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Authorship patterns in contemporary anaesthesia literature: a cross-sectional study

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Editor—Recent studies have shown an increase in the number of authors of scientific publications in the medical field.^{1–4} Several reasons have been proposed, including greater complexity of the scientific question requiring interdisciplinary collaboration, pressure to publish in academia for promotion purposes, and honorary or gift authorship. Gift authorship is defined as naming a person as an author who does not meet authorship criteria. The last reason is a cause for potential concern. To date, no study evaluating the number of authors in the anaesthesiology literature has been published.

We analysed articles published from 2008 to 2018 in the five anaesthesia journals with the highest 2018 impact factors (based on Thomson Reuters-Clarivate Analytics) as an extension of a previous study on gender authorship presented at the American Society of Anesthesiology annual meeting. Our objective was to determine the trend of number of authors and the factors associated with high author numbers over time in the anaesthesiology literature.

This study was prospectively registered with the International Prospective Register of Systematic Reviews (Registration number 151092).⁵ The journals *Anesthesiology*, *British Journal of Anaesthesia* (BJA), *Anaesthesia*, *European Journal of Anaesthesiology* (EJA), and *Anesthesia and Analgesia* (A&A) were included (Fig. 1a). Original research articles, systematic reviews, and meta-analyses published in 2008, 2010, 2012, 2014, 2016, and 2018 were selected. The number and gender of authors, year of publication, country of origin, departmental affiliations, type of study, and source of funding were extracted for each article.

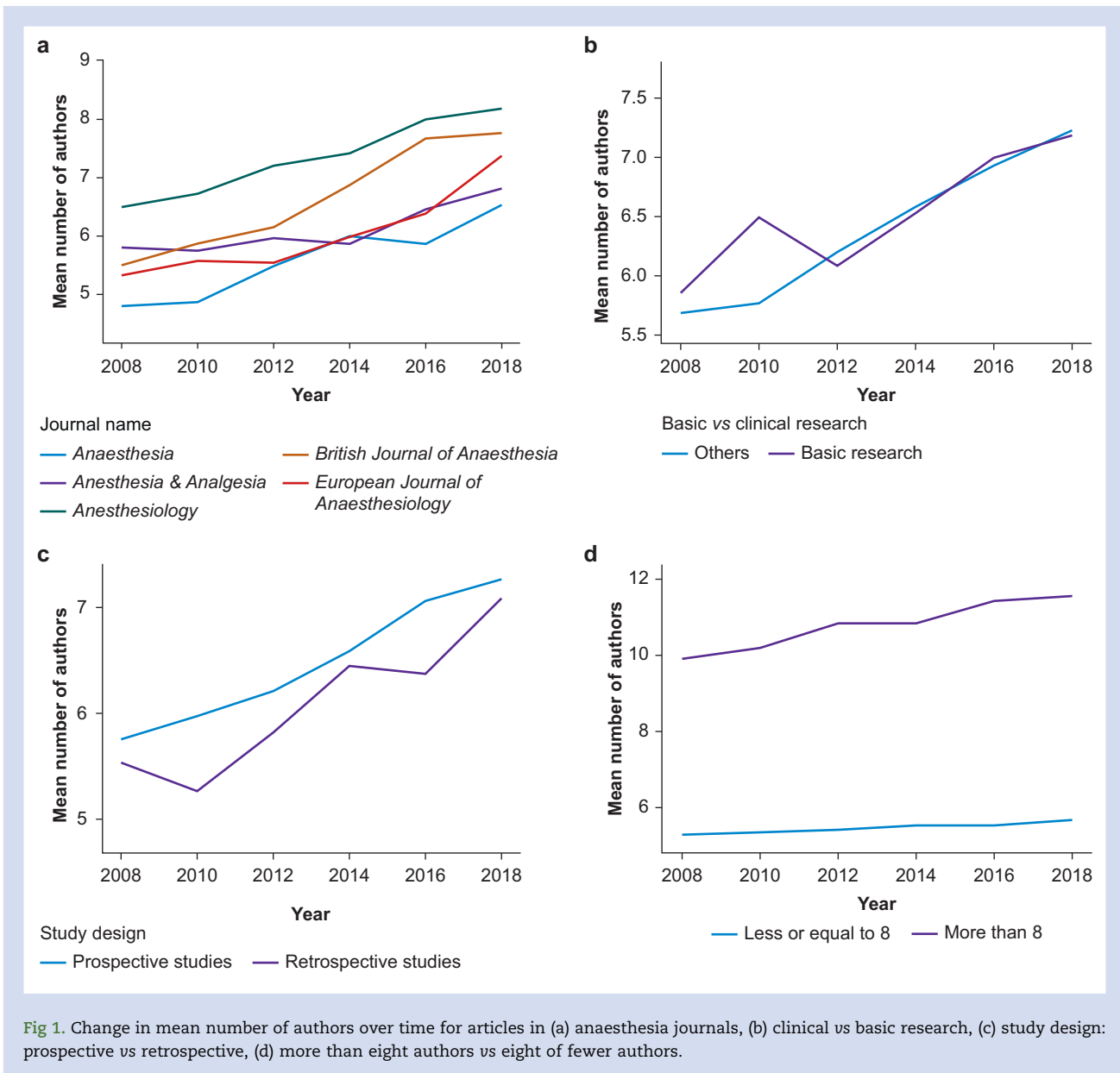
Continuous variables, normally distributed based on visual inspection and the Shapiro–Wilk normality test, were reported as mean and standard deviation (SD) and compared using the Mann–Whitney U-test. Categorical variables were

reported as counts and percentages and compared using the χ^2 test. Two-sided significance testing was used and P-values <0.05 were considered significant.

A total of 4720 articles were included over the study period. Although the number of articles overall slightly decreased over time (1642–1506 to 1572), the number of co-authors per article increased significantly from a mean (SD) of 5.80 (SD 2.23) in 2012–2014 to 6.35 (SD 2.72) in 2014–2016 to 7.10 (SD 3.46) in 2016–2018, all $P < 0.001$. In all five journals, there was a statistically significant increase in the number of authors per article over time ($P < 0.001$). *Anesthesiology* had the highest mean number of authors at 7.28 (SD 3.23) and *Anaesthesia* had the lowest at 5.56 (SD 2.71) (Fig. 1a, Supplementary Table S1). The number of authors increased significantly over time in all considered subgroups, including basic research articles, clinical articles, retrospective and prospective studies, single and multiple institutions studies, different funding sources, and for all continents of origin (Fig. 1b–d).

We examined the number of authors over 10 years in the five anaesthesia journals with the highest impact factors and found a significant increase from a mean of 5.80 authors per manuscript in 2008–2010 to 7.10 in 2016–2018. This trend held true for each journal. The percentage of articles with more than eight authors, defined as the highest quartile of author number per article, more than doubled from 9.8% in 2008 to 25.9% in 2018. *Anesthesiology* had the highest mean number of authors and percentage of articles with more than eight authors (28.0%), while *Anaesthesia* had the lowest mean number and percentage of articles with more than eight authors (9.3%).

Our results are similar to results from previous studies on authorship patterns in general medicine. Studies found that the number of authors of manuscripts published in high impact medical journals increased by 53% from 1980 to 2000,⁴ and by 23% from 1995 to 2005.² A significant increasing trend in



shared first-authorship was found from 2011 vs 2002 in top anaesthesia journals from 6.4% vs 0.4% overall: *Anesthesiology*, 8.8% vs 0.9%; *BJA*, 8.8% vs 0%; *A&A*, 3.4% vs 0.3%.⁶

Although legitimate reasons may exist for this increase in authorship, including increased collaboration among investigators because of more complex research questions, it is possible that the increase may reflect an increase in gift authorship. Evidence suggests that a not negligible proportion of authors do not meet the International Committee of Medical Journal Editors (ICMJE) criteria for authorship. In a 2011 survey of corresponding authors of 896 articles in six general medicine journals with high impact factors including the *New England Journal of Medicine* and *Lancet*, the rate of honorary authorship was highest in original manuscripts, compared with review articles and editorials at 25.0%,⁷ and was significantly higher than found in 1996 at 16.3%.⁸ This may also be an optimistic number because of the possibility of response biases in the survey.

Each journal included in this analysis requests that authors meet all ICMJE criteria. When authorship criteria are not met, contributors should be listed as a collaborator (*A&A*) or in the acknowledgements section (*BJA*, *Anesthesiology*). To further encourage ethical authorship, *Anesthesiology* requests all authors to confirm authorship and approval of the manuscript and *EJA* reserves the right to reject the manuscript if there is evidence of inappropriate authorship. However, there is a lack of further requirements; notably, no anaesthesia journals designate a maximum recommended number of authors. This is in contrast to other journals that recommend a maximum of 10 authors for an original manuscript and require justification for additional authors.

Several limitations exist to our study. We only included the anaesthesia journals with the highest impact factor; we did not include anaesthesia articles published in general medical journals. We could not assess whether all

authors fulfilled authorship criteria and did not identify the reasons for the described increase in author number.

In conclusion, we found that from 2008 to 2018 the number of authors in top anaesthesia journals increased significantly as did the percentage of articles with more than eight authors. Further studies should seek to determine the causes of this trend and determine whether more stringent authorship guidelines should be used.

Declarations of interest

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.bja.2021.01.014>.

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