

#OpenAccess: Free online, open-access crowdsourced-reviewed publishing is the future; traditional peer-reviewed journals are on the way out

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INTRODUCTION

Paul Atkinson (@eccucourse)

This series of editorials will provide *CJEM* readers with an opportunity to hear differing perspectives on topics pertinent to the practice of emergency medicine. The debaters have been allocated opposing arguments on topics on which there is some controversy or perhaps scientific equipoise.

We continue with the topic of open-access (OA) publishing. With the switch from paper-based publishing to online journals, in the age of free OA medical education (FOAM), and with most publications being fully or partially funded by public money, whether directly or indirectly through academic salaries, is it time to bring down the paywall and allow free OA to medical publications? Alternatively, is there still a role for the traditional paper-based or limited access online journal, with regular readers, traditional peer-review processes, supported by a combination of subscriptions, advertising, and pay-per-view access? Can we open-up access and still maintain high academic standards? John Adler, the Dorothy and TK Chan Professor, Emeritus at Stanford University, and Editor-in-Chief of *Cureus.com*, argues that the future of medical publishing should be open and free, with the team led by Teresa Chan, themselves an academic group highly engaged with FOAM, responding that there remains value in a more traditional approach.

Readers can follow the debate on Twitter and vote for either perspective, by going to @CJEMonline or by searching #CJEMdebate.

FOR

John Adler, MD (@JohnRADler)

Free, open-access publishing is the future

Are open-access (OA) journals the future of scientific publishing? Although this was once an important question, the entire premise underlying the present debate has been rendered moot following the European Union's (EU) recent decision to mandate OA publishing for all researchers funded by its scientific agencies by 2020.¹ This pronouncement builds upon similar recent decisions by some of the world's largest private foundations funding scientific research today. How much longer will it be before the National Institutes of Health (NIH) finally joins the club? Therefore, despite a veneration for traditional scientific journals that goes back more than two centuries, the stubbornly conservative world of academic medicine is slowly waking up to its inescapable publishing destiny. Given the inevitability of the pending OA revolution, I am not going to debate the future. Instead, I will turn my argument toward why the coming tsunami of OA is inherently good for all of science and society, as a whole.

It can be argued that traditional journals have served humanity well by chronicling huge advances in medicine

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over more than two centuries. Therefore, if true, maybe it is not broken? Moreover, if it is not broken, why fix it? Well, because publishing is broken in so many ways, beginning with fairness. Medical journals represent a commons of scientific knowledge: knowledge produced by the collective efforts of all humanity. Despite these communal origins, the vast majority of physicians, even in wealthy countries like the United States, lack access to traditional copyrighted journals. The situation is so bad that I, a professor at one of the richest universities in the world, needed once to pay to access my own article that was previously published in a major US medical journal, the *Journal of Clinical Oncology*. The biggest tragedy, however, is that vast numbers of physicians and virtually all patients worldwide lack access to almost all state-of-the-art medical knowledge. When poor Indian and African patients and their doctors lack access to human immunodeficiency (HIV) drugs, it is deemed a human rights matter; how can the same concern not be true with lifesaving medical information? Moreover, for much the same reason, does the public in wealthy countries who funds health care and science research not have a fundamental right to learn about state-of-the-art medical knowledge that is relevant to their wellbeing? If the answer to the above questions is yes, most reasonable people will agree that paywalls and copyrights must go, and as the only credible alternative, OA publishing is the future.²

The only real question before medicine and society right now is how can we have OA publishing without introducing new problems? In the current, dominant business model, the author is expected to cover all the costs of publishing their article that is a far cry from free publication in copyrighted journals. In this regard, some of the more notable OA publishers range from the relatively recent (started in 2000) and very successful independent upstart PLOS to Frontiers and BioMed Central, the latter two now controlled by enormous century-old European scientific publishing houses Nature and Reed Elsevier. Importantly, the standard cost of publishing in these journals runs more than \$2,000 per article that may not be a big deal when covered by grant funding, but with so much (if not most) clinical research unsponsored, who pray tell is going to pay? It seems big and, for physicians from developing countries, impossible, to ask to expect authors who have charitably expended so much effort writing an article for the edification of society to now also pay for the “privilege” of actual publication! Ultimately, it appears that forcing authors to bear the cost borne of OA publishing is the

biggest impediment to its widespread acceptance within medicine. Nevertheless, a key question to be asked is what are the real costs intrinsic to any form of scientific publication, and then by extension, OA publishing?

Nature claims the cost is \$40,000 to publish a single peer-reviewed article in its journal.³ This price may factor in a 90% rejection rate, but really, \$40,000? To do what? Every reviewer knows the money is not going to reviewers. Meanwhile, non-profit OA publishers (by definition, should not be making money) like *PLoS* and *eLife* charge authors several thousand dollars to publish; the implication here is that it costs them several thousand dollars to publish an article. Where is this money going? In contrast, it should be noted that arXiv (arXiv.org), which is free for users, electronically publishes more than 100,000 physics and mathematics *non-peer-reviewed* articles each year for an average cost of about \$10 a piece.

There is some cost incurred by every journal in “overseeing” the peer-review process, but should the price be thousands of dollars? I find such pricing ridiculous and suspect the blame lies with the small community of professional editors who control journal processes (ICJME, WAME, etc.) and use it as a guaranteed employment opportunity. Such editors, who themselves often have no experience generating or using medical knowledge, either refuse or are incapable of reimagining publishing in the modern era. Having created this self-reinforcing model for curating scientific knowledge, the denizens of the publishing industry are literally “laughing all the way to the bank” with some of the highest profit margins of any industry anywhere! As a practical matter, does the world of science need flawlessly formatted and edited articles, or might we all be better off with “good enough,” which has always been the defining mantra of arXiv?

Given the inevitable normalization of OA publishing, it is time to turn our attention toward doing it right and, perhaps in parallel, even reimagining a new era of medical knowledge creation. The consumer internet has of recent resulted in a low-cost wholesale transformation of human knowledge generation and curation. Maybe it is now time for medicine to follow suit. With this goal in mind, the *Cureus Journal of Medicine* was founded. At its core, *Cureus* aspires to blend the time-honoured principle of scientific peer review with tools from the modern internet. By both streamlining processes and automating technology for peer review and publishing, *Cureus* seeks to lower the costs drastically, often providing its services for free, with businesses such as Amazon, Facebook, Dropbox, etc., being consumer internet predicates. By breaking

down the biggest barrier to OA, cost, it should be possible to democratize the generation, curation, and dissemination of medical knowledge and, thereby, reach the 99.9% of the world who lack access today. The future is clear. It is long overdue that medicine embraces it!

AGAINST

Teresa M. Chan (@TChanMD), J. Bruce Blain, and Brent Thoma (@Brent_Thoma)

Free OA publishing is a laudable goal, but ensuring quality is still problematic

The closed, pre-publication peer-review publishing model has faced ample criticism. In 2014, Harnad predicted that crowdsourced peer review would prove to be a supplement, not a substitute, for the traditional peer-review model. Four years later, this prediction has proven accurate.⁴ Online publishing platforms such as arXiv and Cureus allow for some element of crowdsourced review, but these are exceptions to the rule. More commonly, novel online resources are beginning to mix both pre-publication peer review and post-publication commentary,⁵ and major emergency medicine journals still follow traditional paradigms.

Open publication and review are aspects of Open Science,⁶ a movement that aims to increase the transparency and accessibility of science. We are firm believers that it is important to make both the process and product of scientific inquiry readily available. However, while considering our debate question, the laudable goals of the OA movement must be considered along with their under-explored limitations.

Herein, we argue that traditional peer-reviewed journals are not about to be replaced by free, online, and open crowdsourced entities: first, nothing is truly “free”; second, crowdsourced review is not a panacea; and finally, the lack of access to data is a problem that has yet to be addressed by either traditional or novel OA reviewing platforms.

Nothing is truly free

Volunteerism plays a key role in both free online educational resources and traditional publishing. Whereas traditional journals function on a “pay-to-read” model and charge the end-user for access to the work, most OA journals shift the cost of publishing to authors.⁷ This has proven to be quite profitable,⁸ as reviewing and editing are often done on the backs of volunteers. Unfortunately,

OA models have rarely found a balance that addresses the price of admission for both readers and scientists.

One of the biggest threats to “free” OA propositions is that these initiatives are not truly free. High-quality open-review processes require support and oversight to be effective that ultimately requires funding. For example, arXiv requires more than \$1,000,000 of annual funding.⁹ Cureus receives support from advertisements and subscriptions for channels on the platform.^{10,11}

Several examples of “free” approaches to publishing have recently been compromised. Our first example is the Social Science Research Network (SSRN; <https://www.ssrn.com/e>), which is home to over 30 OA research networks in various academic fields including medicine. SSRN began as a fully OA network, but sustainability issues quickly became apparent. While authors can still post for free to SSRN and it only charges a modest article download fee, in 2016, it aligned with the “legacy publisher,” Elsevier.¹² SSRN also sells subscriptions to universities and partners with over 1,800 academic “Partners in Publishing,” which provide funding.¹³

The FOAM (under the Twitter hashtag #FOAMed) movement^{14,15} publishes open, post-publication reviews of the latest research on online platforms such as blogs and podcasts. While some of these resources remain self-funded, they are increasingly seeking sustainability by generating income. For instance, at least one #FOAMed site has launched a paid-for experience (whether digital or live) as a way to establishing some sustainable funding ventures.^{16,17}

Crowdsourced peer review is not effective in its current form

The evidence for crowdsourcing experiments shows that it is possible for a group to come up with more precise answers, with enough engaged reviewers. However, it is unclear how many reviewers are needed, how they will be recruited, or how their expertise can be assured. It is tempting to presume that qualified raters will self identify and perform reviews without prompting; however, this is unlikely to occur. The PubMed Commons experiment in which PubMed authors could comment on their peer’s work was so underutilized that the project was abandoned,¹⁸ suggesting that simply creating a platform will not result in its use.

As open peer review would allow virtually anyone to review and provide commentary on a new scientific piece, it could be subject to gaming. If traditional journals with editorial oversight can be subject to peer-review fraud,¹⁹ open peer review would be even more at risk, as

reviewers would not require invites by editors. Unscrupulous researchers could easily generate fraudulent reviews.

Even if these problems with crowdsourced peer review are addressed, it would be difficult to synthesize the contradictory comments of numerous reviews, some of which are likely to be poor quality.²⁰ Reconciling comments may also be complicated by differences in medical cultures and practices across countries. Authors will inevitably be asked to respond to multiple conflicting reviews, without the expertise of experienced editors.

The real problem: a lack of open data and transparency

Neither traditional publishing nor novel open, crowdsourced publications address another fundamental problem: the lack of access to research data. We believe there should be open publication of data alongside research, such as through Google's new open data search engine.²¹ Until reviewers have access to data, all review processes are fundamentally flawed. Open sharing of data would allow reviewers in both traditional and novel processes to replicate or confirm study findings. Beyond detecting unintentional statistical errors, open data would help to expose academic fraud associated with "publish or perish" cultures.²²

CONCLUSION

The benefits of open-review and OA publication have created challenges that have not been addressed sufficiently to abandon the current model. Of course, we acknowledge that there is a false dichotomy created by contrasting these two processes. The answer lies in the space between: we must harness both approaches to ensure academic rigour. Further, open publication of data by authors in both paradigms would help to increase the public's trust in research.

Keywords: Open access, publishing, peer review

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