

EDITORIALS

Women in anaesthesia, a special issue of the *British Journal of Anaesthesia*

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Keywords: diversity; female anaesthesiologists; gender; inclusion; sex; women anaesthesiologists

Women in anaesthesia—they have always been there, as patients (Sir James Young Simpson's use of chloroform for childbirth in the mid-19th century) and anaesthetists (anaesthesia in the late 19th century in the USA was often done by female nurses),¹ and more recently, as clinical anaesthesiologists, researchers, and educators. However, as noted in this special issue of the *British Journal of Anaesthesia* (BJA), female patients remain under-represented in research cohorts, and as in other medical specialities, women lag behind in leadership positions in anaesthesiology and are under-represented in the specialty compared with the proportion of women in medicine.

Women comprise at least 50% of medical school students in most Western countries, yet it is well recognised that the lack of sex and gender diversity in medical leadership and research positions is detrimental to the profession and women's health. The first step to correct a problem is to recognise, describe, and measure it. The *Lancet* devoted its February 9, 2019 issue to advancing women in science, medicine, and global health.² Major anaesthesiology journals are increasingly publishing articles addressing the status of women in anaesthesia, and

recent major anaesthesiology meetings have included panels addressing gender equity and inclusion.

This special issue of the BJA is timely in this regard, and collects clinical and laboratory investigations, reviews, special articles, and correspondence focused on Women in Anaesthesia. The issue publication date is March 8, 2020 to coincide with International Women's Day (<https://www.internationalwomensday.com>). The effort was launched 9 months ago with the Women in Anaesthesia Research Symposium held in Prato, Italy, and sponsored by the BJA and Monash University, Australia.³ The articles address several major themes, including the current status of women anaesthesiologists, the status of women in anaesthesiology research and education, women as subjects in anaesthesiology research cohorts, clinical investigations that focus on women patients, and laboratory studies that address the issue of sex as a biologic variable.

Semantics are important here. While writing and editing the articles for this issue, the authors and editors struggled with the semantics, as have authors of many previous studies published in anaesthesiology journals.⁴ The words *gender* and

sex are not synonymous. As noted by Leslie and colleagues,⁴ 'Sex is a biological state defined by chromosomes, gonads, genitals, and secondary sexual characteristics. "Gender" is a set of attitudes, feelings, and behaviours linked to a person's identity as a man, woman, both, neither, or of fluid identity'.

An additional source of confusion is that the words 'female/male' and 'women/men' are nouns, but only 'female' and 'male' are adjectives. Grammar purists object to the phrase 'women anaesthesiologists' rather than 'female anaesthesiologists'. But others may object to attaching a biological label to their profession. It has been suggested that 'women anaesthesiologists' can be used as a (grammatically correct) appositive noun (a noun or noun phrase that renames a noun right next to it).^{5,6} We acknowledge that using the terms 'women' and 'men' implies that gender identity is binary, although these labels do not adequately portray the spectrum of gender experience.

Sex and gender are key determinants of health and must be considered in the design, analysis, and reporting of perioperative medicine research. In an authoritative editorial, Leslie and Kasza⁷ summarise current legislative, regulatory, policy, and guideline initiatives that promote gender and sex inclusiveness in medical research, and suggest processes for improvement. They suggest that 'better evidence about the effects of sex and gender on health is critical to improving health care for everyone' and that 'international consensus and enforcement of inclusion of women and sex/gender analysis and reporting is required'.

Several articles in this issue address the position of women in anaesthesiology. A scoping review by Bosco and colleagues⁸ provides an overview that explores gender issues in anaesthesiology and identifies gaps in the literature and effective strategies to improve gender equity in anaesthesiology. The authors concluded that women are under-represented in academic positions, in journal authorship, as editorial board members, and as award recipients, and that in some countries women are remunerated at a lesser rate than their male colleagues.⁸ Many of these concerns are also articulated in other articles in this issue.^{3,9-17}

The results of two large Internet surveys investigating career opportunities in leadership and research among women anaesthesiologists are reported in this issue.^{16,17} Using an online survey translated into seven languages, investigators collected 11 746 responses from 148 countries over a 6-week period.¹⁶ Women were more likely to perceive mistreatment in the workplace and many more women than men perceived that women were disadvantaged in research and leadership positions. Interestingly, countries with lower average incomes had a smaller gender gap. In a survey of members of the European Society of Anaesthesiology, women respondents were just as likely as men respondents to desire a leadership career, although women perceived more barriers to doing so than men.¹⁷ Qualitative analysis of free-text comments allowed detailed identification of perceived problems and suggested solutions.^{16,17}

Tracking progress requires baseline performance to be measured. Work published in this special issue provides a baseline for future evaluations of interventions aimed at improving the gap in gender equity in anaesthesia.^{12,15} Potential solutions to the recognised gap in gender equity in anaesthesiology are also proposed.^{3,8-14,18-20} Several groups have published 'checklists' of positive actions that can help close the gender gap. Such a checklist was proposed by Leslie and colleagues²¹ in 2017 (they suggested 'taking the pledge' to

routinely perform 10 items that will facilitate closing the gender gap). Similarly, in a recent editorial, Geagea and Mehta²² listed 10 everyday strategies to advance women in academic medicine. These checklists include being aware of one's implicit biases, speaking up about inequities, formulating policies that address inequities, collecting and reporting data, and addressing gender pay gaps.^{21,22} In this issue of the *BJA*, Patel and Moonesinghe¹¹ suggest that 'a seat at the table is no longer enough', and recommend six 'amplifications' to help close the gender gap: amplification of opportunity, voices, inclusion, participation, recognition, and leadership.

Role models are important. Women medical students and trainees need to know that their predecessors have persevered and succeeded, and that senior women clinicians, educators, and researchers with whom they work have also done so. This issue includes accounts of the inspiring careers of early anaesthesia luminaries: Katharine Georgina Lloyd-Williams (1896-1973),²³ Sarah Joyce O'Malley (1896-1959),²⁴ and Virginia Apgar (1909-74).²⁵ They are inspirational role models for everyone, but are of particular significance in this context as they succeeded as professional women in an environment that was overwhelmingly male dominated. The vital importance of positive role models is emphasised in many of the articles in this issue.^{3,9-12,16-18}

Many academic departments have developed formal programmes to support gender diversity. Lane-Fall and colleagues⁹ describe how Maslow's hierarchy fits into the professional development of individuals, and how this hierarchy can be used to structure a programme of faculty development that focuses particularly on women. They emphasise that a feeling of love and belonging (which follows the necessities of physiological needs and safety at the bottom of the hierarchy) must be achieved before the top levels of the hierarchy (self-esteem and finally, self-actualisation) can be attained. Bustillo and Gotian¹⁰ describe how introduction of a women's circle can support faculty development.

Anaesthesiologists primarily work in a team environment, and teams require a leader who is endowed with the authority to lead. Minehart and colleagues¹³ argue that inclusive rather than authoritative leadership is better suited to the operating theatre, and that women's leadership styles are inherently more inclusive. Current gender leadership stereotypes may interfere with optimal team functioning and bear re-examination in today's complex operating theatre environment.¹³

Training the next generation of anaesthesiologists is a primary mission of academic anaesthesiologists. In the USA, the residency programme director is considered an important academic department leader. Although women are still significantly under-represented in traditional academic leadership roles in the USA and elsewhere,²⁶ Gonzalez and colleagues¹² report that the proportion of women residency programme directors now mirrors that of women anaesthesiologists.

Pearce and colleagues¹⁹ examined Australian and New Zealand trainees' perceptions of their numbers and readiness to perform 12 anaesthesiology procedures without senior supervision. More male than female trainees reported that they had performed these procedures at least 10 times. Men were also more confident in their procedural skills and were more likely to exaggerate their procedural experience when queried by supervisors.

Boer and Daelmans¹⁸ highlight the role of the hidden curriculum (implicit messages about values, norms, and attitudes that are 'taught' in medical schools without overt thought or formal inclusion in the curriculum) and the role that this

hidden curriculum plays in the development of many important traits of the practising physician. These traits are critical to professional aspects of our jobs, and failure to address these issues may contribute to burnout and other stressors often faced by female students and young physicians, widening the gender gap.

A significant impetus for this special issue was consideration of women in anaesthesiology research.³ Samuel and Ellicott¹⁴ describe gender equity in the UK Research and Audit Federation of Trainees. They propose that this successful group serve as a model for future gender equity among UK anaesthesiology researchers.

Social networks have taken an increasingly greater role in scientific communication and promotion of individual researchers. Demailly and colleagues²⁰ assessed the visibility of women compared with men anaesthesiology researchers on social networks. Despite a similar rate of use of these networks by women, the visibility of women remains lower than that of men, particularly on a social network dedicated specifically to scientific research (ResearchGate). Identifying the causes of these differences and actively managing them provide the potential means to raise the visibility of women scientists.

High-quality reproductive care is critical to women's health. Irish investigators surveyed conscientious objector status regarding termination of pregnancy following the 2018 referendum vote allowing this procedure in the Republic of Ireland for the first time.²⁷ Approximately one-quarter of respondents indicated that they would conscientiously object to providing anaesthesia for termination of pregnancy, similar to the proportion of general practitioners who objected.

This issue includes a number of research studies that is specific to women cohorts.^{28–31} Caesarean delivery is the most common major surgical procedure performed worldwide, and spinal anaesthesia is the most common anaesthetic for these procedures. One clinical study²⁸ and one network meta-analysis²⁹ address spinal anaesthesia-induced hypotension in this surgical population. A narrative review summarises studies of persistent pain after childbirth and identifies gaps in current knowledge.³¹ The authors suggest research strategies to close these gaps and identify interventions to decrease the incidence of persistent postpartum pain. Aho and colleagues³⁰ investigated autonomic nervous system function profiles during the cold pressor test as a possible biomarker for pain phenotypes in women with breast cancer. A 25-year review of a large Quebec, Canada database found an association between maternal exposure to general anaesthesia during the first trimester and central nervous system defects, particularly microcephaly, in offspring.³²

There is concerning preclinical evidence of anaesthesia-induced developmental neurotoxicity, but whether early human exposure to anaesthesia (*in utero* or in early life) contributes adversely to human development remains to be determined. In a thought-provoking review of this translational research, Cabrera and colleagues³³ summarise emerging evidence that neurotoxicity may occur differentially in female and male rat models of anaesthesia-induced neurotoxicity. This finding should not be surprising, given our knowledge of the influence of sex on many aspects of health, including responses to drugs. However, it serves to emphasise that we must take sex and gender into account in future research.⁷

In conclusion, women anaesthesiologists, educators, and researchers are critical to the profession and to the health of our patients, both women and men. Women professionals and

women patients have many similar, yet many different, characteristics and attributes than men. Women anaesthesiologists act and respond differently to their work environments, and women patients respond differently to their anaesthetic and treatment plans. It is our responsibility to recognise, study, adapt to, and celebrate these differences.

Authors' contributions

Drafting of the manuscript: CAW, CB, JMH.

Editing of manuscript: SRM, HCH.

Final approval of the manuscript: CAW, CB, JMH, SRM, HCH.

Declarations of interest

CAW is a member of the editorial board of the *BJA*. SRM has no interests to declare. CB is an editor of the *BJA*. HCH is editor-in-chief of the *BJA*. JMH was editor-in-chief of the *BJA* from 1997–2005 and chair of the *BJA* board from 2006 to 2012.

Funding

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British Journal of Anaesthesia, 124 (3): e43–e49 (2020)

doi: [10.1016/j.bja.2019.12.003](https://doi.org/10.1016/j.bja.2019.12.003)

Advance Access Publication Date: 8 January 2020

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Sex and gender inclusion, analysis, and reporting in anaesthesia research

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This work was presented in part at the *British Journal of Anaesthesia* Women in Anaesthesia Research Symposium on 4 June, 2019 at Monash University, Prato, Italy.