Altmetrics should not be used for ranking of anaesthesia journals

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Editor—Traditional bibliometric indicators, such as Journal Impact Factor™, used for journal ranking have been criticised.1, 2 Altmetric™ provide a real-time score of attention when a publication appears online using social media sources (Altmetric LLP, WeWork-Kings Place, 7th Floor, 90 York Way, London, N1 9AG) last revision lists 15 of them),[3] each contributing to a different degree to the final Altmetric attention score. We compared the ranking of five top anaesthesia journals by journal impact factor with ranking by Altmetric.

Altmetric data were collected for articles published within 2016 in the *British Journal of Anaesthesia* (*BJA*) and the *European Journal of Anaesthesiology* (*EJA*) representing Europe, and *Anesthesiology, Anesthesia & Analgesia* (*A&A*), and *Canadian Journal of Anesthesia* (*CJA*) representing North America. Searches were conducted from October 2016 to July 2017. Publications with no Altmetric score, errata, infographics, and book reviews were not used in the analysis. Editorials, review articles, original articles, practice guidelines, and correspondence were included.

On November 2017, a search of the Web of Science™ database was conducted, and the citations of articles with an Altmetric score and published in 2016 were recorded.

Altmetric scores, research outputs across all sources (those tracked by Altmetric research across all sources), and citations were compared between the five anaesthesia journals. Correlations between cumulative Altmetric scores and citations of the articles with Altmetric scores were carried out (Table 1). The Altmetric scores of each individual journal were also correlated to the citations of its articles with an Altmetric score. Cumulative Altmetric scores, total citations of the articles with Altmetric scores, and attention scores of cumulative research outputs for all sources were compared using the Kruskal–Wallis test. Individual comparisons between the journals were carried out with the Wilcoxon test as indicated. The mean, standard deviations, median, minimum, and maximum for all variables are reported. Pearson's correlation coefficient (*r*) was used as a measure of the strength of the association between Altmetric scores and citations of the five journals, and also between Altmetric scores and citations of each individual journal. All analyses were carried out in SPSS 11.0v (Chicago, IL, USA).

Table 1. Number (%) of articles with Altmetric score over number of articles with and without Altmetric score, total Altmetric score, total citations, journal impact factor, Altmetric score and citations per article, and research counts (%) across all sources for articles of the five journals. Values are numbers and percentages of articles with an Altmetric score, mean, standard deviation, median, and (minimum – maximum). Altmetric score comparisons: † *vs* *, ‡, ¶, §: $P<0.001$ for all comparisons, and * *vs* ¶: $P<0.001$. Citations per article comparisons: † *vs* *, ‡, ¶, §: $P<0.001$ for all comparisons. Also: *, ‡ *vs* ¶: $P<0.001$ and § *vs* ¶: $P=0.01$. Altmetric attention scores for all research outputs: † *vs* *, ‡, ¶, §: $P<0.001$ for all comparisons, and § *vs* ¶: $P<0.001$

Journal	Number (%) of articles with Altmetric score over articles with and without Altmetric score	Total Altmetric score	Total citations	Impact factor	Altmetric score	Citations	Research counts (%) across all sources for the articles of the five journals
Anesthesia & Analgesia	452/550 (82)	3417	1095	4.014	7.6 (38.4)* 2 (1–403)	2.5 (3.0)* 2 (0–19)	47 (30.3)* 54 (1–99)
Anesthesiology	259/368 (70)	4577	1153	5.660	17.7 (29.4)† 9 (1–335)	4.5 (5.5)† 3 (0–36)	81 (19.6)† 88 (1–99)
British Journal of Anaesthesia	267/559 (48)	1741	800	6.238	6.5 (15.8)‡ 2 (1–173)	3.2 (4.5)‡ 2 (0–32)	49 (33.3)‡ 53 (1–99)
Canadian Journal of Anesthesiology	186/214 (87)	901	313	2.312	4.8 (6.3)¶ 2.5 (1–38)	1.7 (2.4)¶ 1 (0–20)	53 (30.8)¶ 57 (1–97)
European Journal of Anaesthesiology	133/179 (74)	391	315	3.570	3.0 (2.4)§ 2 (1–12)	2.4 (3.1)§ 2 (0–19)	43 (27.3)§ 52 (1–92)

Of the 2015 articles published in the five journals, 145 were excluded according to the study protocol. Of the remaining 1870 articles, 1297 had an Altmetric score and were analysed. *A&A* had the highest percentage of articles with an Altmetric score (82%) and the *BJA* the lowest (48%). *Anesthesiology* received the highest cumulative Altmetric score (4577), whilst the *BJA* had the highest journal impact factor (6.238) for the year 2016 (Table 1).

Altmetric scores per article differed between journals ($P<0.001$) with *Anesthesiology* having the highest Altmetric score compared with the other journals ($P<0.001$ for each individual comparison) (Table 1). The five journals also differed significantly regarding citation number per article with Altmetric score ($P<0.001$). *Anesthesiology* has the highest ($P<0.001$ *vs* the other journals) and *CJA* the lowest compared with the remaining three journals ($P=0.01$–$P<0.001$ for individual comparisons) (Table 1). The score of attention for the published items across all sources expressed as percentile differed between journals ($P<0.001$) with *Anesthesiology* receiving more attention ($P<0.001$ for all individual comparisons) (Table 1).

The cumulative Altmetric scores of the 1297 articles published in the five journals correlated with the total citations we tracked in the 1260 articles bearing an Altmetric score ($r=0.234$; $P<0.001$). Individual correlations showed a significant relationship between article citations and Altmetric score: *A&A* ($r=0.614$; $P<0.024$), *Anesthesiology* ($r=0.412$; $P<0.001$), *BJA* ($r=0.427$; $P<0.001$), *CJA* ($r=0.307$; $P<0.001$), and *EJA* ($r=0.486$; $P<0.001$).

Our results show that Altmetric scores and journal impact factor do not follow the same pattern. *BJA* with the highest impact factor for the year 2016 did not receive the highest Altmetric score, as only 48% of its articles published in 2016 were scored by Altmetric. Citations of its 52% remaining articles and ignored by Altmetric contributed to its impact factor as well. The impact factors of *A&A* with the highest percentage of articles bearing an Altmetric score and of *Anesthesiology* with the highest cumulative Altmetric score ranked behind the impact factor of *BJA*.

Citations of the five journals correlate to their cumulative Altmetric scores. The Altmetric scores of each individual journal are related to its citation numbers. This is consistent with Mendeley's patterns and the report by Thelwall and colleagues.[4] Nevertheless, Mendeley readership, a strong social medial metric relative to citations, is not included in the sources for calculating the Altmetric score.[3]

Altmetric favours the three journals representing North America, so geographical variation but not scholars' views influence Altmetric.[5] Another issue is the ‘sleeping beauty’, articles cited frequently long after their publication that do not receive attention early after publication.[6]

Although impact factor can be manipulated,[7] altmetrics are much more vulnerable to manipulation than traditional bibliometrics. Altmetric scores articles online before publication, and some journals try to promote their articles via social media. Altmetric neither relate nor associate with traditional bibliometrics, and may have a limited lasting impact.

Cautious evaluation of those metrics that affect and determine Altmetric scores must be re-examined and validated. Subsequently, a long follow-up is required to evaluate if a high Altmetric score continues to draw attention or expires soon. In contrast, an impact factor of 2 or 5 yr indicates whether a scientific journal stands the test of quality and of time. Altmetric scores lack a peer review process and indicate the social impact of a single article rather than the scholars' view and criticism. It is questionable and probably too early to be considered for ranking anaesthesia and perhaps other scientific journals of different fields.

Authors' contributions

Study design: A.F.

Data collection and analysis: A.V., V.C., A.K.

Writing of manuscript: A.F.

Revising of manuscript: all authors.

Acknowledgements

The authors thank A. Dimitriou for help in statistics.

Declaration of interest

The authors declare that they have no conflicts of interest.

Funding

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