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to one another.^{9,11} For example, a review of case reports on perioperative thyroid storm may identify themes regarding how the condition presents in the perioperative period, or the clinical signs that should warn anaesthesia providers that a patient may benefit from additional preoperative investigation and optimisation.⁴

We commend de Mul and colleagues for addressing an important clinical question, and agree with their findings that evidence of sufficient type and quality to change practice is currently lacking and indeed very difficult to acquire. However, we suggest that synthesising the *learning* presented by case reports, rather than numerical comparisons, which are vulnerable to reporting bias, may yet add useful and meaningful data to this important but understudied area of perioperative medicine.

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Declarations of interest

The authors declare no competing interests.

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COVID-19 publications in anaesthesiology journals: a bibliometric analysis

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Editor—We carried out a bibliometric analysis^{1–5} to quantify the contribution of anaesthesiology journals to COVID-19 research, quantifying the proportion of COVID-19 publications in anaesthesiology journals from the COVID-19 pandemic onset, describing COVID-19 publication trends and comparing research topics between COVID-19 publications in anaesthesiology and non-anaesthesiology journals, and assessing the profile of publications in anaesthesiology journals according to journal impact factor (IF). This study is embedded into the Covid Content Curation Project. This project was approved by the Research Ethics Committee of the University of Navarra. Research topic categories were defined following specialised COVID-19 article filters documented in the PubMed User Guide (Supplementary Table S1). We estimated the proportion of COVID-19 publications in anaesthesiology journals among all COVID-19 publications using the Agresti–Coulter method to calculate the corresponding 95% confidence interval (95% CI). Odds ratios (ORs) were estimated using logistic regression. *P* values <0.05 were considered statistically significant. We downloaded data from 171 509 COVID-19-related publications available on PubMed as of date, 2021. After exclusions, 166 380 COVID-19 publications were available for analysis (Supplementary Fig. S1).

The cumulative total of COVID-19 publications in anaesthesiology journals was 1476 (8.9%; 95% CI, 8.4–9.3%). The most

frequent research topics of COVID-19 publications in anaesthesiology journals were treatment (*n*=985 publications, 66.7%) and prevention (*n*=885 publications, 60.0%) (Supplementary Table S2). There were clear differences in the frequency of these research topic classification categories compared with non-anaesthesiology journals. The between-group differences were 22.3 percentage points (95% CI, 19.8–24.7; *P*<0.001) for treatment and 21.4 percentage points (95% CI, 18.8–23.9; *P*<0.001) for prevention, both in favour of the anaesthesiology journals group. The diagnosis topic also showed a higher frequency in anaesthesiology journals compared with non-anaesthesiology journals. The diagnosis research theme was addressed in 344 publications (23.3%) in anaesthesiology journals, whereas 31 450 publications (19.1%) dealt with this topic in the non-anaesthesiology journals group (*P*<0.001).

Transmission was addressed with slightly more frequency in anaesthesiology journals compared with the non-anaesthesiology journals group. The transmission topic was reported in 194 publications (13.1%) of anaesthesiology journals vs 20 838 publications (12.6%) in non-anaesthesiology journals (*P*=0.559).

The research topic of mechanism was identified in 399 of 1476 publications (27.0%) in anaesthesiology journals and in 50 652 of 164 904 publications (30.7%) in non-anaesthesiology journals, for a between-group difference of –3.7 percentage

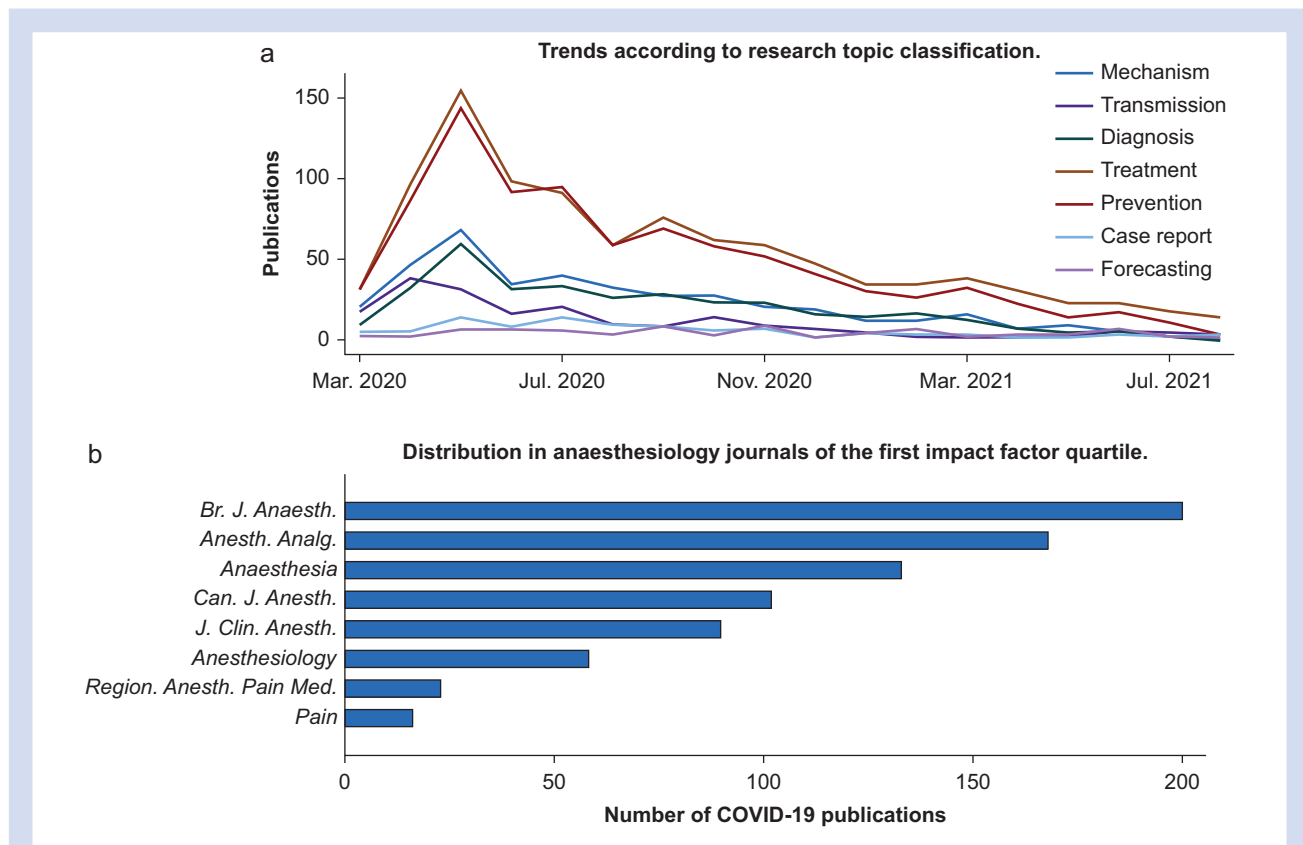


Fig 1. COVID-19 publications in anaesthesiology journals. *Anesth. Analg.*, *Anesthesia & Analgesia*; *Br. J. Anaesth.*, *British Journal of Anaesthesia*; *Can. J. Anesth.*, *Canadian Journal of Anesthesia—Journal canadien d’anesthésie*; *J. Clin. Anesth.*, *Journal of Clinical Anesthesia*; *Region. Anesth. Pain Med.*, *Regional Anesthesia and Pain Medicine*.

points (95% CI, -1.4 to -6.0) in favour of the non-anaesthesiology group ($P < 0.001$). Case reports and forecasting were topics addressed with higher frequency in non-anaesthesiology journals compared with anaesthesiology journals, although the magnitudes of the observed differences were not remarkable. **Figure 1a** shows trends of COVID-19 publications in anaesthesiology journals according to research topic categories. Interestingly, treatment and prevention remained leading research themes throughout the whole study period.

COVID-19 publications of anaesthesiology journals were mostly published in journals ranked in the first IF quartile (53.5%). The remaining COVID-19 papers were published in anaesthesiology journals ranked in the second (14.8%), third (21.4%), and fourth (10.3%) IF quartiles. The first and second quartiles showed the highest proportion of publications in anaesthesiology journals for all research topics except for case reports that were predominant in the third and fourth quartile categories. Statistically significant associations between topic and IF quartile were observed when IF quartiles were compared with the IF quartile with the highest proportion of publications on a specific research topic (reference category). The odds of the mechanism topic for publications in the third quartile declined by 46% (95% CI, 20–64%; $P = 0.002$) when compared with the quartile with the highest proportion of publications dealing with mechanism (second quartile). The odds of the transmission topic for publications in the second quartile declined by 54% (95% CI, 23–73%; $P = 0.003$) when compared with the first quartile. Compared with the first quartile, the odds of the transmission topic for publications in the third quartile decreased by 60% (95% CI, 36–75%; $P < 0.001$). When evaluating the treatment topic, the OR comparing the third quartile with the reference quartile (first quartile) was 0.63 (95% CI, 0.48–0.83; $P = 0.001$), showing a lower odds of publications addressing treatment topics among anaesthesiology journals in the third quartile than those in the first quartile. The odds of the prevention topic did not show statistically significant association when first (reference category) and second quartiles were compared. However, the odds decreased by 56% (95% CI, 43–66%; $P < 0.001$) in the third quartile and by 33% (95% CI, 4–53%; $P = 0.028$) in the fourth quartile, both compared with first quartile.

Case reports and forecasting were the topics that received less attention in anaesthesiology journals. Diagnosis and forecasting topics were quite homogeneously distributed among IF quartiles and no associations were observed between these topics and anaesthesiology journal impact.

The distribution of COVID-19 publications in anaesthesiology journals of highest scientific impact (first IF quartile) is shown in **Figure 1b**. This category comprises eight journals with IF from 5.063 to 9.452. The top three anaesthesiology journals with greatest publication contribution include more than 60% of total COVID-19 articles published in first quartile anaesthesiology journals. This triad of journals includes the *British Journal of Anaesthesia* (IF=9.166; $n=200$ COVID-19 publications, 25.3%), *Anesthesia & Analgesia* (IF=5.108; $n=168$ COVID-19 publications, 21.3%), and *Anaesthesia* (IF=6.955; $n=133$ COVID-19 publications, 16.8%). The remaining

anaesthesiology journals in the first IF quartile were the *Canadian Journal of Anaesthesia (Journal canadien d'anesthésie)* (IF=5.063; $n=102$ COVID-19 publications, 12.9%), the *Journal of Clinical Anesthesia* (IF=9.452; $n=90$ COVID-19 publications, 11.4%), *Anesthesiology* (IF=7.892; $n=58$ COVID-19 publications, 7.3%), *Regional Anesthesia and Pain Medicine* (IF=6.288; $n=23$ COVID-19 publications, 2.9%), and *Pain* (IF=6.961; $n=16$ COVID-19 publications, 2.0%).

Potential limitations of this analysis include the use of an anaesthesiology journals category exclusively based on the subject category 'Anesthesiology-Science Citation Index Expanded (SCIE)' of the Journal Citation Reports dataset, non-discrimination on the basis of article type, use of a single database, and potential imprecision in the classification system based on keywords.

This study provides an initial overall picture of COVID-19 publications in anaesthesiology journals. This provides a profile of anaesthesiologists' contributions to the global COVID-19 pandemic^{6–10} and provides a basis for future research.

Declarations of interest

The authors declare that they have no conflict of interest.

Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.bja.2021.12.003>.

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