Peer Review and Medical Journals: How to Make a Good Thing Better?

Peer review is almost as old as scientific journals themselves; Stephen Lock reminds us that the Royal Society's *Philosophical Transactions* incorporated external evaluation of manuscripts submitted for publication soon after it began in 1665. Since that time, peer review has become such an established part of scientific publishing in general, and medical journal publishing in particular, that today all the world's major medical journals make use of external experts (peers) to judge the quality of at least some of the articles they publish.

Editors claim that the process of peer review is a key component in helping to ensure as much as possible that they publish high-quality medical science. This claim is supported by evidence: colleagues and we have shown that experts found manuscripts accepted for publication after peer review and editing were superior in quality to the manuscripts originally submitted by the authors. Many academic institutions signal the importance they attach to peer review by requiring faculty who are being evaluated for appointment, promotion, and/or tenure to indicate on their bibliographies which of their publications are in peer-reviewed journals.

Despite the general acclaim of peer review, there are critics. Lock quotes Huxley, who complained in the 1700s that the peer-review process was based more on politics than rigorous scientific evaluation. More recently, Sharp outlined the potential sources of bias in the evaluation of submitted manuscripts. It has been shown that peer review cannot reliably detect fraud. In the United States, the news media have accused the peer-review process of delaying publication of life-saving research.

We suggest that the contribution of peer review to medical journals has four steps which should be repeated in an ongoing cycle. First, there should be a clear idea of what peer review is to accomplish. Second, editors should develop monitoring systems to determine how well the peer-review process meets these objectives. Third, editors, authors and reviewers should work to develop and implement methods to improve the process. Finally, editors should assess whether the interventions have had good effects.

If the overall goal of peer review in medical journals is to improve the quality of published articles, what is meant by 'quality'? For manuscripts of original research, the dimensions of quality are the importance and originality of the question addressed by the study, the strength of the research methods, the presentation of the work, and the appropriateness of the article for the particular medical journal. How can peer review improve these dimensions of quality? Editors depend on reviewers to help select the better articles among those submitted, and improve the ones selected.

A knowledgeable reviewer should be able to help the editor choose among submitted articles by advising on the originality and importance of the research question. An expert in clinical research methods can also aid in determining the strengths and weaknesses of the study, especially how much the weaknesses...
undermine the credibility of the results. On the other hand, reviewers are least helpful in commenting about how well a manuscript is written, they usually point out the obvious but little more. Also, their judgement of appropriateness for a particular journal usually reflects what they have seen in the past in the journal and may not reflect what the editor envisions for the future. Finally, peer reviewers' advice about accepting manuscripts cannot take into account the queue of accepted articles and competing manuscripts.

Good reviewers help authors as well as editors. It is not enough to point out what is wrong with a manuscript; good reviewers suggest ways to improve it. We have had many authors tell us that even though we turned down their manuscript for publication, comments of the reviewers (and, sometimes even the editors) helped get a revised version published elsewhere. This collegial help is one of the most important functions of peer review, something that can improve medical science a great deal.

To get high-quality reviews, one can either choose good reviewers or help reviewers become good. Stossel found that for the *Journal of Clinical Investigation* how to chose good reviewers was not intuitively obvious. Those judged by the editor to have more often submitted good reviews were not the 'high-prestige' members of the profession, full professors and/or leaders in their fields, but rather 'low-prestige' members, the young instructors and assistant professors.7

At the *Journal of General Internal Medicine*, colleagues and we took Stossel's study further, finding that if a reviewer was under 40 years of age, came from a top academic institution, had advanced research training, was known to the editorial staff, and was blinded to the identity of the manuscript's authors, there was a very high (87%) chance that the review would be graded by the editor as good, whereas a review from someone without any of the above characteristics had a very low chance (7%) of being good.8 We found younger reviewers do better than older ones partly because they spend more time (and probably more effort) at it. Even so, after taking time into account, younger reviewers were still better. In the United States they are likely to have had more training in modern clinical research methods, and those with formal training were better. The quality of the reviewer's institution and editor's knowledge of the reviewer may be proxies for quality of the individual—editors tend to recall outstanding reviewers (both good and bad).

Almost all peer reviewers for medical journals have research backgrounds, but the readers for most are predominantly clinicians. Recently, we looked at whether *Annals of Internal Medicine* readers (most of whom are practising internists) judged articles in the same way as peer reviewers and experts in clinical research methods. Readers more often judged articles as less relevant to their daily practice, while peer reviewers gave high marks for the importance of the articles.9 Some journals, such as the *British Medical Journal*, routinely seek opinions of non-researchers, as well as researchers, about manuscripts under consideration.

How can medical journals help reviewers to do a better job? Many beginners point out that they were not explicitly taught to do this activity during their training; some have asked editors for help. There is evidence that simply withholding authors' names and institutional affiliations helps reviewers do better.10 Authors sometimes think that the fate of their manuscripts lies in the hands of reviewers who may have preconceived notions, either about the particular work or about the authors themselves. We found this to be true, although perhaps not in the direction authors might assume. In our study of blinding,10 we found that for manuscripts submitted by authors from high-prestige institutions, reviewers who were not blinded to author identity gave poor critiques by not being appropriately tough on the manuscripts' weaknesses. Also, they tended to recommend acceptance of the papers more often than blinded reviewers.
Blinding the reviewer to the author’s identity did not improve the quality of the review from the authors’ perspective. However, authors judged reviewers who opted to sign their comments for the author as fairer than those who did not. (Editors judged signed reviews as more constructive and more courteous.) Written guidelines for reviewers are available to check that they have not omitted important aspects of the review. Whether these guidelines actually help produce better reviews has not yet been tested, but should be.

Peer reviewing is usually a charitable and anonymous act. Although some journals pay reviewers, the sum is nominal for the amount of time. (At the Journal of General Internal Medicine, reviewers reported they spent an average of three hours per manuscript.) Ordinarily, only the editor knows when a reviewer has done an outstanding job. This should change, and persons producing high-quality reviews should receive academic credit just as they do when producing high-quality publications. To promote this, at Annals of Internal Medicine we graded all reviews we received; at the end of the year, we sent a special letter of thanks to top reviewers, suggesting that they share a copy of the letter with their superiors. Many wrote letters of appreciation, and acknowledging outstanding reviewers may be worthwhile if only for the courtesy of acknowledging work well done. But paying for good reviews, either financially or with academic recognition, are interventions that could be put to the test to determine if they help produce better reviews.

If we keep searching—and testing—we should be able to improve the ancient and honourable practice of peer review, thereby helping both medical science and medical practice.

REFERENCES
4 Sharp DW. What can and should be done to reduce publication bias? The perspective of an editor. JAMA 1990;263:1390-1.