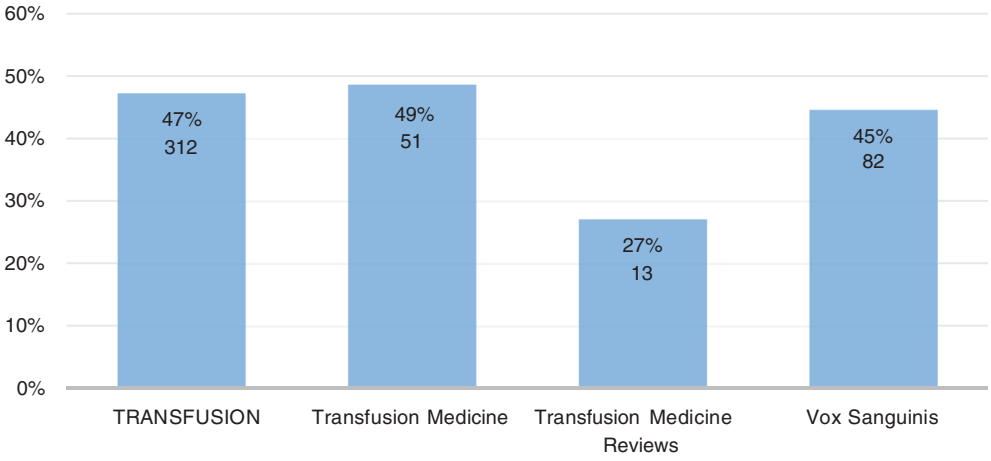

FIGURE 3 Percentage of publications by women by journal (2019–2020) [Color figure can be viewed at wileyonlinelibrary.com]

women as first authors was somewhat more equitable in *Transfusion Medicine* (48.7% women as first author), *Transfusion* (47.3%), and *Vox Sanguinis* (44.6%), while only 27.1% of publications in *Transfusion Medicine Reviews* listed women as first authors (Figure 3). Analyzing by senior author, for each of the reviewed journals, approximately one-third of authors were women: *Vox Sanguinis* (38.04%), *Transfusion Medicine* (35.6%), *Transfusion* (34.9%), and *Transfusion Medicine Reviews* (32%).

4 | DISCUSSION

Our results showed that fewer women were first authors on publications in transfusion medicine journals in 2020 than in 2019, and these decreases are congruent with literature from other medical fields.[3, 4] While the number of women as senior authors remained stable at 35%, the low percentage highlights the baseline gender inequity that exists in medicine. It is likely that first authors were more impacted than last authors because first authors tend to be junior faculty with younger children. Therefore, senior authors could continue to be productive despite the pandemic as childcare responsibilities impacted junior faculty predominantly. The reduction in publications by women also stresses the amplification of existing gender disparities in medicine during the COVID-19 pandemic.

The low number of publications by women in medicine is troubling considering that an equal proportion of women and men are entering this field.[1] In addition, given that more women obtained their transfusion medicine subspecialty certification than men, it raises concerns about barriers faced by women not only to publish but also to advance in their careers. According to the American Board of Pathology, 63% (n = 36) of physicians certified in transfusion were women in 2019.[6] One potential barrier is women being held to different publication standards. According to a paper published in an economics journal, higher writing standards were required from women than men to publish in that field.[7] Other barriers faced by women include unequal opportunities to publish as more men occupy leadership roles on editorial boards.[6] Lack of mentors and sponsors also hampers women not only in publishing but also in collaborating and leading clinical research studies. In our analysis, we found that

Transfusion Medicine Reviews, which publishes invited commentaries and review articles, had the lowest percentage of women as first authors. Given that invited authorship may favor male authors, invited commentaries and review articles further highlight the disparity faced by women to publish despite having similar professional attributes as men.[8]

Furthermore, the increased burden of household responsibilities shouldered by female physicians prevents many from publishing as prolifically as their male counterparts.[2] The increased household tasks may include caring for elderly relatives who are trying to socially distance during COVID-19, resulting in more errands to be performed by female physicians, in addition to their household and childcare obligations. Besides the above, women shoulder a greater share of teaching responsibilities at academic institutions, and as the teaching activities have continued or increased during the pandemic with virtual platforms, their overall share of responsibilities may not have decreased.[3] All of the existing disparities have been exacerbated during the COVID-19 pandemic, straining women further in achieving their goals for academic advancement.

A potential limitation of our analysis is that a small percentage of authors remained nonreconcilable as a man or woman based on the gender API software or even with a manual review of these cases. However, the gender API software has been used for multiple analyses in the medical and nonmedical realms. In addition, the 6-month publication time frame is another potential limitation of our study. However, we felt that the initial impact of COVID-19 on academic productivity of women in transfusion medicine was important to assess. Our analysis identified a baseline gap in the academic productivity of women compared to their male counterparts. This gap can be reviewed at a later time to determine if the gap worsened during the various waves and final resolution of the pandemic. In addition, there could be parallel analysis of "submitted" manuscripts from the journals to assess disparity between those that were submitted and published. The reduction in publication by women also implies that women researchers' academic output is concurrently more negatively impacted due to this pandemic. Overall, this eventually translates as adverse effects on research creativity and advancements of novel therapeutics and diagnostic testing in transfusion medicine. Academic institutions can support their female faculty in achieving gender parity by reviewing and addressing system-wide policies that hinder women. In addition, women would benefit from opportunities such as targeted research funding from their institutions. Transfusion medicine journals could identify additional strategies for narrowing the gap between women and men in the field by providing opportunities such as invited editorials and by including more women as editors, especially editors in chief. Deidentified reviews of manuscripts may be helpful as well. The journals could also proactively assess their gender statistics to determine the barriers faced by women publishing in the field.

CONFLICT OF INTEREST

TSI is a consultant for Terumo, BCT. RG is a consultant for Terumo, BCT and Alexion Pharmaceuticals. RG is supported by a Research Initiative to Sponsor and Empower Women in Medicine and Science grant through the American Medicine Association's Joan F. Giambalyo Fund.

ORCID

Tina S. Ipe https://orcid.org/0000-0003-3554-5521
Ruchika Goel https://orcid.org/0000-0001-9653-9905
Sara Bakhtary https://orcid.org/0000-0002-7896-2459

REFERENCES

1. Colleges AoAM. 2019 FACTS [monograph on the Internet]. 2019. [cited 2020 Sept 7]. Available from: https://www.aamc.org/data-reports/students-residents/interactive-data/2019-facts-applicants-and-matriculants-data.
2. Jolly S, Griffith KA, DeCastro R, Stewart A, Ubel P, Jagsi R. Gender differences in time spent on parenting and domestic responsibilities by high-achieving young physician-researchers. Ann Intern Med. 2014;160:344–53.
3. Viglione G. Are women publishing less during the pandemic? Here's what the data say. Nature. 2020;581:365–6.
4. Kibbe MR. Consequences of the COVID-19 pandemic on manuscript submissions by women. JAMA Surg. 2020;155:803–4.
5. API G. [cited 2020 Aug 12]. Available from: https://gender-api.com/.
6. Lally K AT, Stone EF, Arinsburg SA. Gender representation in editorial boards of transfusion medicine journals Poster presented at AABB Annual Meeting. Virtual, 2020.
7. Hengel E. Publishing while female. Are women held to higher standards? Evidence from peer review. Cambridge Working Papers in Economics. 2017;1753.
8. Thomas EG, Jayabalasingham B, Collins T, Geertzen J, Bui C, Dominici F. Gender disparities in invited commentary authorship in 2459 medical journals. JAMA Netw Open. 2019;2:e1913682.

How to cite this article: Ipe TS, Goel R, Howes L, Bakhtary S. The impact of COVID-19 on academic productivity by female physicians and researchers in transfusion medicine. *Transfusion*. 2021;1–4. https://doi.org/10.1111/trf.16306