European Journal of Anaesthesiology 1997, **14**, 118–121

EDITORIAL

What do referees actually do?

The readers of scientific articles do not give much thought to the process a manuscript goes through from when it is written and submitted for publication until it appears in a medical journal on their desk. They hold the author responsible for the article, and if someone else is to be blamed or given credit, they perhaps think of the journal's editor, but seldom of the editorial advisers involved.

However, authors have learned that these advisers, often called referees, are crucial in the field of scientific publication. They perceive referees as nameless and faceless individuals with a predilection for details and with no grasp of the originality or magnificence of the submitted paper. Every now and then they suspect that the colleague next door is responsible for the ill-natured comments enclosed with the letter of rejection they have just received, but normally they like to believe that some clever guy from abroad is to blame. At best, they are willing to accept some of the referees' minor objections to their choice of statistical methodology – on reflection and after some months. But seldom or never are they able to forgive the referees for their lack of understanding of the importance of the work in question.

Thus, being a referee, unknown to readers and feared by authors, is hardly a way of making new friends.

But who are these referees who hide anonymously behind the editor? And what do they actually do?

The history of peer review

The assessment of submitted papers by external experts, frequently called refereeing or peer review, was a feature of the first scientific journals in the 17th century [1]. For the next 300 years this system was used intermittently. Since the Second World War, peer review has been introduced by most medical journals as a replacement for or supplement to the personal judgments made by the editor alone.

Editorial peer reviewing appeared independently of grant peer reviewing, and has been taken up by different journals in an unsystematic way. Peer review has been introduced mainly for pragmatic reasons. Editors need assistance when they have to choose among an increasing number of submitted manuscripts. It is impossible for an editor to judge quality in all the specialized fields which a medical journal may cover. Thus, editorial peer review did not evolve primarily to secure the quality of science or to detect scientific misconduct and fraud, but to solve practical problems within an editorial office [2].

This development explains the still existent diversity in the peer review practice of different scientific journals. Today, three out of four western scientific journals use external referees to assess original articles prior to publication, but the way they organize this peer review system varies [3]. According to the International Committee of Medical Journal Editors (the Vancouver Group) a peer reviewed journal is defined as 'one that has submitted most of its published articles for review by experts who are not part of the editorial staff' [4]. Statements on peer review policies are found in only half of the journals listed in *Index Medicus* and a survey conducted among editors of journals in dermatology, neurology, orthopaedics and otolaryngology showed that in general two out of three articles were peer reviewed [5]. The larger, well-known, clinical journals with a broad orientation make less use of external peer review and rely more on the editorial staff than do the smaller, specialized journals [6].

Who are the referees?

Even the semantics of peer review can be confusing. Peer review, the review by a peer, or according to Webster's Dictionary [7], 'an equal, of the same rank, value, quality, ability etc.' has been regarded as American jargon. But the former editor of the *British Medical Journal* (*BMJ*), Stephen Lock, in his comprehensive book on editorial peer review [3], uses 'peer review'

https://doi.org/10.1046/j.1365-2346.1997.d01-621.x Published online by Cambridge University Press

for the process and 'referee, assessor, reviewer, consultant, or adviser' for the person who carries it out.

Normally, a referee is an acknowledged expert in the relevant field, who is asked by the editor of the journal to give professional comments on a manuscript. Referees are recruited among specialists known to the editor, often because of the referee's own research and publications. This sometimes raises the possibility of conflicts of interests and other ethical problems [8]. Assessors of a particular paper are chosen on the basis of their scientific profile and their earlier reviews for the journal (quality of the report, punctuality) and their capacity and willingness to read and comment on a manuscript. Most editorial offices now have their own computerized files of potential referees, showing how many papers each of them has reviewed and sometimes even including a formalized scoring system for assessing the quality of the reviews. In the case of medical journals, it seems as if an average of two referees are used for each article [3]. While some journals, as a routine, ask each referee (by phone, fax or e-mail) whether they are willing to read and comment on a specific paper, others just mail or fax the manuscript with an accompanying letter and wait for a response. Two to 3 weeks is normally allowed for the referee to make his or her comments.

There is no formal education for referees. The norm seems to be learning by doing, without much guidance.

Almost all journals use anonymous review, i.e. the authors are not told the names of the referees, but fewer than 20% use blinded reviews, where the referees are not told the names of the authors [9]. Even though blinding has been shown to improve the quality of the reviews [10], there is no tendency towards more blinding of manuscripts sent out for review. Blinding is difficult and time-consuming and many referees, especially in small countries or within small specialities, can recognize the authors despite attempts to hide their identity.

The workload of referees has been studied in the UK [11], the United States [12], and the Nordic countries [13]. The referees review for a mean ranging from 3.6 to 5 journals each, and spend on average 1.4 to 2.4 hours on each manuscript.

Most referees do their work without payment or compensation, as a part of their general academic duties, thus underlining the integrated role publishing plays in the medical community. Referees are also authors themselves, and sometimes even editors of other journals. This ensures that they understand the different stages of the publication process, and the roles of the different players.

Referees are advisers

Modern peer review aims at quality control, and referees are expected to advise editors and authors alike on whether or not a manuscript is suitable for publication. Peer reviewing is a matter of confidence. Referees may not disclose any part of the contents of a paper sent to them, nor make use of it in their own scientific work. The judgement should be made on as objective grounds as possible, and the referee should be aware of any possible conflicts of interest related to the paper or the authors. Scientific misconduct is, unfortunately, the most topical ethical issue in medical publication today, and high quality peer reviewing may be helpful both in preventing and revealing this problem.

The referee is an adviser to the editor, not a decision-maker. The final decision to publish or not is made by the editor, or editors, perhaps through consensus at an editorial meeting. This decision is based not only on the referees' assessment of the quality and originality of the manuscript, but also on other criteria, such as the supply of and demand for manuscripts, and the relevance of the paper for the actual readers concerned. The editor will normally tell the authors the reason for a paper being rejected, and the referee will likewise be informed of the fate of the paper, including any reason for his or her advice not being followed [3].

Referees normally make a recommendation to accept, revise, or reject a manuscript. Most journals use some sort of refereeing form with space for separate free-text comments for authors and editor. A Nordic study revealed that 86% of 156 referees preferred structured forms to unguided assessment of manuscripts. Refereeing forms were appreciated most by the least experienced referees [14]. The main advantage of forms is the checklist function. It ensures that the referee assesses all the different aspects of the article's content and presentation. In the above-mentioned study, where the same two manuscripts were sent to several referees, experienced and young

https://doi.org/10.1046/j.1365-2346.1997.d01-621.x Published online by Cambridge University Press

referees made a stricter assessment of the manuscripts than their less experienced and older colleagues [13].

Every now and then authors will have major objections to the referee's comments related, for example, to fundamental misunderstandings, misinterpretations of methodology or results. Most journals will accept a process of negotiation based on a factual, unemotional letter from the author. Sometimes the editor will appoint another referee to assess the paper in question.

The science of peer review

In spite of the important role peer review plays in science, we do not know enough about the review process [15].

Peer review is expensive and time-consuming, and delays publication. Authors often complain that referees are biased against them and their manuscripts. The peer review system has even been accused of suppressing innovation in medicine. And the main question remains unanswered: does peer review really secure or raise the quality of medical research?

Recognizing these questions, 10 years ago the *Journal of the American Medical Association* (*JAMA*) invited the results of research into editorial peer review to be presented and discussed at the First Congress on Peer Review in Biomedical Publication in Chicago in 1989. This initiated the science of the study of peer review, and in 1993 the Second Congress on Peer Review was arranged, again in Chicago under the auspices of the American Medical Association. Among the studies presented in the field of anaesthesiology was an evaluation of the authors' satisfaction with the peer review process used by the *Journal of Clinical Anesthesia*. Not surprisingly, the authors of accepted manuscripts reported a higher degree of satisfaction than did the authors of rejected manuscripts [16].

More research is needed, both on the way editors manage manuscripts and on the cognitive part of the process, that is to say how manuscripts are assessed [17]. Therefore *JAMA* and *BMJ* have again sent out invitations to The International Congress on Biomedical Peer Review and Global Communication to be held in September 1997, this time in Prague, in the Czech Republic [18]. To promote research into peer review in Europe, the editors of the *BMJ* and the *Lancet* have formed a research network with many other editors [19].

And while readers, authors, referees and editors alike are all waiting for more light to be shed on the review process, we should all do our best in the meantime to ensure that peer review is as accurate, fair and quick as possible. In spite of all the deficiencies in today's system, no serious alternative for quality assessment and control of scientific publications has been suggested so far.

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https://doi.org/10.1046/j.1365-2346.1997.d01-621.x Published online by Cambridge University Press

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